



# Shortness of Breath

- Author: Nathan J. Lewis, MD, Clerkship Director, Virginia Commonwealth, University School of Medicine, Richmond, VA
- Editor: Rahul Patwari, Rush University
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## Introduction

*An ambulance arrives to your emergency department with a 60 year-old woman who reports she can't breathe. Her vital signs en route were: BP 190/100, HR 118, RR 34, SpO2 87% on RA. As they move her off of the stretcher, you notice that she's breathing fast, she isn't talking, and her shoulders and abdomen move with each breath*

## Objectives

- Describe the initial approach to a patient in respiratory distress
- Discuss initial management options for a patient in respiratory distress

- List the immediate life-threatening causes of shortness of breath

## Initial Actions and Primary Survey

### General Impression

Patients with a chief complaint of shortness of breath can vary in their degree of distress at initial presentation. Like many other complaints in the ED, the assessment begins with, “When I walk in the room, what do I see?” Gaining that initial general impression within the first few seconds/minutes is critical—you may find you need to intervene to stabilize your patient before you have enough information to make a final diagnosis.

*Our general impression of this patient is that she is not breathing normally and is in severe distress. We should prepare ourselves for immediate intervention.*

### First Steps

Having additional help from nurses, medics, or other ED staff is tremendously useful. While you are assessing your patient’s ABCs, you should request the following to occur simultaneously:

- Full set of vital signs including BP, HR, RR, SpO<sub>2</sub> and temperature
- Oxygen application via nasal cannula, non-rebreather mask, or bag-valve mask if patient requires assisted ventilations (not breathing adequately on their own)
- IV access
- Cardiac and pulse oximetry monitoring
- In some cases, obtaining an EKG may be useful as well

If your patient fails to respond to oxygen administration and is not breathing adequately, you may need to consider more aggressive treatment with non-invasive positive pressure ventilation (NIPPV) or intubation.

*The patient's first set of vital signs in the ED is consistent with those reported by EMS. She is placed on a non-rebreather mask at 15 LPM without significant improvement in her level of distress or her oxygen saturation. IV access is obtained, and patient is placed on the monitor. EKG shows sinus tachycardia. Her mental status is normal, however, and she is able to protect her airway. Respiratory therapy is paged to respond with a BiPAP machine.*

### Indications for Non-invasive Ventilation

Consider NIPPV in patients with	When NOT to use NIPPV
Moderate to severe dyspnea Accessory muscle use Paradoxical abdominal movement Fatigue RR > 25 bpm pH < 7.35, pCO <sub>2</sub> >45	Respiratory arrest/absent respiratory drive Hemodynamic instability Aspiration Risk Airway obstruction Unable to tolerate mask Mask does not fit Altered mental status

## History and Physical Exam

In developing a working diagnosis, the history can often provide clues to the etiology of your patient's symptoms. If the patient is unable to answer questions because of their respiratory distress, ask the paramedics if they have any useful information. They may have insight into the patient's past medical history, medications, or pertinent events leading up to the patient's symptoms. Additionally, family members, if present, may also provide useful information.

Some key elements of the history:

- Did the shortness of breath begin suddenly? If so, consider pulmonary embolism or spontaneous pneumothorax. A gradual onset of symptoms is more suggestive for COPD, pneumonia, or congestive heart failure.

- Is the shortness of breath chronic or recurrent? Many chronic disease processes can acutely worsen from time to time. Your patient may even be able to tell you that his or her symptoms are similar to the last episode of asthma/COPD/CHF/pneumonia/etc.
- Is the shortness of breath positional or exertional? Orthopnea is typically thought of as a symptom of CHF but can also occur in COPD, neuromuscular disorders, pleural/pericardial effusions, or ascites. Exertional dyspnea can also have multiple causes including primary pulmonary disease, cardiac ischemia, or anemia.
- Were there any precipitating events? Shortness of breath occurring after an environmental or known allergen exposure can be a clue in diagnosing an allergic reaction. Similarly, recent hospitalization or prolonged travel may raise your suspicion for a PE.
- Does your patient have any pertinent past medical history? As stated above, a history of asthma, COPD, or CHF, for example, can suggest a cause for your patient's symptoms. Suspicion for developing angioedema may be higher if your patient has a history of hypertension treated with an ACE inhibitor.

The physical exam can also be incredibly helpful in determining a cause for your patient's symptoms. Learning to recognize patterns that support your history can make your evaluation more efficient.

- Visible swelling in the upper airway can point to an allergic reaction or angioedema. Voice changes, stridor, and drooling are ominous signs concerning for impending airway obstruction and can be related to an infection, allergic reaction, or foreign body.
- Focally absent or diminished breath sounds on auscultation can suggest an infectious consolidation, effusion, or pneumothorax.
- Wheezing can be attributed to bronchospasm-inducing processes, such as asthma, COPD, and anaphylaxis.
- Rales can be found in pneumonia, PE, and pleural effusions. Rales in the setting of JVD and peripheral edema can be suspicious for CHF.
- Unilateral leg swelling and tenderness raises suspicion for a DVT/PE.
- Signs of chest trauma, including crepitus, bruising, and tenderness can be suggestive of pneumothorax, hemothorax, or pulmonary contusion.
- "Tripoding," or use of accessory muscles may be less helpful in determining the etiology, but can signal impending respiratory failure and need for immediate intervention.

