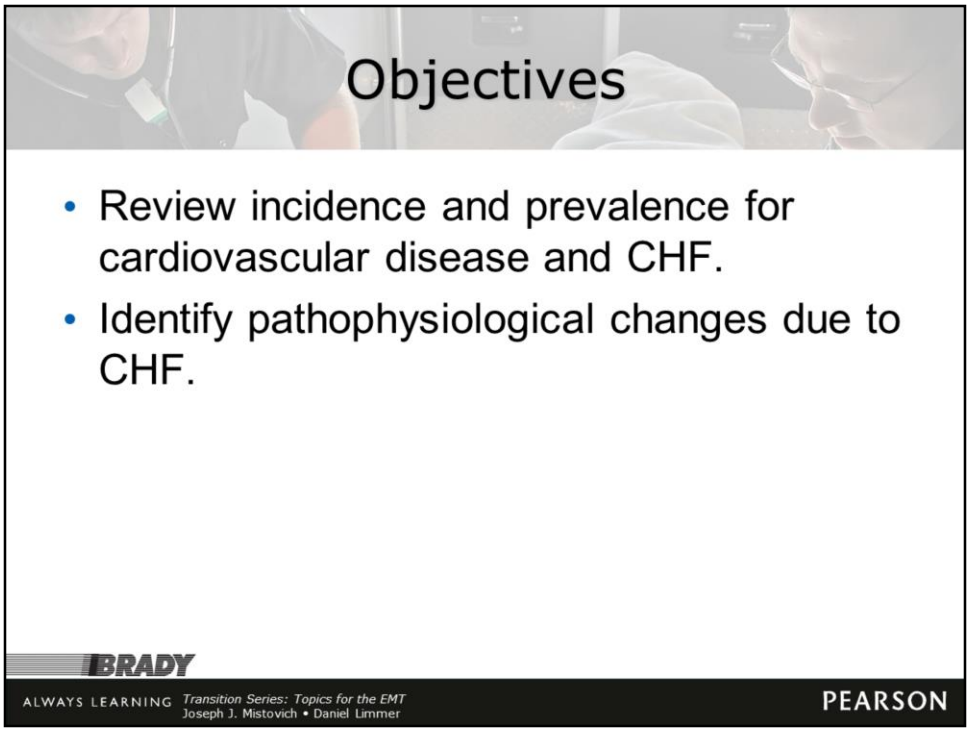
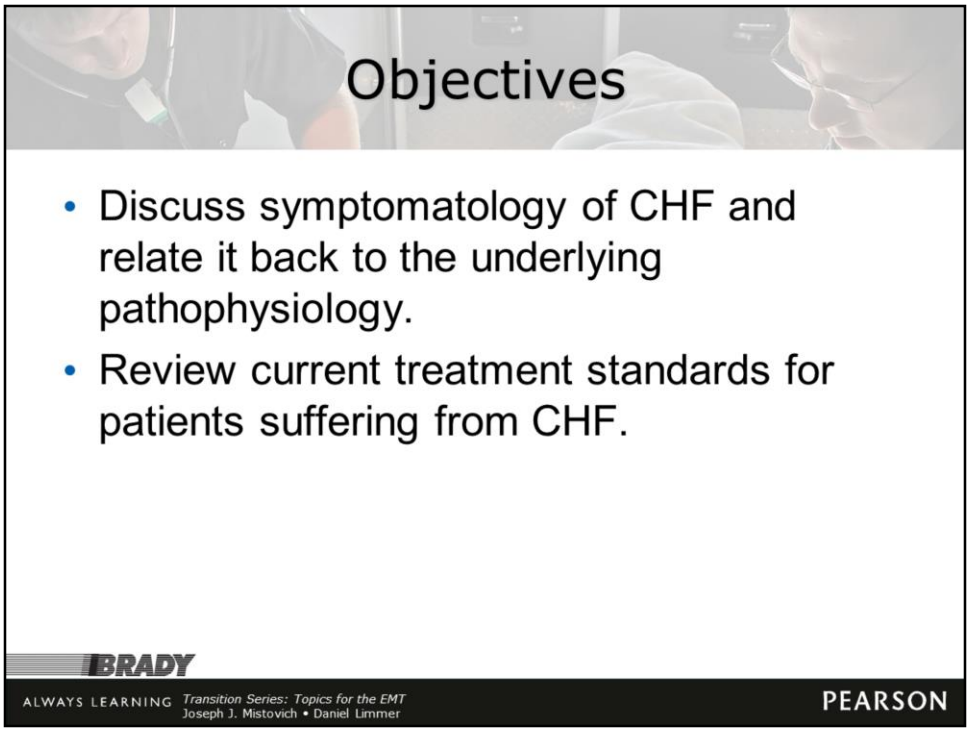
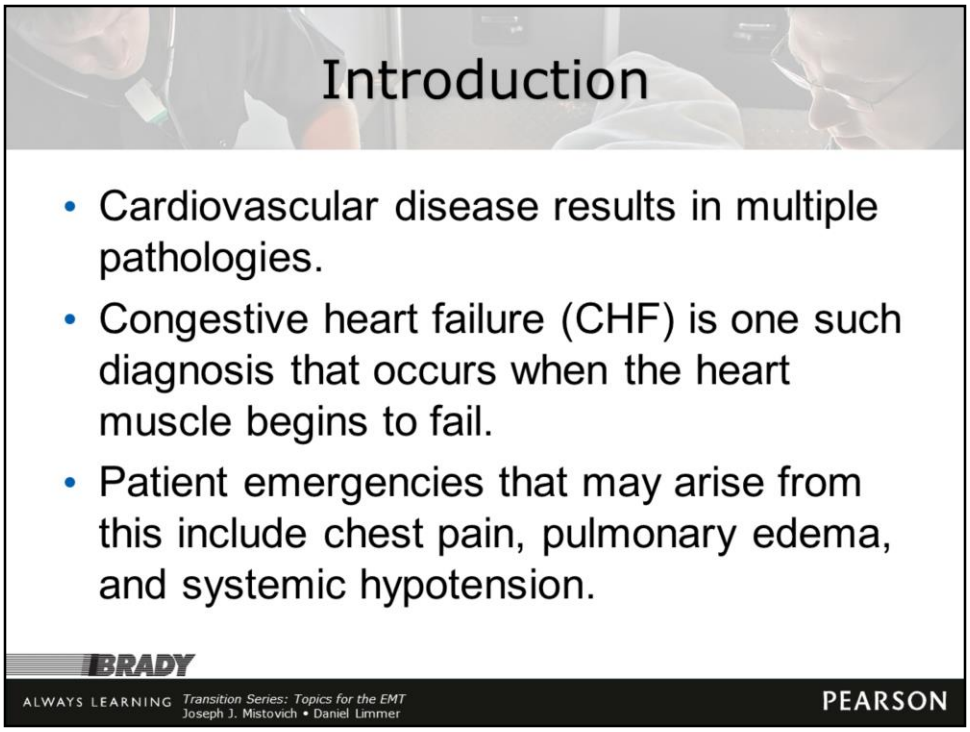

BRADY
TRANSITION SERIES
TOPICS FOR THE EMT
TOPIC 25
Cardiovascular Emergencies:
Congestive Heart Failure
ALWAYS LEARNING
PEARSON



Discuss objectives.



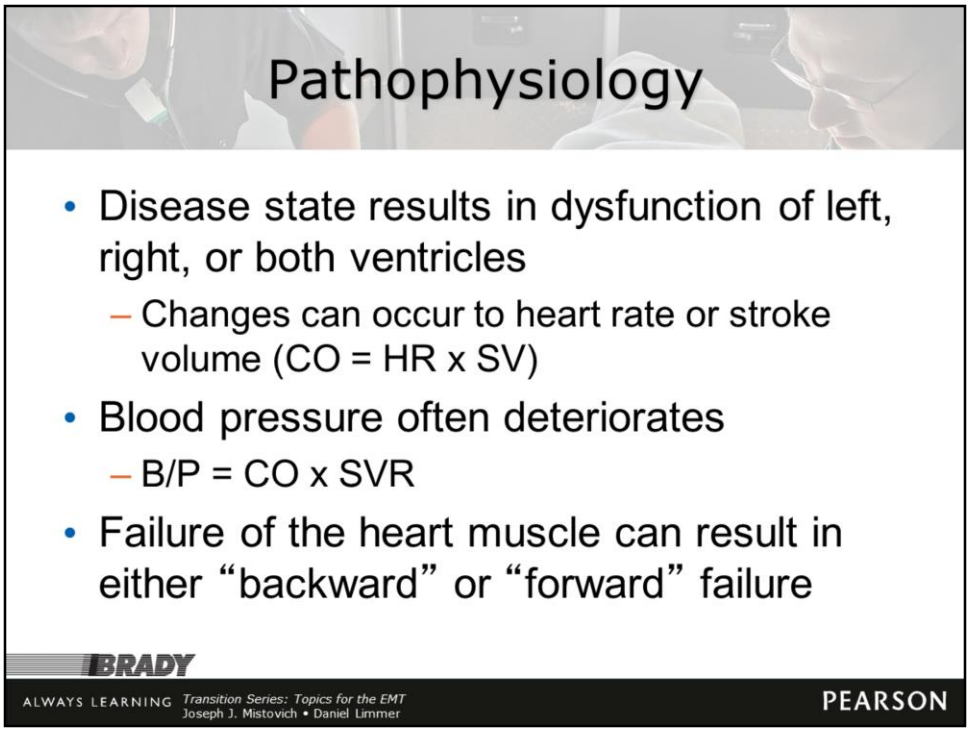
Discuss objectives.



