

Respiratory Distress

HASPI Medical Anatomy & Physiology 14b

Lab Activity

Name(s): _____

Period: _____ Date: _____

Background

Respiratory Distress

Respiratory distress is a broad medical term that applies to any type of breathing difficulty and the associated mental distress that occurs as a result. Respiratory distress can be caused by any type of physiological issue that can inhibit normal breathing. This could be from infection, respiratory disorders, trauma, or even severe physical or emotional stress. The most common diseases that cause respiratory distress are asthma and **chronic obstructive pulmonary disorder (COPD)**, which is a combination of chronic bronchitis and emphysema.

Symptoms of respiratory distress include:

Respiratory Rate	<p>Above or below the normal respiratory rate of 12-24 breaths per minute.</p> <ul style="list-style-type: none"> • <u>Tachypnea</u> – more than 24 breaths per minute • <u>Bradypnea</u> – less than 12 breaths per minute • <u>Apnea</u> – the cessation of breathing • <u>Hyperventilation</u> – breathing is too fast and shallow to bring oxygen completely into the lungs • <u>Hypoventilation</u> – breathing is too slow and shallow to get enough oxygen to meet the needs of the body
Skin Color	Paleness or cyanosis (blue tint) of the skin may indicate a lack of perfusion (oxygen circulation)
Nostril Flaring	Indicates the individual is having to work harder to breathe
Muscle Retraction	The respiratory muscles are visibly working harder to bring oxygen into the lungs. This is especially visible in the space between the neck and clavicle
Diaphoresis	Excessive sweating
Audible Breathing	The individual may be grunting, wheezing, or making other sounds signifying the airways are not clear and/or unable to bring in enough oxygen

Asthma

What is it?

Asthma is a chronic disorder that causes the bronchi and bronchioles to become inflamed. This inflammation causes excess mucus and swelling within these airways, leading to a narrower space for air to pass. In severe asthma attacks, the airways may swell and close completely, which can result in death from lack of oxygen.

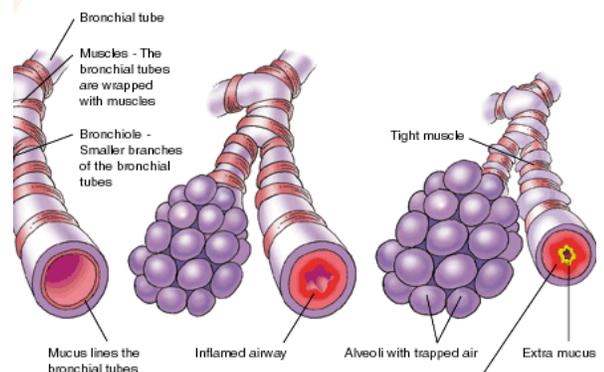
What causes it?

Asthma is an allergic reaction that can be triggered by a variety of inhaled substances. Asthma is actually an immune response gone overboard. The immune system senses a foreign invader that has been inhaled and goes on an all-out assault, even though the “foreign invader” could be something that would normally not be harmful at all, like pollen particles. More than 25 million people suffer from asthma in the U.S.

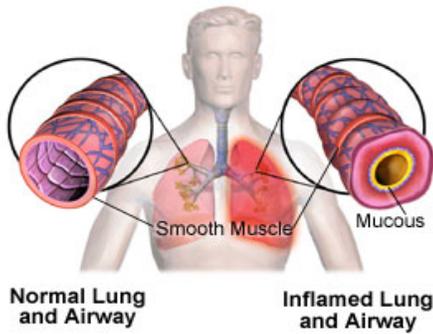
What are the symptoms?

Some individuals experience very mild asthma symptoms, while others can experience potentially fatal attacks. The most common symptoms are wheezing, chest pain and tightness, coughing, and shortness of breath.

When You Have Asthma



<http://4.bp.blogspot.com/-fJKYqJ16zBs/TxPVhnPLvLI/AAAAAAAAAUE/tEBqJ9EE-yo/s1600/how-you-get-asthma.jpg>



<http://www.allinahealth.org/mdex/en135139.jpg>

Chronic Bronchitis

What is it?

Bronchitis is an inflammation of the bronchi and bronchioles. Chronic bronchitis has prolonged symptoms and will eventually damage the bronchi and bronchioles irreversibly. The tissue lining the bronchioles thickens from scarring and causes a narrowing of the airways. This narrowing decreases the amount of oxygen entering the lungs and the damaged tissue makes it much easier for respiratory infections to occur. In 2009, more than 9.9 million people in the U.S. were diagnosed with chronic bronchitis.

What causes it?

85-90% of chronic bronchitis cases are caused by smoking. Nicotine causes paralysis of the cilia cells in the trachea and bronchi, which results in the body becoming unable to catch and remove particles that damage the bronchi, bronchioles, and alveolar tissue. Other sources of chronic bronchitis may be prolonged exposure to dust and/or fumes in the workplace, air pollution, or a serious viral or bacterial infection.

What are the symptoms?

A productive cough that lasts more than 3 months and occurs more than once within a 2-year period is cause for diagnosis of chronic bronchitis. Other symptoms of chronic bronchitis include excess mucus, dyspnea, wheezing, fever, fatigue, chest pain, and it may lead to cardiovascular disease.