*EMS reports that our patient has been out of her medications for several weeks, which include multiple antihypertensives and a diuretic. On physical examination, she has bilateral rales to the level of her shoulder blades, pitting edema in both legs, and JVD. She is placed on BiPAP, given nitroglycerin, and her symptoms and vital signs begin to improve.*

## Additional Tests

After the initial assessment and stabilization of your patient, additional tests can be used to confirm a diagnosis or exclude other potential life-threatening diagnoses.

- An EKG can be used to assess for cardiac ischemia, dysrhythmia, PE, pericarditis, and pericardial effusion.
- Chest x-rays are often obtained as portable (bedside) AP views in unstable patients and as PA/lateral views in stable patients who can be transported to radiology. They can reveal a wide array of pathologies, including pneumonia, pleural effusions, pneumothorax, and chest wall injuries.
- Chest CTs can be performed to evaluate for atypical infections, traumatic injuries, pulmonary emboli, and aortic pathologies.
- Beside ultrasonography is often the fastest way to gather additional information. Ultrasound examination of the lungs can identify a pneumothorax, pleural effusion, or consolidation. Cardiac views can identify left ventricular dysfunction, right heart strain, pericardial effusions, and tamponade. Ultrasound is also used to evaluate for lower extremity DVTs.
- Laboratory tests can provide additional information to support a diagnosis or assist in the workup (e.g. d-dimer to exclude low probability PE, BNP to assess for CHF exacerbation, serial cardiac enzymes to exclude MI).

## Differential Diagnosis

Critical diagnoses (and general management options) to consider in patients with respiratory distress include:

- [Acute congestive heart failure exacerbation \(/cdem/education/online-education/m4-curriculum/group-m4-approach-to/shortness-of-breath/congestive-heart-failure\)](/cdem/education/online-education/m4-curriculum/group-m4-approach-to/shortness-of-breath/congestive-heart-failure) – nitrates, diuretics, PPV
- [Acute coronary syndrome \(/cdem/education/online-education/m4-curriculum/group-m4-approach-to/cardiac-arrest\)](/cdem/education/online-education/m4-curriculum/group-m4-approach-to/cardiac-arrest) – aspirin, antiplatelet/anticoagulation agents, reperfusion
- Anaphylaxis – epinephrine, beta-agonists, antihistamines, steroids
- [Asthma \(/cdem/education/online-education/m4-curriculum/group-m4-approach-to/shortness-of-breath/asthma\)](/cdem/education/online-education/m4-curriculum/group-m4-approach-to/shortness-of-breath/asthma)/[COPD \(/cdem/education/online-education/m4-curriculum/group-m4-approach-to/shortness-of-breath/copd\)](/cdem/education/online-education/m4-curriculum/group-m4-approach-to/shortness-of-breath/copd) exacerbation – beta-agonists, steroids
- Cardiac tamponade – pericardiocentesis
- Non-cardiogenic pulmonary edema – supplemental O<sub>2</sub>, PPV, diuretics
- [Pulmonary embolism \(/cdem/education/online-education/m4-curriculum/group-m4-approach-to/shortness-of-breath/pulmonary-embolus\)](/cdem/education/online-education/m4-curriculum/group-m4-approach-to/shortness-of-breath/pulmonary-embolus) – anticoagulation
- [Pneumonia \(/cdem/education/online-education/m4-curriculum/group-m4-approach-to/shortness-of-breath/pneumonia\)](/cdem/education/online-education/m4-curriculum/group-m4-approach-to/shortness-of-breath/pneumonia) – antibiotics
- [Pneumothorax \(/cdem/education/online-education/m4-curriculum/group-m4-approach-to/shortness-of-breath/pneumothorax\)](/cdem/education/online-education/m4-curriculum/group-m4-approach-to/shortness-of-breath/pneumothorax)/tension pneumothorax – needle decompression, chest tube

- Upper airway obstruction – early intubation for airway protection (alternative: cricothyrotomy), treat underlying cause

## Summary

Shortness of breath is a nonspecific symptom with many possible causes and degrees of severity, making the evaluation of these patients challenging. In many cases, treatment/stabilization may actually precede establishing a final diagnosis. It is important to consider the critical diagnoses in your evaluation and look for patterns in the history and physical exam. Additional tests can be helpful in establishing a diagnosis or excluding alternative diagnoses.

*With continued NIPPV and nitrate therapy, our patient's degree of respiratory distress improves significantly, and she is able to avoid intubation. She is admitted to the hospital for an acute CHF exacerbation and is restarted on her home medications. After several days of additional diuresis, she feels back to normal and is discharged home.*