Cardiovascular emergencies are the number one cause of death in the United States today.

The disease pathology underlying cardiovascular disease can actually cause multiple emergencies such as CHF, MI's, strokes, and hypertension to name a few.

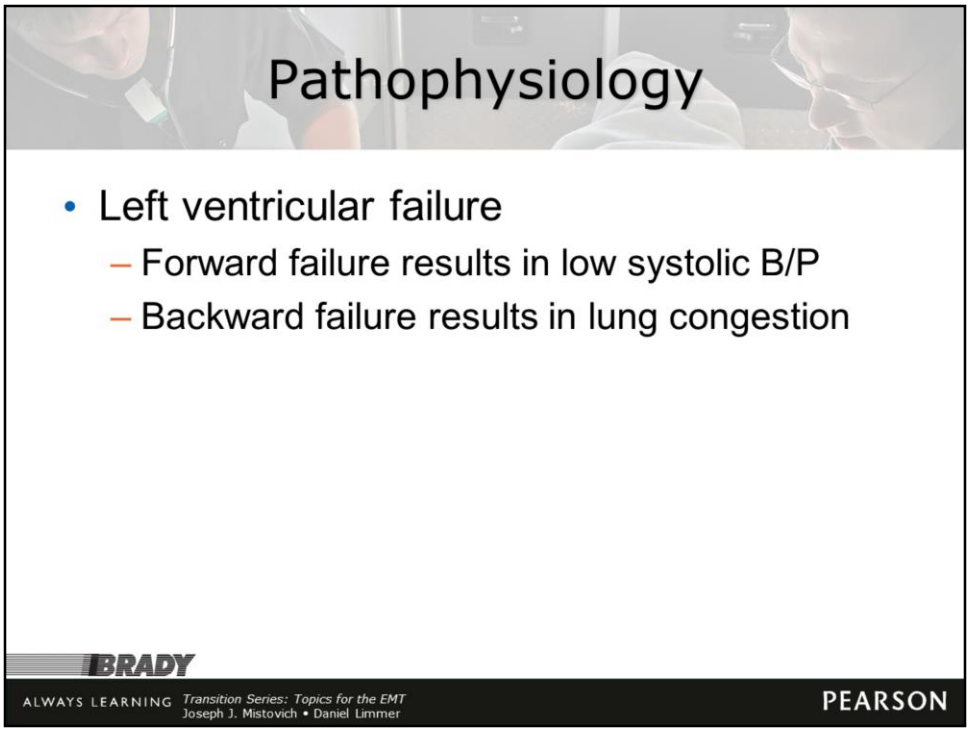
It has been estimated that the prevalence rate for CHF is about 1 to 2 percent in the adult population. In more specific numbers, more than 400,000 patients are diagnosed yearly with CHF, and currently about 3 million Americans have this disease state. In fact, this pathology is a common reason for hospital admittance, as up to 40 percent of CHF patients are hospitalized every year. CHF has been found to be the cause of death in blacks more often than in whites (blacks are 1.5 times more likely to die from CHF) and has a higher prevalence in men than in women.



Discuss that heart failure results in the reduction of cardiac output and may be caused by a decrease in stroke volume or a change in heart rate. By definition, cardiac output is the amount of blood pumped by the heart for 60 seconds.

A reduction in cardiac output leads to compensatory mechanisms that act to restore cardiac output. For instance, when a patient sustains an MI, the dead heart muscle prevents the heart from pumping normally, thus leading to decreased cardiac output. The body senses the decrease in cardiac output by way of baroreceptors in the aortic arch and carotid bodies and tries to compensate by increasing sympathetic tone.

Ultimately the heart is unable to:
•Pump blood effectively forward (frontwards failure)
•Keep up with incoming preload (backwards failure)



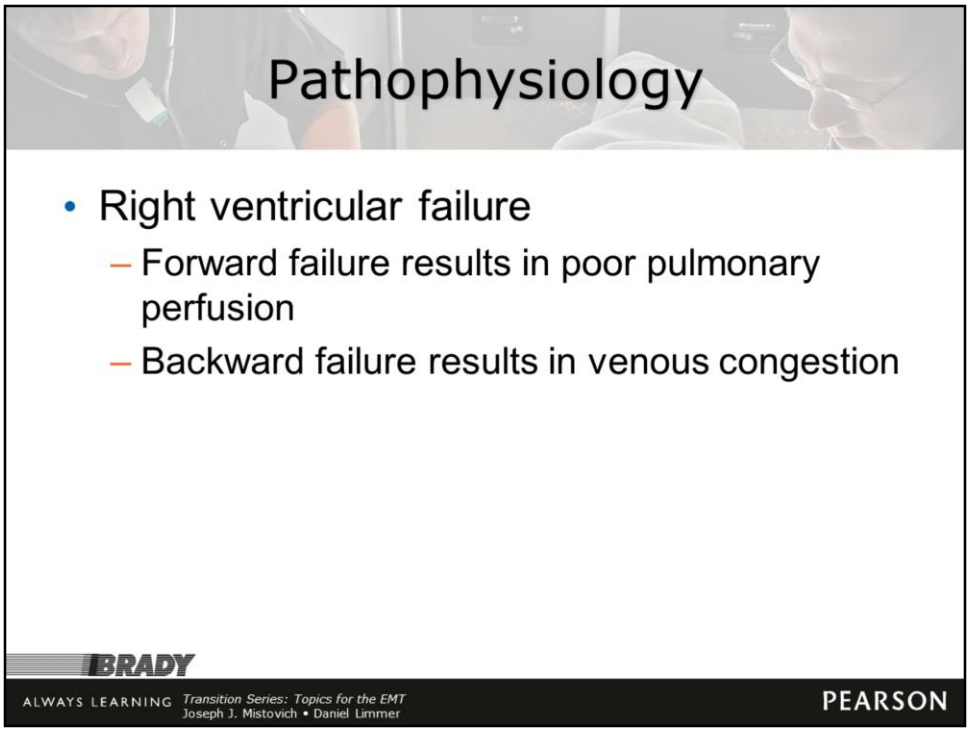
Left ventricular failure occurs when the left ventricle is unable to pump adequately.

Dysfunction of the heart muscle itself, as is seen with MI, is one of the main causes of left ventricular pump failure.

Dysrhythmias also inhibit the heart's ability to pump normally.

With *backward failure* of the left ventricle:
•Pulmonary congestion (pulmonary edema) results
•Leading to signs and symptoms that are primarily respiratory in nature

With *forward failure* of the left ventricle:
•Diminished peripheral perfusion
•Systemic circulation result

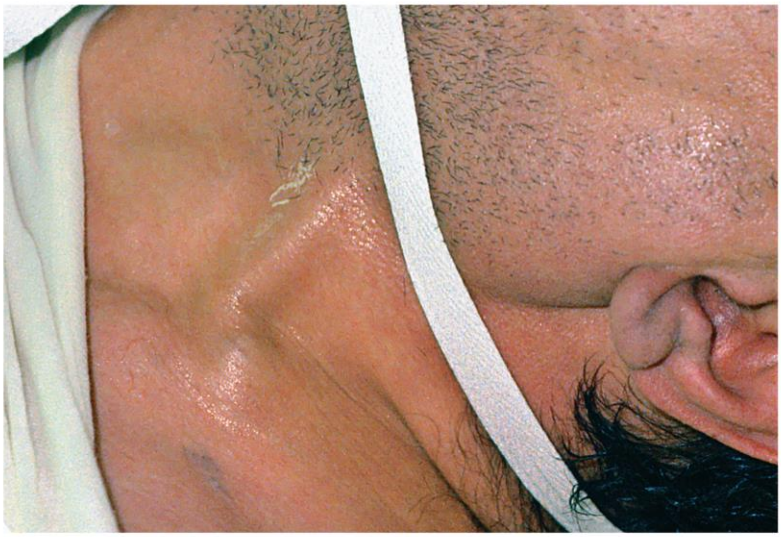


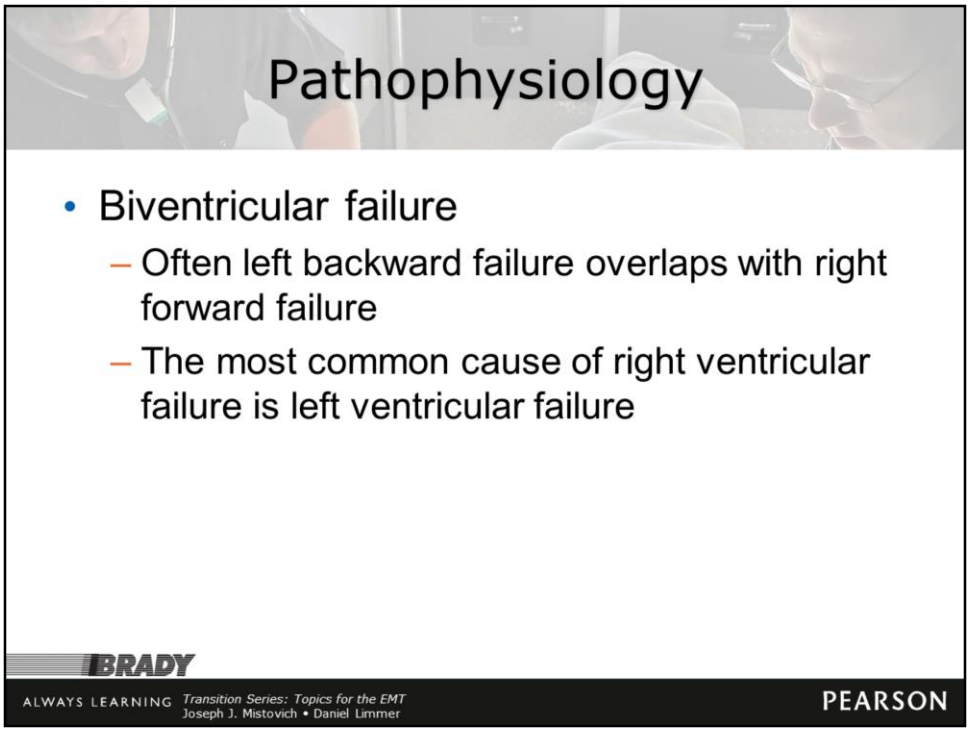
With right heart failure, the right side of the heart fails to function as an adequate pump to the lungs, which commonly leads to back pressure of blood into the venous and systemic circulation with *backward failure* of the right ventricle.

