

APPROACH TO PEDIATRIC DYSPNEA

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General Presentation

Shortness of breath (dyspnea) is the subjective sensation of difficult, laboured, uncomfortable breathing. It may occur through increased respiratory muscle work, stimulation of neuroreceptors throughout the respiratory tract, or stimulation of peripheral and central chemoreceptors.

Questions to Ask (Follow the steps)

- Step 1:** ABC (Assessment of the Airway, Breathing and Circulation i.e is the patient stable?)
- Step 2:** Think broadly about the differential diagnosis. Is the cause respiratory, cardiovascular or psychiatric (diagnosis of exclusion)? Does the patient have a fever that indicates a possible infectious etiology?
- Step 3:** Now, gather basic information from the history.
- How old is the patient (newborn vs toddler vs adolescent)?
 - How long has the shortness of breath been present?
 - Sudden or insidious onset?
 - Preceding events?
 - Is this the first time?
 - Associated symptoms?
 - Underlying cardiovascular, respiratory or psychiatric problems?
 - Ask whatever else seems relevant given the context, and you should have a good feeling about which of the three broad categories to pursue. Now remind yourself of the differential for that category and use it to narrow down the diagnostic possibilities. Remember, though, to keep an open mind.
- Step 4:** Physical examination
- Step 5:** Laboratory Investigations/Imaging
- Step 6:** Differential Diagnosis, Provisional Diagnosis, & Management

Important clinical clues

- **Hypoxia:** Is it present? This sign is the most worrisome endpoint of SOB. O₂ sats are helpful, but remember that they represent the ratio of oxygenated hemoglobin to total hemoglobin; O₂ sats can still be normal in the face of anemia or CO poisoning.
- **Cyanosis:** Is it present and central? Cyanosis means that carboxyhemoglobin is at least 5g/100mL of blood, or that O₂ sats have dropped below 85%. Therefore, polycythemic patients can appear cyanotic when an anemic patient would be acyanotic, simply due to the content of carboxyhemoglobin. The patient either has severe

respiratory disease or cyanotic congenital heart disease.

- **Peripheral cyanosis:** if present without central cyanosis, is a sign of decreased peripheral perfusion (due to peripheral vasoconstriction) or impaired gas diffusion.

Differential Diagnosis

Respiratory system dyspnea

- Insult to respiratory controller (brainstem)
 - Sensation of “air hunger” or “urge to breathe”
 - Clinically → change in rate/depth/rhythm
 - think of metabolic/toxic changes
 - eg drugs: DKA
- Insult to ventilatory pump/passages (muscles/chest wall/airways)
 - Sensation of “chest tightness”
 - Clinically → signs of increased WOB
 - think of airway obstruction/ neuromuscular problems
 - eg. Laryngomalacia/ tracheomalacia/ foreign body/ epiglottitis/ pneumonia/ asthma/ bronchiolitis
- Insult to gas exchange (alveolar-capillary boundary)
 - Sensation of “air hunger” or “urge to breathe”
 - Clinically → hypoxemia
 - think of alveolar infiltration or destruction
 - eg. Pneumonia, pulmonary edema, TTN, MAS, BPD, pulmonary hypoplasia

Cardiovascular system dyspnea

- Myocardial dysfunction (pump failure)
 - inadequate delivery to lungs (hypoxemia)
 - R heart failure (cyanotic CHD)
 - inadequate delivery to body (pulmonary edema)
 - L heart failure (acyanotic CHD)
- Anemia
- Deconditioning (poor cardiovascular fitness)

Investigations

Physical exam

While taking the history from the family, you can also begin the inspection phase of your physical examination. Look at the vital signs and perform your usual complete physical exam, but the following highlights may help you distinguish between respiratory and cardiovascular causes of SOB.

- Respiratory
 - What position is the patient in? (sitting forward, etc)
 - Does the patient have stridor? Acute or chronic? Tracheal tug?
 - Consider the Ddx for extrathoracic obstruction, think anatomy.
 - ✓ Hoarsness (larynx)?
 - ✓ Cough (trachea)?
 - ✓ Does the patient have fever?
 - Does the patient have signs of increased WOB (inter/subcostal retractions)?
 - Consider intrathoracic respiratory causes.
 - ✓ Does the patient have a wheeze? fever?
 - ✓ Does the wheeze respond to bronchodilators?

- Cardiac
- Does the child develop SOB during feeds or activity? Have poor weight gain?
- Does the anterior left hemithorax look more prominent?
Consider congestive heart failure.
- Does the patient have periorbital edema? Hepatomegaly?
Consider R-sided congestive heart failure.
- Does the patient have tachypnea, increased work of breathing or a history of recurrent pulmonary infections?
Consider L-sided congestive heart failure.
- Does the patient squat when fatigued? Have central cyanosis or hypoxic spells?

Labs

Order selectively based upon your history and physical examination. You may consider:

- CBC with differential
- electrolytes, BUN, Cr
- cultures (blood, urine, sputum)
- swabs (throat, NPW)
- ABG
- CXR
- EKG

References

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