Emphysema

What is it?

The alveoli sacs are elastic, much like balloons, in order to fill and release air during respiration. Emphysema results when the elasticity of the alveoli is destroyed, which can result in a breakdown of alveoli tissue. Less alveoli means less gas exchange of oxygen and carbon dioxide, which means less oxygen for the body.

What causes it?

The causes of emphysema and chronic bronchitis are virtually the same. As with chronic bronchitis, the primary cause of emphysema is smoking. Other causes may include air pollution, dust and/or fume inhalation, and in rare cases a hereditary deficiency in cells that should maintain the elasticity of the lungs.

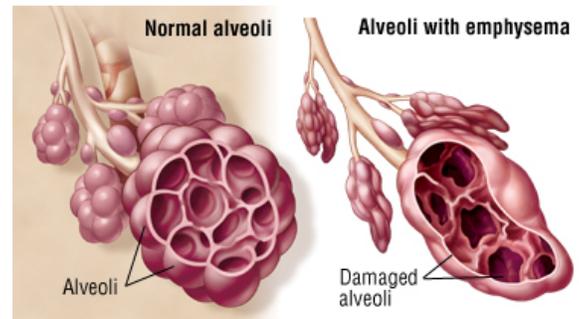
What are the symptoms?

It is possible for emphysema to remain asymptomatic for years. The primary symptom is dyspnea or shortness of breath during activity, which will start gradually and increase until an individual experiences dyspnea even at rest. There are complications that can result from emphysema. As the lungs become less elastic, the pressure balance is disturbed that causes a back-up of pressure into the pulmonary arteries. This may lead to cor pulmonale where a specific portion of the heart connected to these arteries is weakened. Other complications may include pneumothorax (collapsed lung) and giant bullae (holes) in the lung due to the breakdown of tissues within the lungs.

CSU. 1998. Respiratory Distress. Emergency and Critical Care Medicine, Colorado State University.

Fayyaz, J, Lessnau, K.D., Nascimento, J., Olad, R.B., and Ong, S. 2011. Bronchitis. WebMD, Medscape, Article 297108, www.emedicine.medscape.com.

Shapiro SD, et al. 2010. Chronic bronchitis and emphysema. Textbook of Respiratory Medicine, 5th ed., Philadelphia, Pa.; Saunders Elsevier.



<http://www.drugs.com/health-guide/images/205041.jpg>

Materials

Large straw

Medium straw

Small straw

Timer

Procedure

This activity will allow you to simulate different levels of respiratory distress. You will be measuring the impact of respiratory distress on the respiratory rate and pulse.

Directions

✓ when complete

Step 1	Choose a test subject in your group. Anyone who is sick or already has respiratory issues should not be the test subject. At any point, if the test subject gets light-headed, have them stop and take the respiratory rate and pulse.	
A. Control Trial		
Step 2	Have the test subject sit quietly.	
Step 3	Take the respiratory rate of your test subject. Watch the rise and fall of the chest and count the number of breaths in 30 seconds. Multiply this number by 2 and record for "A. Control Trial for No Exercise" in Table 1.	
Step 4	Take the pulse of your test subject. Find the radial pulse using your middle and index fingers on the thumb side of the test subject's wrist. Count the number of beats in 15 seconds. Multiple this number by 4 and record for "A. Control Trial for No Exercise" in Table 1.	
Step 5	Have the test subject stand and jog in place for 60 seconds. The test subject may also do step-ups on a step or chair.	
Step 6	Immediately at the end of 60 seconds, take the test subject's respiratory rate and pulse. Record in "A. Control Trial for Exercise" in Table 1.	
Step 7	Have the test subject rest at least 2 minutes before starting the next step.	
B. Mild Respiratory Distress		
Step 8	Have the test subject sit quietly and ONLY BREATHE through the LARGE STRAW for 60 seconds. The test subjects will need to hold their noses closed to ensure they are only breathing through the straw.	
Step 9	Immediately at the end of 60 seconds, take the test subject's respiratory rate and pulse. (Note: The test subject does not need to continue breathing through the straw while you are taking the respiratory rate or pulse). Record in "B. Mild Respiratory Distress for No Exercise" in Table 1.	
Step 10	Have the test subject stand and jog in place for 60 seconds while ONLY BREATHING through the LARGE STRAW . The test subject may also do step-ups.	
Step 11	IMPORTANT: IF AT ANY TIME THE TEST SUBJECT STARTS FEELING LIGHT-HEADED OR IS SEVERELY SHORT OF BREATH, HAVE HIM OR HER STOP IMMEDIATELY AND SIT DOWN. TAKE THE RESPIRATORY RATE AND PULSE.	
Step 12	Immediately at the end of 60 seconds, take the test subject's respiratory rate and pulse. (Note: The test subject does not need to continue breathing through the straw while you are taking the respiratory rate or pulse). Record in "B. Mild Respiratory Distress for Exercise" in Table 1.	
Step 13	Have the test subject rest, breathing normally (no straw) for at least 2 minutes before starting the next step.	
C. Medium Respiratory Distress		
Step 14	Repeat steps 8 – 13 using the MEDIUM STRAW . Record results in "C. Medium Respiratory Distress" in Table 1.	
D. Severe Respiratory Distress		
Step 15	Repeat steps 8 – 13 using the SMALL STRAW . Record results in "D. Severe Respiratory Distress" in Table 1.	