Backward failure of the right ventricle results in excess fluid that accumulates in the body, often in dependent extremities and may cause:
•Jugular venous distention
•Enlargement of the liver
•Possible abdominal distention in severe cases

Figure 25-1 Edema to the lower extremities is a classic sign of congestive heart failure.

Figure 25-2 Jugular vein distention is a late sign of congestive heart failure. *(© David Effron, M.D.)*





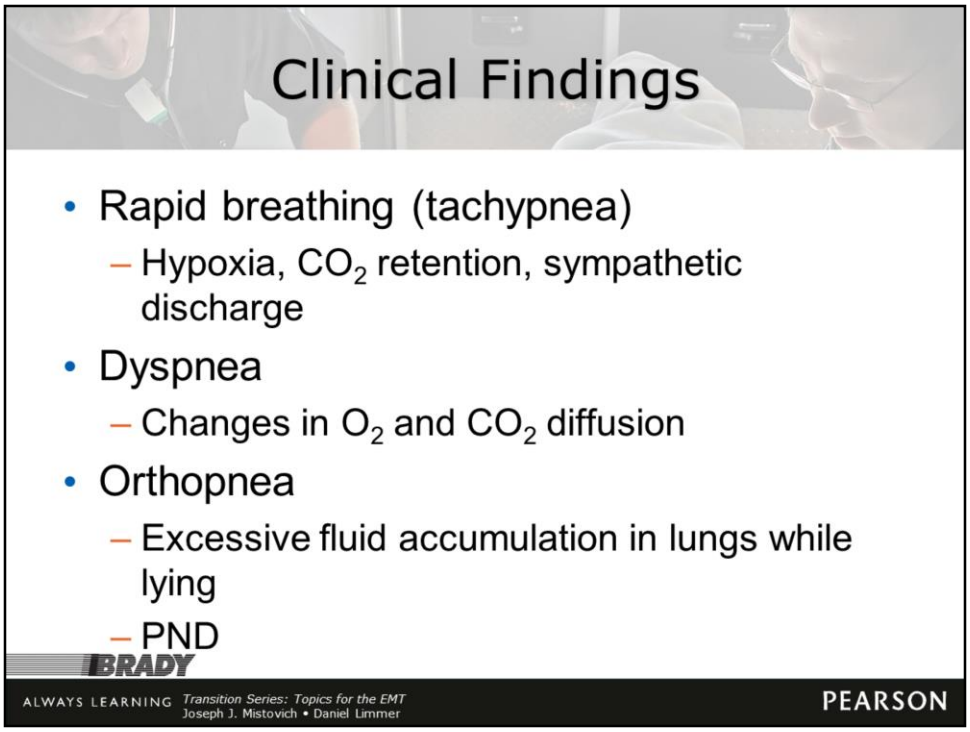
In severe or prolonged disease states, usually failure of one ventricle will eventually cause the failure of the other ventricle.

This creates a mixing of signs and symptoms of both syndromes.

The important point for the EMT is to:
•Recognize the clinical emergency
•Provide symptom specific management

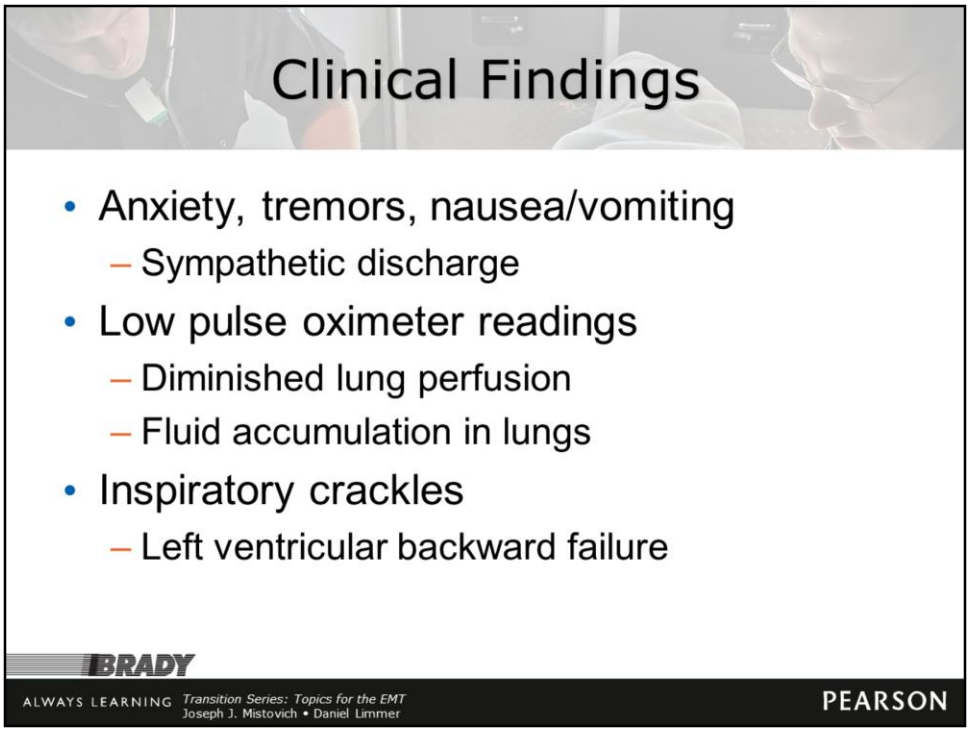
TABLE 25-1 Pathophysiologic Changes in Right and Left Heart Failure

	Pathophysiologic Findings
Right heart failure	Right heart fails because of infarction, increased workload, valvular dysfunction, or a combination of these. It results in the congestion of blood in the vena cava, resulting in jugular venous distention, peripheral edema, enlarged liver, clear breath sounds, and probably hypotension.
Left heart failure	Left heart fails also because of infarction, increased workload (systemic hypertension), valvular dysfunction, or a combination of these. It results in the congestion of blood in the lungs, which increases pressure to a point at which fluid escapes into the alveoli, causing respiratory distress and pulmonary edema. Lung sounds often reveal crackles or "cardiac asthma," blood pressure is commonly normal to high, and peripheral congestion is absent.



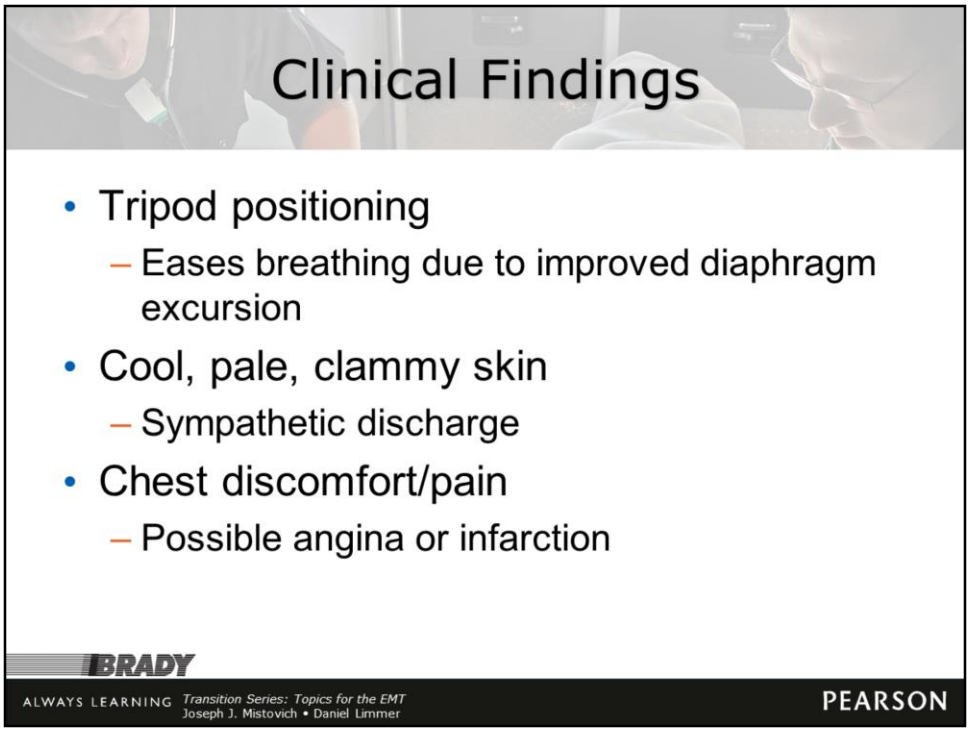
Changes in the respiratory pattern can be from:
•Hypoxia
•Acidosis
•Poor perfusion through the lungs (right heart failure)
•Fluid accumulation in the lungs (left heart failure)

Often, while lying flat, the fluid accumulation seen in the lungs with left heart failure is exacerbated and the patient becomes dyspenic while lying down (orthopnea).



