HASPI Medical Anatomy & Physiology Lab 14

Respiratory System

Teacher Information

Description

Activity 14a – The Respiratory System

Station lab activity that has students investigate the organs, histology, diseases, and characteristics of the respiratory system. Students have the opportunity to perform a spirometry test to measure tidal volume, expiratory reserve volume, inspiratory reserve volume, vital capacity, and total lung capacity. Students practice auscultating lung sounds and taking respiratory rates. Students also have the opportunity to perform a simulated analysis of a patient to determine what is causing respiratory distress.

Activity 14b – Respiratory Distress

Students learn how to recognize respiratory distress and the most common causes including asthma and COPD (chronic bronchitis and emphysema). The lab activity involves students using different diameter straws to simulate constriction of airways. The students will assess the respiratory rate and pulse of test subjects breathing through the straws at rest and during exercise.

Activity 14c – Air Quality

Students identify the amount of particulate matter pollution in outdoor or indoor locations of their choice. Assessment of environmental factors and using an air quality index to determine respiratory safety is used throughout the lab. The impact of air pollution on respiratory health is also reviewed.

Objectives

1. Outline the steps of inhalation and exhalation using all of the organs involved in the process.
2. Identify the causes and symptoms of common respiratory disorders.
3. Conduct a spirometry exam using a spirometer to determine lung capacity and volume.
4. Assess the impact of respiratory distress and exercise on respiratory rate and pulse.
5. Determine sources and dangerous concentrations of common air pollutants using an air quality index.

Time: *Dependent on Activity*

Lab 14a: 60-90 minutes; Each station can be separated and used as individual labs or activities.
Lab 14b: 45-60 minutes; If time is an issue, different respiratory distress levels can be assigned to groups and class data can be shared.
Lab 14c: 7 days to collect data (can be less); 30-45 minutes in class.

Materials *Supplies needed for 10 lab groups or 40 students*

Supply	Provided (P) or Needed (N)	Quantity	Company/ Item #	Approximate Cost
14a. The Respiratory System				
Spirometer	P	3	Amazon/B00BHELXQI	$10.99 each
Alcohol wipes	P	20	Convenience	$5.00
Respiratory Anatomy Posters	P	4	HASPI	Cost of copies
Respiratory Histology Posters	P	4		
Respiratory Disorder Posters	P	5		
Patient Question Cards	P	1 set		
Stethoscopes (use from lab 13)	N	3	-	-
Timer	N	3	-	-

14b. Respiratory Distress				
Large straws (boba straws)	P	10	Grocery	$3.00
Medium straws (regular)	P	10	Grocery	$3.00
Small straws (stirrers)	P	10	Grocery	$3.00
Timer	N	10	-	-
14c. Air Quality				
Petroleum	P	5 g	Convenience	$5.00
Petri dishes (rinse & reuse)	P	20	Carolina/741254	$17.25
Cotton swabs	P	10	Convenience	$3.00
Dissecting microscopes	N	10	-	-
Paper towels	N	As needed	-	-

IMPORTANT: Check the MSDS for safety information on unfamiliar chemicals

Company Contact Information:				
HASPI www.haspi.com Download free online	Convenience *Can be found at local convenience store*	Amazon www.amazon.com	Grocery Store *Can be found at local grocery store*	Carolina www.carolina.com 800.334.5551

Additional Information

Lab 14a

- The station activities for Lab 14a can easily be completed as individual activities rather than stations.
- It is recommended that the spirometers be soaked in bleach or run through a dishwasher after use. Students will be washing with alcohol pads between use, but saliva can still build up within the spirometer.

Lab 14b

- Be aware that the students will be putting respiratory stress on themselves by breathing through the smaller straws. STRESS the importance of stopping immediately if they start to feel light-headed. Instruct them to take the respiratory rate and pulse right whenever they stop. Expect them to need to stop when exercising with the smallest straw.
- If time is an issue, groups can be assigned tests A – D, and their data can be shared with the class.

Lab 14c

- The lab specifies a week for the plate placement, but less or more days will work just as well. The week recommendation is more for the students to observe the difference in AQI from day to day as weather conditions fluctuate.

Resources and References

- Carter, J. 2004. Respiratory System. http://biology.clc.uc.edu/courses/bio105/respirat.htm.
- 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.
- NIH. 2011. How is Respiratory Failure Diagnosed? National Institutes of Health, National Heart Lung and Blood Institute, www.nhlbi.nih.gov.
- Shapiro SD, et al. 2010. Chronic bronchitis and emphysema. Textbook of Respiratory Medicine. 5th ed. Philadelphia, Pa.: Saunders Elsevier; 2010.

- WHO. 2000. Air quality guidelines for Europe, 2nd ed. Copenhagen, World Health Organization Regional Office for Europe, 2000 (WHO Regional Publications, European Series, No. 91).
- www.airnow.gov
- www.weather.com
- Heather Peterson, HASPI Curriculum Coordinator. www.haspi.org
- Edited by Janet Hoff-Kneier, HASPI Program Manager. www.haspi.org

Images (in order of appearance)

- https://www.lung.ca/children/images/grades7_12/the_respitatory_system.gif
- http://encyclopedia.lubopitko-bg.com/images/A%20spirogram.jpg
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