Table 1. Effect of Respiratory Stress on Respiratory Rate and Pulse

A. Control Trial – No Straw

No Exercise		Exercise	
Respiratory Rate	Pulse	Respiratory Rate	Pulse

B. Mild Respiratory Distress (Large Straw)

No Exercise		Exercise	
Respiratory Rate	Pulse	Respiratory Rate	Pulse

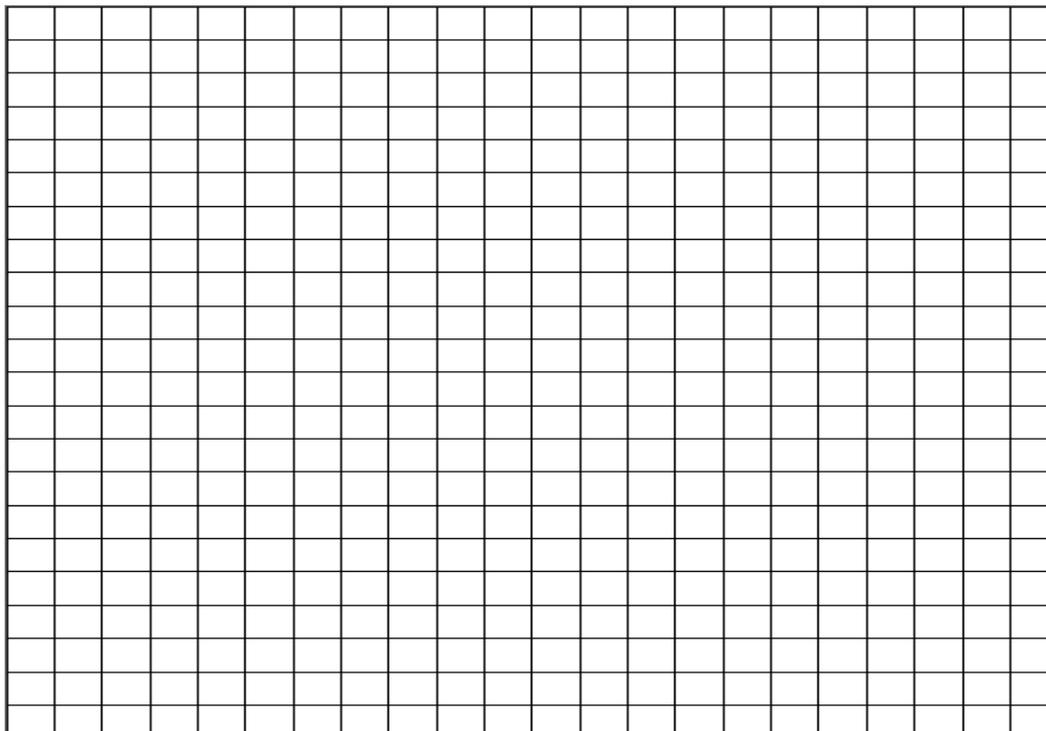
C. Medium Respiratory Distress (Medium Straw)

No Exercise		Exercise	
Respiratory Rate	Pulse	Respiratory Rate	Pulse

D. Severe Respiratory Distress (Small Straw)

No Exercise		Exercise	
Respiratory Rate	Pulse	Respiratory Rate	Pulse

Create a bar or line graph summarizing your results from Table 1 in the grid below. Label your graph!



Analysis Questions - *on a separate sheet of paper complete the following*

1. Describe how the respiratory rate was affected by mild, medium, and severe respiratory distress in this lab.
2. Describe how the pulse was affected by mild, medium, and severe respiratory distress in this lab.
3. How did the straws represent different levels of respiratory distress?
4. How did increasing respiratory distress impact the mental and emotional level of the test subject?
5. How did exercise impact the respiratory rate and pulse?
6. After completing this lab, how do you think an individual suffering from an asthma attack, chronic bronchitis, or emphysema might feel about exercising?
7. Why was it important to give the test subject at least 2 minutes to rest before moving to the next step?
8. **CONCLUSION:** In 1-2 paragraphs summarize the procedure and results of this lab.

Review Questions - *on a separate sheet of paper complete the following*

1. What is respiratory distress?
2. What can cause respiratory distress?
3. What is the difference between hyperventilation and hypoventilation?
4. What is the difference between tachypnea, bradypnea, and apnea?
5. Hypothesize as to why would paleness or cyanosis of the skin would occur when there is a lack of oxygen?
6. What causes audible breathing sounds such as wheezing?
7. What is asthma?
8. What causes asthma?
9. What are the symptoms of asthma?
10. What is chronic bronchitis?
11. What causes chronic bronchitis?
12. What are the symptoms of chronic bronchitis?
13. What is emphysema?
14. What causes emphysema?
15. What are the symptoms of emphysema?