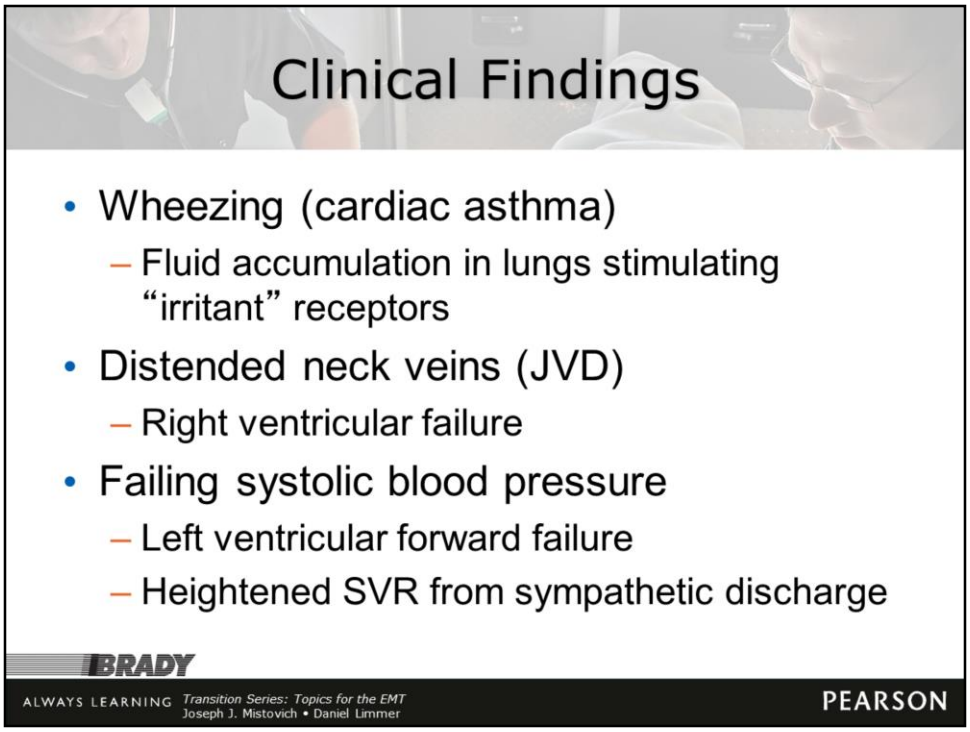
With sympathetic discharge, there is an increase in nausea and with some, vomiting may occur. N/V are also common findings when a patient's blood pressure dips dangerously low.

As blood oxygenation through the lungs fail, so will the pulse oximeter reading. This may be due to:
•Poor perfusion through the lungs
•Fluid accumulation in the lungs



Keeping the abdominal contents in a dependent position makes it easier for diaphragmatic excursion.

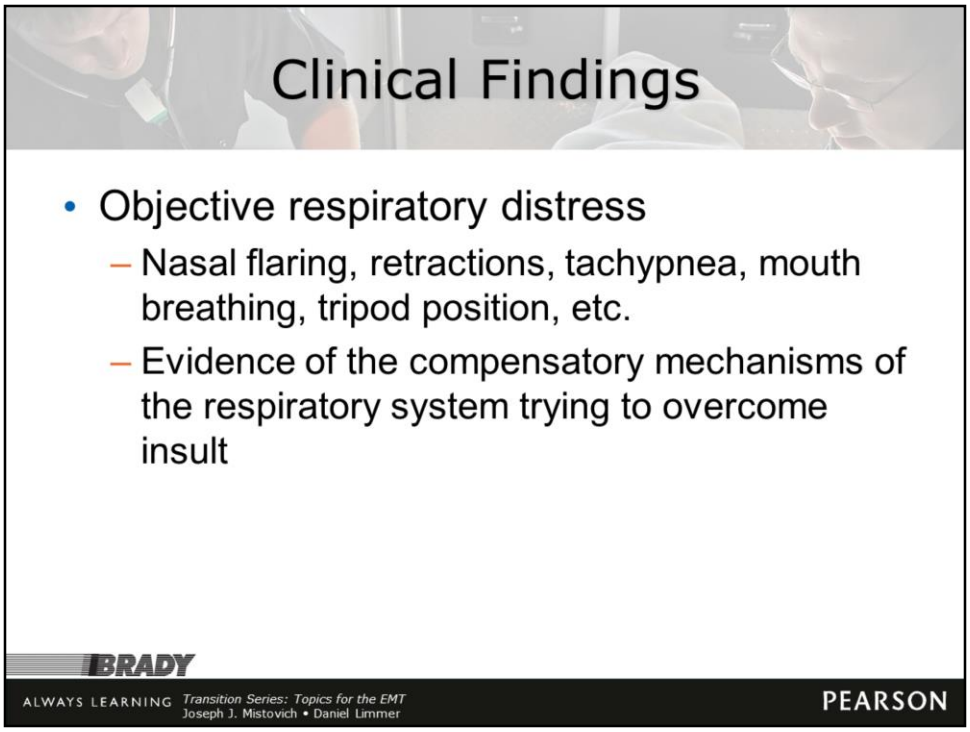
Again, with sympathetic discharge, peripheral vasoconstriction will make the skin become cool and sweaty.



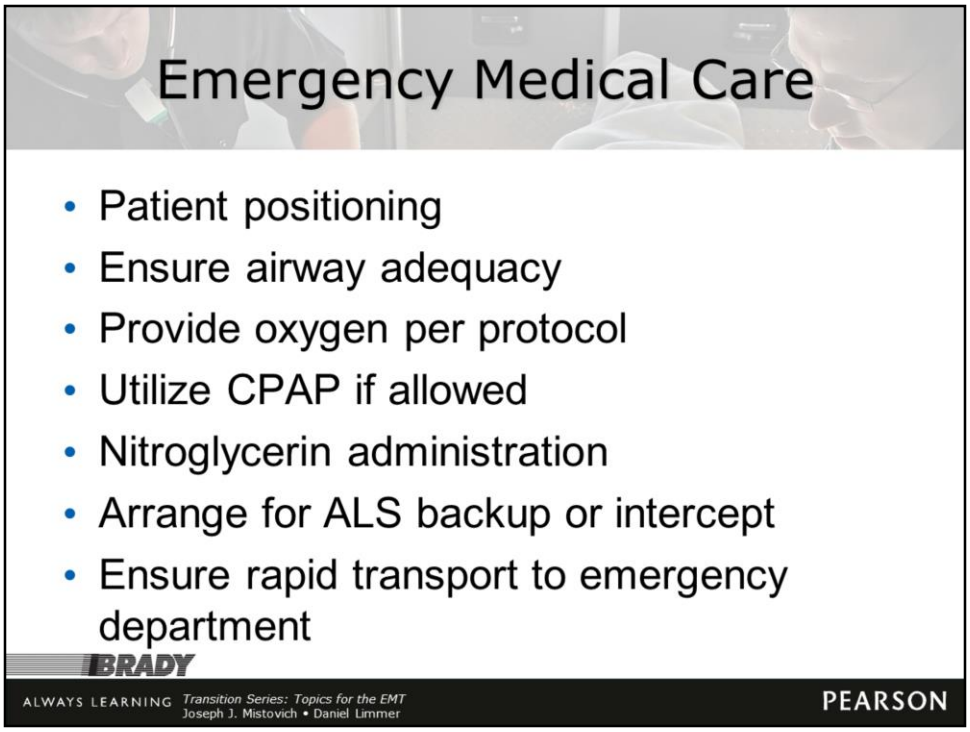
Cardiac asthma occurs when fluid accumulation in the lungs from left sided failure starts to migrate up the bronchioles (due to breathing), and stimulates the irritant receptors.

This causes bronchiole constriction as the body attempts to stop the migration of the fluid.

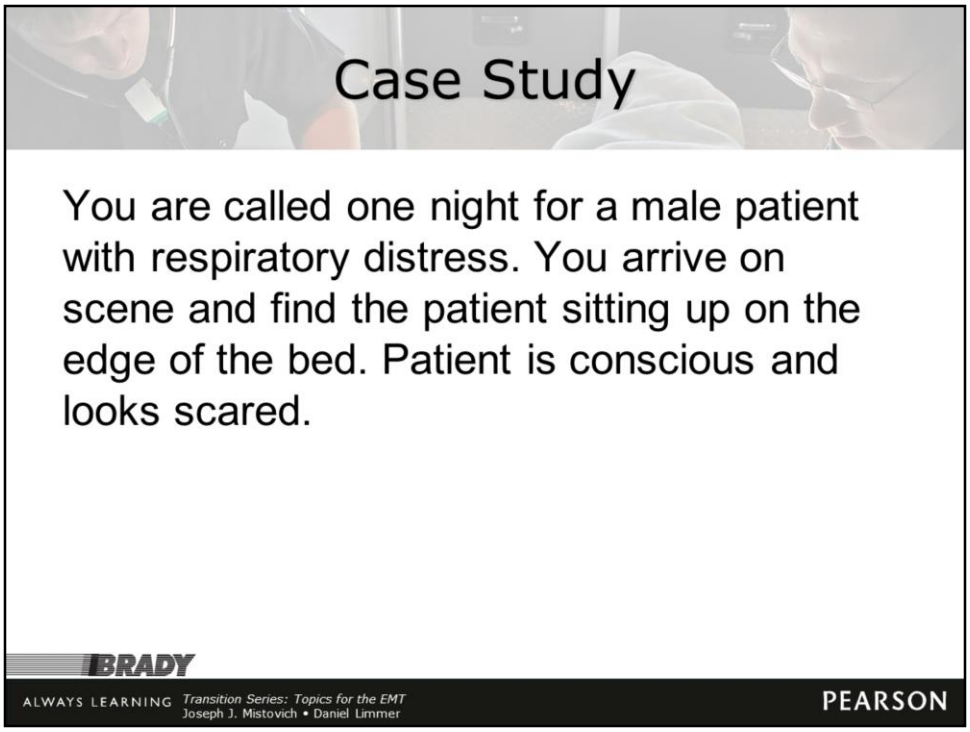
The problem is that excessive bronchoconstriction inhibits good alveolar ventilation which in turn diminishes oxygenation and promotes dyspnea.



