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Approach to the Dyspneic Adult Patient

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Case 1

24 year old female with a history of asthma presents with shortness of breath for 2 hours and wheezing

Afebrile, BP 112/62, P 122, RR 28, O2 saturation 92% on room air

Alert, tachypnea, good air movement with bilateral expiratory wheezing

Case 2

75 year old diabetic male with shortness of breath for 4 days. Has history of COPD and CHF. No fever or chest pain. Worse lying down or with exertion. Improved sitting up. Dry cough.

T38, BP 158/92, P 92, RR 18, O2 saturation on room air 89%

Alert, no distress, irregular pulse, good air movement with crackles at the left base

Case 3

32 year old female with no past medical history reports gradual onset of mild shortness of breath for 2 days. No fever, cough, chest pain.

Afebrile, BP 118/58, P 84, RR 26, O2 saturation on room air 100%

Alert, no respiratory distress, normal lung and heart sounds

Functions of the Cardiorespiratory System

- Bring O_2 into the body
- Remove CO_2 from the body
- Deliver O_2 to the tissues
- Maintain the pH of the body

Shortness of breath will be felt if you interrupt any of these functions

Main Causes of Dyspnea

1. **Respiratory**
2. **Cardiac**
3. **Blood**
4. **Metabolic Acidosis**

RESPIRATORY PROBLEMS

- Upper Airway
- Lower Airway
- Lung Tissue
- Lung Vasculature
- Restriction of Lung Expansion

Upper Airway Problems

- Foreign Body
- Tumors
- Swelling
  - Inhalation Injury
  - Anaphylaxis
  - Angioedema
- Infections of the pharynx and neck
  - Epiglottitis
  - Peritonsillar abscess
  - Retropharyngeal abscess
  - Deep space neck infections

Lower Airway Problems

- Foreign Body (including mucous, vomitus, and blood)
- Tumors
- Asthma
- COPD

Lung Tissue Problems

- Infections
  - Pneumonia
  - Tuberculosis
  - Abscess
- COPD
- Cardiogenic Pulmonary Edema
- Non-Cardiogenic Pulmonary Edema (ARDS)

Lung Vasculature Problems

- Pulmonary Hypertension
- Pulmonary Embolism
- Acute Chest Syndrome in Sickle Cell Disease

Problems Restricting Lung Expansion

- Pneumothorax and Pneumomediastinum
- Pleural effusions
- Severe scoliosis
- Abdominal distention
- Abdominal pain
- Neuromuscular Problems
  - Severe Hypokalemia
  - Guillain-Barre
  - Myasthenia gravis
  - ALS

CARDIAC PROBLEMS

- Rhythm
- Vasculature
- Pump
- Extrinsic to the Heart

Cardiac Rhythm Problem

- Atrial Fibrillation
- Second Degree Block – Type II
- Third Degree Block
- Bradycardia
- Supraventricular Tachycardia
- Ventricular Tachycardia

Cardiac Vascular Problems

- Acute Coronary Syndrome

Cardiac Pump Problem

- Low Output Heart Failure
  - Cardiomyopathy
  - Valve Problem
  - Myocarditis
- High Output Heart Failure
  - Hyperthyroidism
  - Beriberi
  - AV Fistula

Problems Extrinsic to the Heart

- Cardiac Effusion
- Cardiac Tamponade
- Restrictive Cardiomyopathy

BLOOD PROBLEMS

- Acute Severe Anemia
- Hemoglobin Toxins
  - Carbon Monoxide
  - Methemoglobinemia

METABOLIC ACIDOSIS

- Ketoacidosis
- Lactic acidosis
- Salicylates

MEDICAL HISTORY

- Use a systematic approach to address possible respiratory problems, cardiac problems, blood problems, and consider whether there is any concern about metabolic acidosis.
- Start with the airway and work through all the systems needed for O2 delivery

MEDICAL HISTORY

- Ask about sudden or gradual onset
- Ask what makes it worse and what makes it better
- Ask about fever
- Ask about chest pain
- Ask about cough