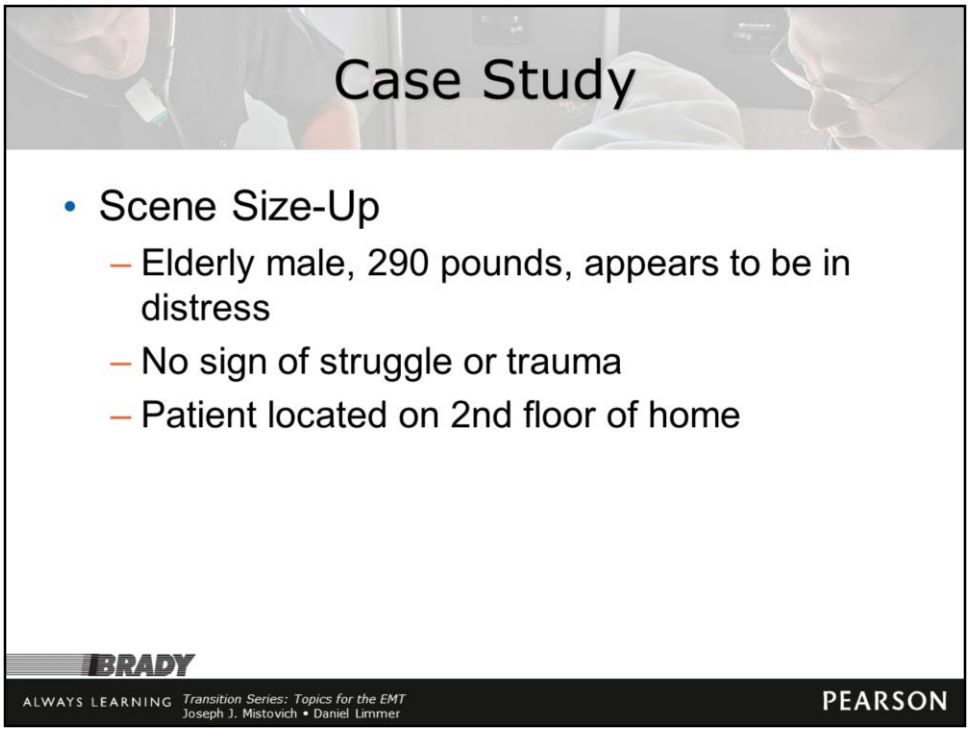
These findings are consistent with general respiratory distress and are indicative of the body laboring harder to maintain normal oxygenation.



The goal of management is to:
- Improve oxygenation
- Improve cardiac output
- Limit ischemia or infarction
- Deliver the patient to the ED rapidly with ALS intercept if possible



Present case study.



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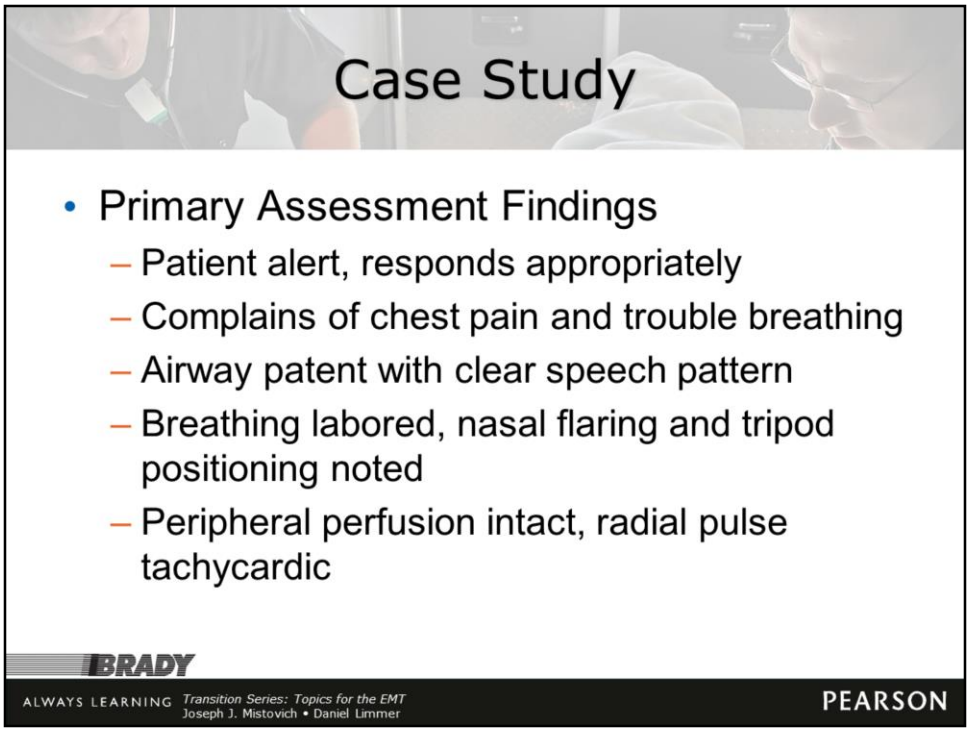

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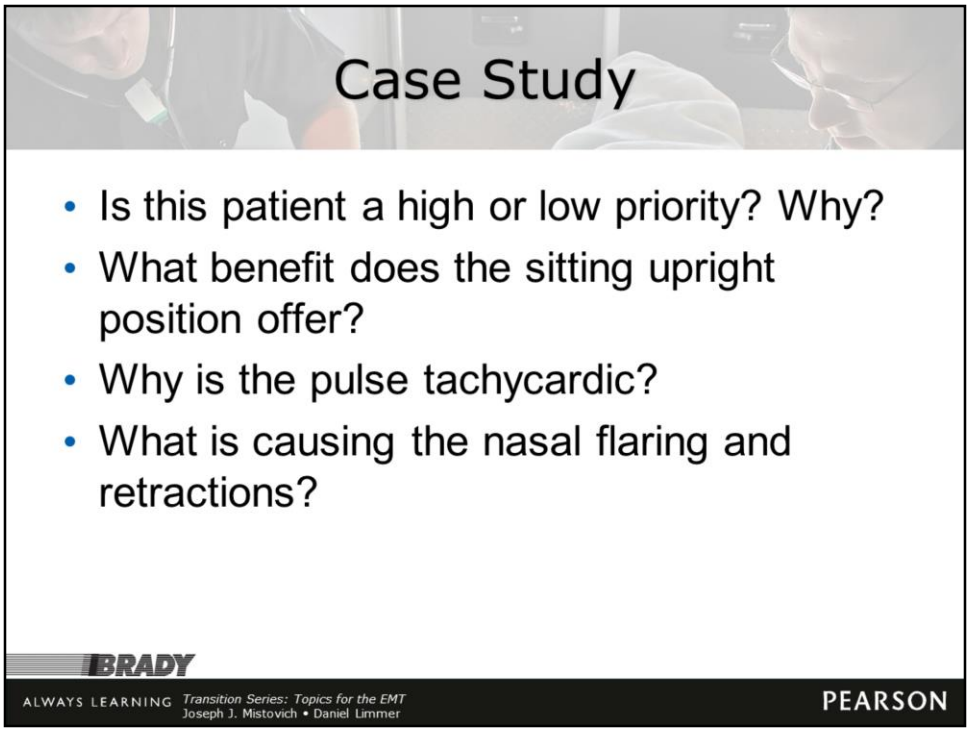
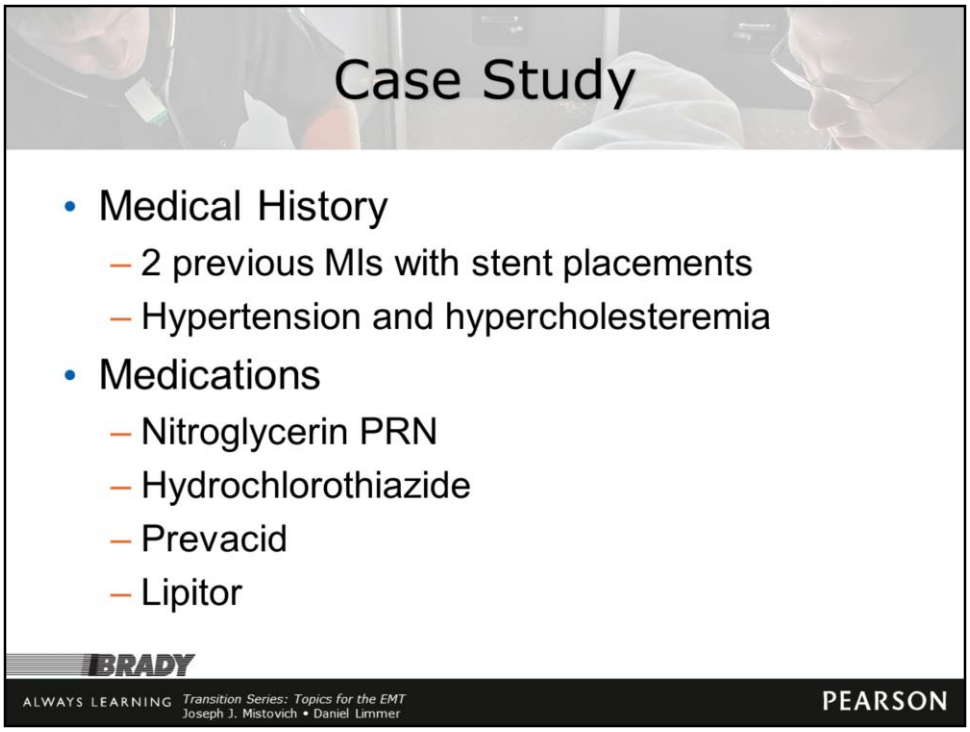


The patient could probably be considered a "stable but potentially unstable" patient at this time since there are no gross disturbances to vital functioning (airway, breathing, circulation). A patient with cardiovascular chest pain could rapidly deteriorate into cardiac arrest.

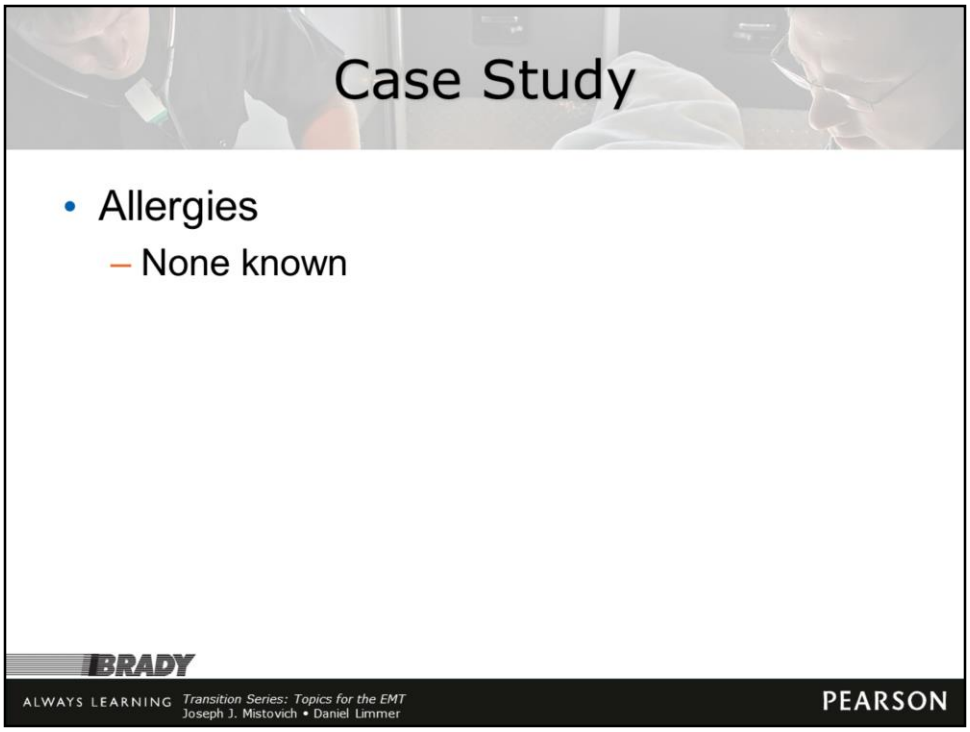
Sitting in an upright position helps to improve diaphragmatic motion as well as displace any fluid accumulation in the lungs to a more dependent position.

Tachycardia is secondary to sympathetic discharge, which is being stimulated due to probable baroreceptor and chemoreceptor influence on the brainstem.

Nasal flaring and retractions indicate more vigorous inspiratory muscle use to overcome resistance of airflow into the lungs. The negative intrathoracic pressure generated starts to draw in soft-tissues that overlay the bony thoracic structures – causing retractions.



Discuss case study.



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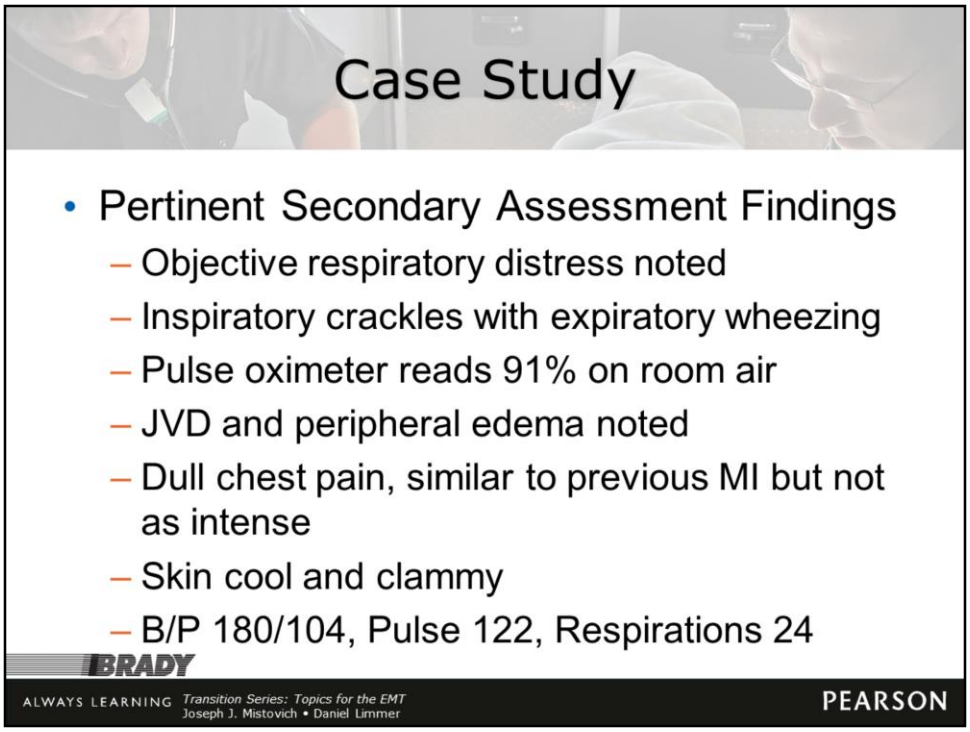

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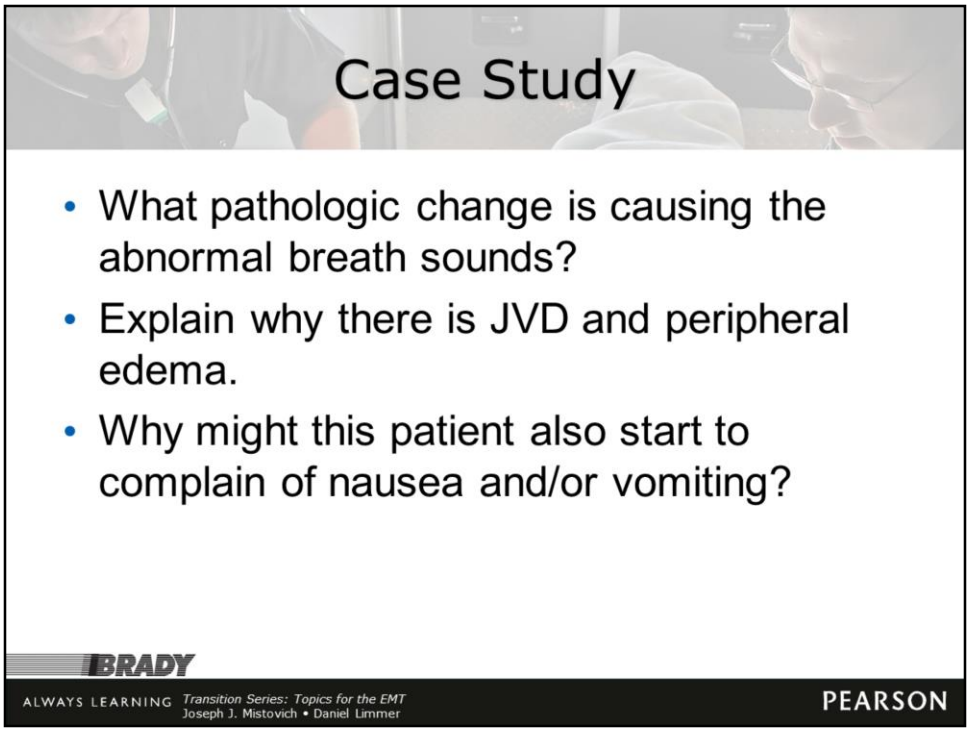
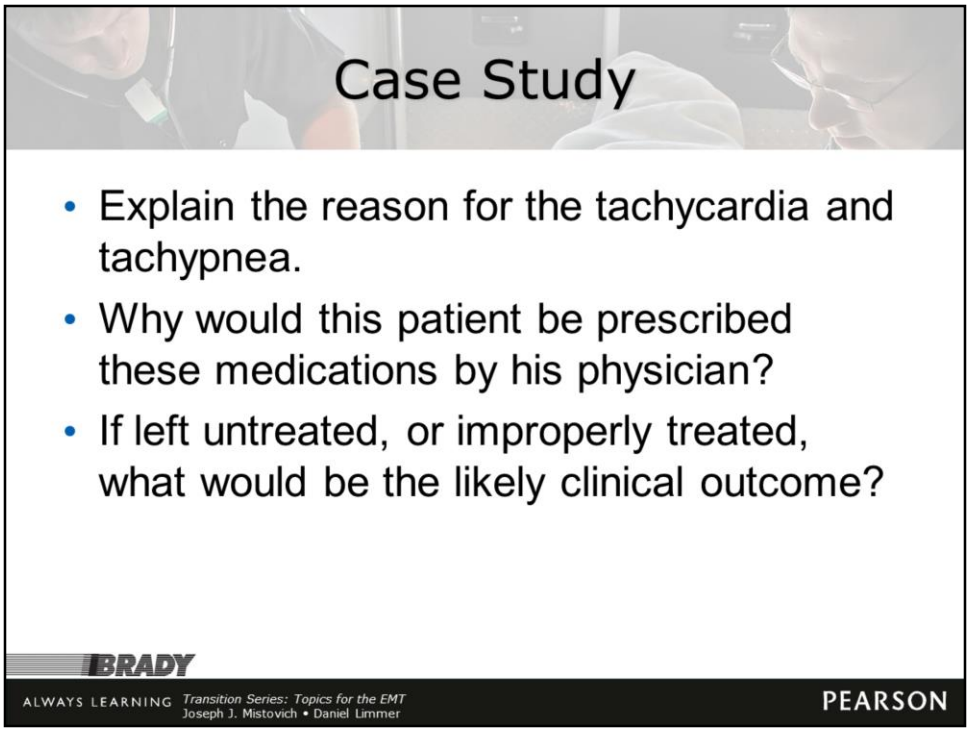