PHYSICAL EXAM

- Again, use a systematic approach.
  - How do they look? Do they need immediate interventions before the H&P
  - Start with the lips and oropharynx (swelling, masses)
  - Examine neck (JVD, swelling or masses, stridor)
  - Examine lungs (work of breathing, air movement, breath sounds, symmetry, cough)
  - Examine the heart and peripheral pulses
  - Examine blood related problems (pale conjunctiva, any source of bleeding, consider stool hemacult)

INITIAL STABILIZATION AND MONITORING

This may be the first thing to address prior to the H&P

- Minimal
  - O2 by nasal cannula
  - Sit the patient up
  - Start IV
  - Put the patient on a monitor
- Maximal
  - 100% nonrebreather mask
  - BIPAP
  - Intubate the patient

ASSESSMENT

- Chest X-ray
- ECG

Also consider:

- White Blood Count
- Hemoglobin/Hematocrit
- Renal Function
- Liver Function
- Cardiac Enzymes
- Arterial Blood Gas
- BNP
- D-dimer

ULTRASOUND EXAM OF THE SEVERELY DYSPNEIC PATIENT

There are many different protocols out there:

- **BLUE Protocol** (Chest 2008) by Lichtenstein and Meziere
- **ETUDES Protocol** (Academic EM 2009) by Liteplo and Marill
- **RADiUS Protocol** (Ultrasound Clinics 2011) by Manson and Hafez

ULTRASOUND EXAM OF THE SEVERELY DYSPNEIC PATIENT

Common features of most dyspnea US protocols:

1. **Cardiac**: pericardial effusion, look at contractility
2. **Pulmonary**: pneumothorax, pleural effusion, consolidation, COPD vs CHF
3. **Inferior Vena Cava**: look for IVC distention and collapsibility

Some protocols look for DVT in both legs

Case 1

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Case 1

She was given nebulizer treatments and steroids with only mild improvement. The next day a medical student interviewing the patient learned that she had a family history of pulmonary emboli. A chest CT showed multiple pulmonary emboli. Further testing revealed that she had Protein C deficiency.

Diagnoses: Pulmonary Emboli
Hypercoagulable State secondary to
Protein C deficiency

Case 2

75 year old diabetic male with shortness of breath for 4 days. Has history of COPD and CHF. No fever or chest pain. Worse lying down or with exertion. Improved sitting up. Dry cough.

T 38, BP 158/92, P 92, RR 18, O2 saturation on room air 89%

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Case 2

- WBC 12,000
- CXR shows LLL infiltrate
- ECG shows new onset atrial fibrillation
- Troponin was elevated

Diagnoses: Pneumonia
New Onset Atrial Fibrillation
Non-ST elevation Myocardial Infarction

Case 3

32 year old female with no past medical history reports gradual onset of mild shortness of breath for 2 days. No fever, cough, chest pain.

Afebrile, BP 118/58, P 84, RR 26, O2 saturation on room air 100%

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Case 3

The patient had a normal CXR and ECG. Her anion gap was 18. ABG revealed a pH of 7.28, pCO_2 26, pO_2 110 on room air. Blood glucose was normal. Urine and serum acetone was positive. After further questioning, patient reveals that she is trying to loose weight and has only had water for the past 48 hours. Patient eats in the ED and receives IVF. Four hours later her tachypnea, shortness of breath, and acidosis have resolved. She is discharged to home.

Diagnosis: Ketoacidosis secondary to starvation

Key Points

- Use a systematic approach when evaluating the dyspneic patient or you will miss something
- The systematic approach in the pediatric patient is the same. The differential diagnoses are slightly different and respiratory problems predominate.
- Consider more than one diagnosis, especially in older patients
- Consider that prior diagnoses may be wrong
- Be aggressive in early airway management. It is easier to deal with airway issues earlier, rather than wait for things to worsen and doing crash airway management during a code.