The inspiratory crackles occurs when the left ventricle cannot pump as much blood out into the aorta as it is receiving from the lungs. As such, there is a "backup" of fluid in the pulmonary vasculature that starts to leak out of the capillary beds and into the alveoli where it promotes alveolar collapse during exhalation. When the patient does breathe in, the alveoli try to reopen and it creates the characteristic "crackling" identified with crackles.

JVD and peripheral edema is likely from failure of the right ventricle to pump as much blood towards the lungs as it's receiving from the body. When the blood backs up behind the right side of the heart, it causes peripheral edema.

Nausea and vomiting occur secondary to low blood pressure and sympathetic discharge.



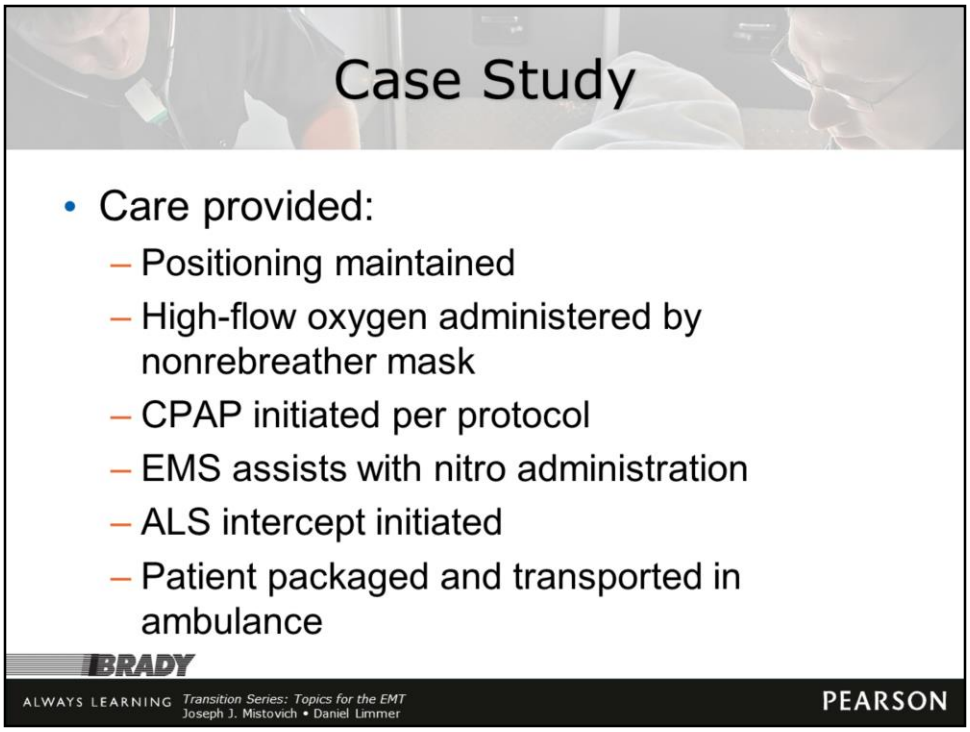
Tachycardia and tachypnea are mediated by the sympathetic nervous system in response to influence from the chemoreceptors and baroreceptors monitoring blood gases and blood pressure.

These medications are to treat:
•The occasional angina (nitro)
•The excessive fluid buildup from CHF (hydrochlorothiazide)
•The high cholesterol (lipator)

The prevacid is for stomache ulcers.

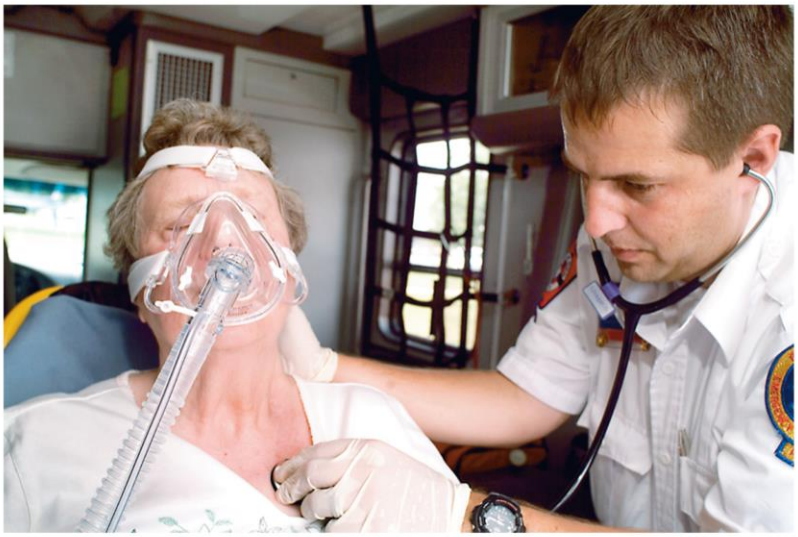
If left untreated, the fluid buildup in the lungs would continue to worsen to the point that the patient will no longer oxygenate properly.

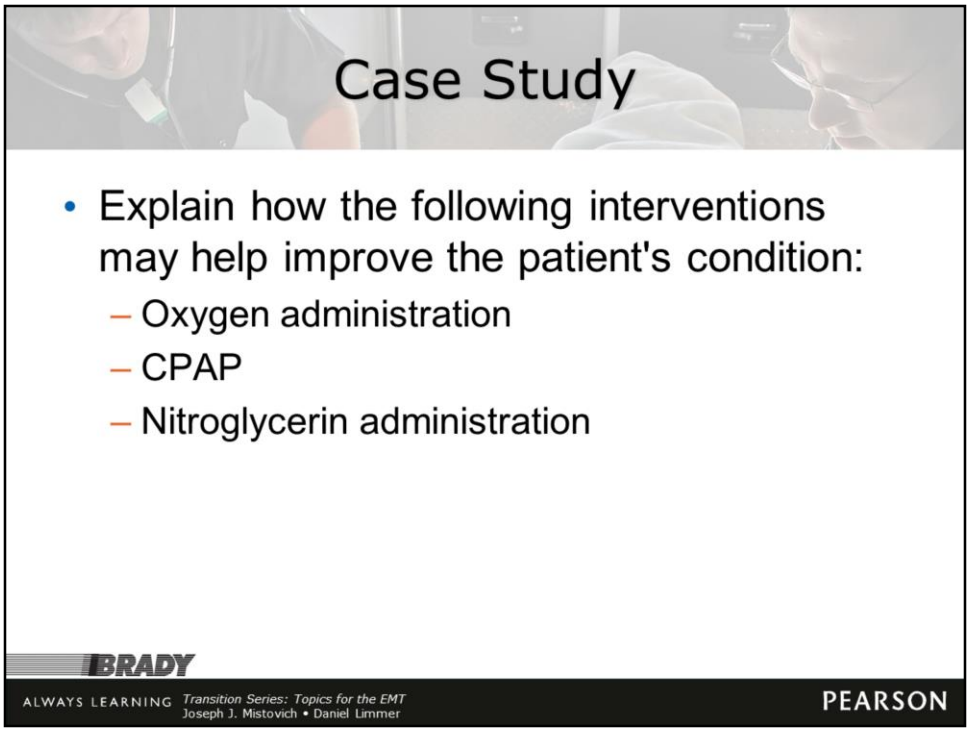
Along with the untreated angina, the patient would likely experience a severe MI and ultimately die.



Relate care to how it attempts to restore physiologic normalcy.

Figure 25-4 CPAP is a form of noninvasive positive pressure ventilation used in the awake and spontaneously breathing patient who needs ventilatory support. *(© Ken Kerr)*

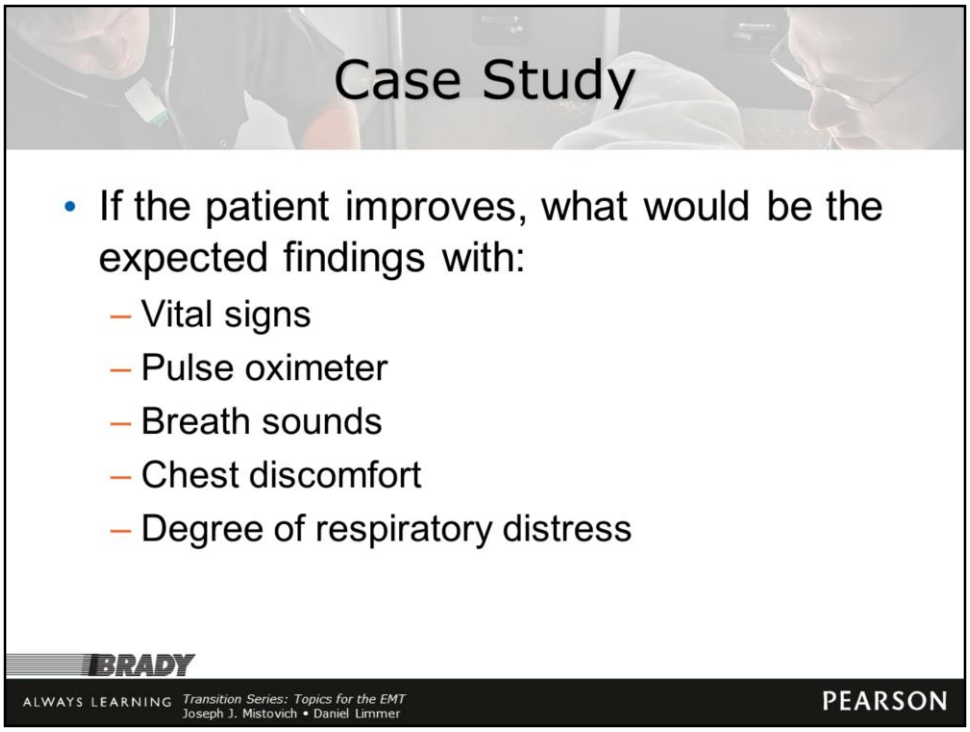




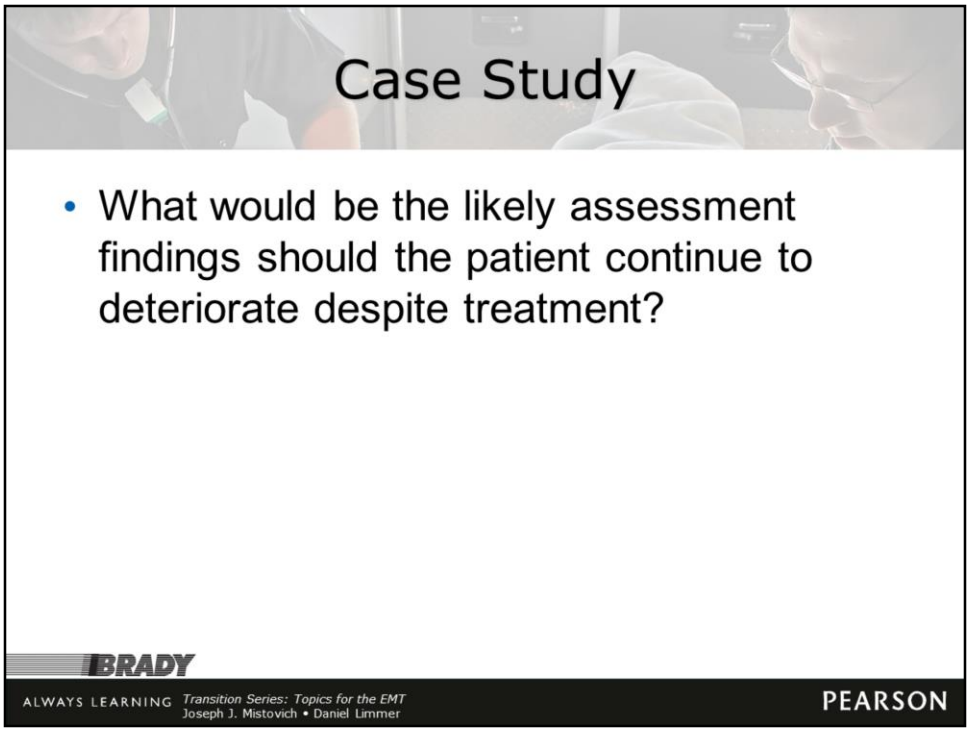
O_2 administration enhances diffusion of gases into the blood stream.

The use of CPAP provides a "back pressure" to help shift fluid out of the alveoli and back into the vascular system—also resulting in improved oxygenation.

Nitro will improve coronary blood flow which hopefully prevents a worsening MI.

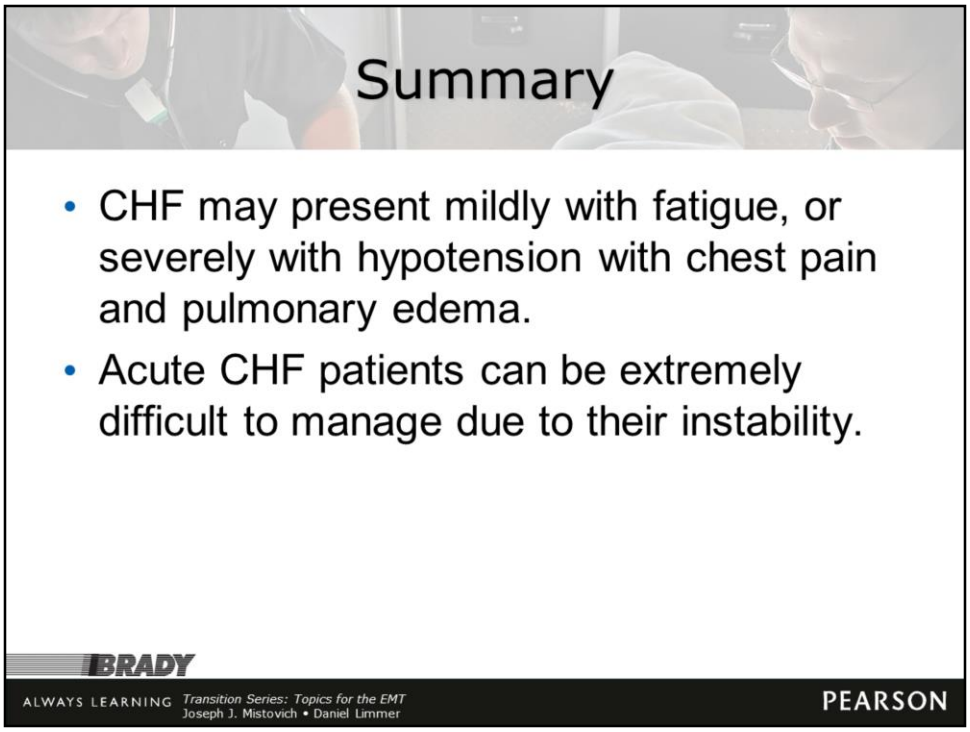


- Vital signs will normalize.
- Pulse oximeter will improve.
- Breath sounds will become more clear.
- Chest discomfort should ease.
- Respiratory distress should start to relinquish.

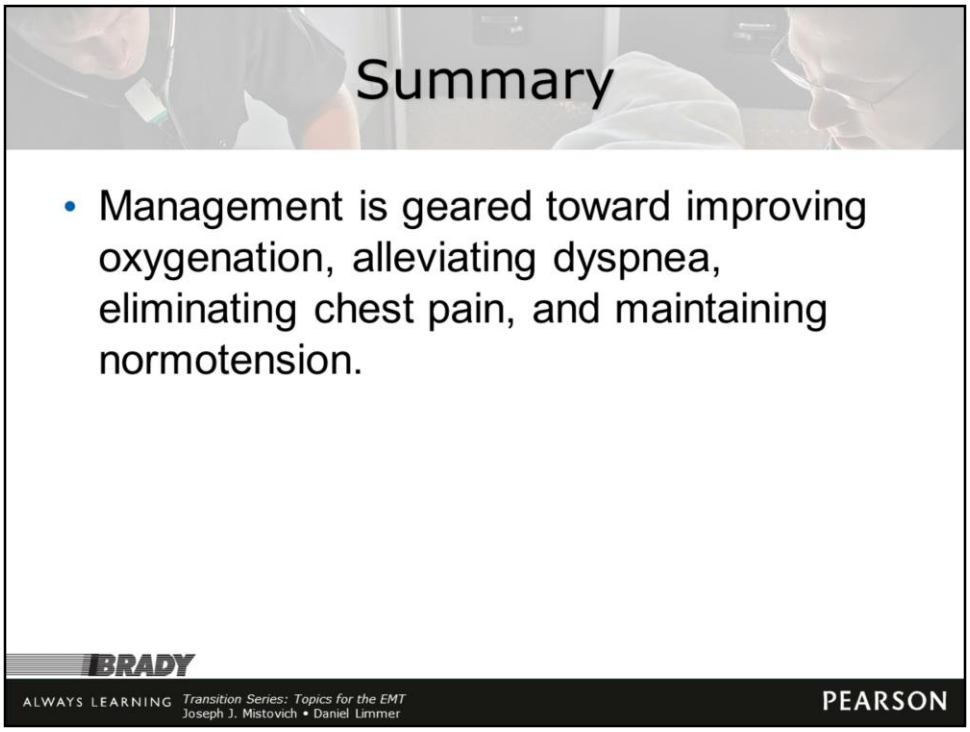


Worsening of the following:

- Mental status
- Blood pressure
- Pulse oximeter
- Breath sounds
- Chest pain
- Skin characteristics



Review as appropriate.



Review as appropriate.