RESPIRATION: DATA ANALYSIS

**Essential Question:** *Who’s Coming to the Rescue?*

**Learning Targets:**

Students will:

- Explain the body as a system of interacting subsystems.
- Describe how respiratory distress affects heart rate.
- Analyze data to summarize results and report conclusions.

**Lesson Overview**

Young Allied Health professionals will continue exploring how respiratory distress affects heart rate by analyzing the data collected in the previous lesson. Students will work together to summarize their results and report conclusions. The respiration unit concludes with a reflective connection to home activity that digs deeper into the career of EMT.
Lesson Agenda

<table>
<thead>
<tr>
<th>Opening (10 min)</th>
<th>Work Time</th>
<th>Closure (10 min)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Human Bar Graph</td>
<td>• Review of the Respiratory System (15 min)</td>
</tr>
<tr>
<td></td>
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<td>• Data Analysis (20 min)</td>
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<tr>
<td></td>
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<td>• Writing to Learn (10 min)</td>
</tr>
<tr>
<td></td>
<td>• Writing to Learn (10 min)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• An EMT and Me: Postcard Home</td>
<td></td>
</tr>
</tbody>
</table>

Materials

- Young Allied Health Professional packet
- The Respiratory System video (to project)
- Colored pencils
- Controls, Variables, and Constants video (to project)

FACILITATION NOTES

Narrative Arc. The more each *Emergency Scenario* can be presented as if telling a story, the more engaged the audience will be. Work to avoid a stale reading and lean towards bringing the information to life as in a conversation or a “reveal” of the next chapter. Think of creative ways to make the story your own.

Data Interpretation. Students may be in various stages of understanding experimentation and analyzing the results of data. Be prepared to offer more scaffolding or modeling than what is scripted in this lesson for some students or the whole class.

IN ADVANCE

- Review the *Human Bar Graph* protocol, and set up the labels. The purpose of this activity is to assess student exercise in a physical representation of data.
- Preview The Respiratory System located at https://www.youtube.com/watch?v=RPdGQ-A_yM4. It provides a humorous but educational explanation of the Respiratory System for children. Laugh at the narrator with your students! It is a relatively short, comprehensive presentation that touches on the connection between the respiratory and circulatory systems. For a more academic video with additional vocabulary terms, see: https://www.youtube.com/watch?v=hc1YtXc_84A. Brain Pop (https://www.brainpop.com) also has a great library of educational videos that can be accessed through a school subscription.
Preview the Controls, Variables, and Constants video found at https://www.youtube.com/watch?v=KaiIoNnEZ9c. You can show from 1:47-4:25 for the crucial information on variables. For an alternative video, which includes additional information about control variables, see: http://study.com/academy/lesson/identifying-interpreting-independent-dependent-variables.html (1:30-3:04).


An interactive diagram is available at: https://www.innerbody.com/image_card06/card94.html

Vocabulary

<table>
<thead>
<tr>
<th>Content</th>
<th>Tier II</th>
</tr>
</thead>
<tbody>
<tr>
<td>respiration, respiratory rate, airway, circulation, oxygen, diaphragm, bronchi, trachea, lungs</td>
<td>variable, analyze, results, conclusion, probable, manipulate</td>
</tr>
</tbody>
</table>

Opening (10 min)

Human Bar Graph

As we saw in the Respiratory Distress Lab, our ability to perform physical activity was limited when our breathing was restricted. Today, we will be analyzing the data we collected by constructing a bar graph. What are the elements of a bar graph? **Listen for:** A title, a labeled x- and y-axis, and bars representing the data collected.

First, let’s explore bar graphs using a physical model. We use our respiratory system every day when we breathe, but how often do we put it to work during physical exercise?

1. **Tell** students that they are going to create a graph out of their bodies by standing in a line at the label that best represents their answer to the question.

2. **Invite** students to think about their answer to this question: Based on your behavior most days, how many hours in a typical week do you exercise? This can include running, walking, hiking, swimming, biking, playing sports, etc.
3. **Offer** students a personal example: *I like to play soccer____ hours every other day. That is ____ hours a week.* Then demonstrate your answer by standing in front of the appropriate label.

4. **Tell** students that the labels for the four possible choices on the bar graph are 0–2 hours, 2–4 hours, 4–6 hours, and 6+ hours.

5. **Invite** students to form a human bar graph by standing in the line that best represents their average amount of time spent exercising in a typical week.

   - When students have arranged themselves, ask for volunteers to describe their exercise habits and to tell what they notice about the graph. Ask for a student volunteer to record the class’ answers in a bar graph.
   - Point out the basic elements of a bar graph (x and y axis, data points)

6. **Invite** students to return to their seats.

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**Work Time**

**Review of Respiratory System (15 min)**

**Distribute** the *<Respiratory System Coloring Page>* and colored pencils.

*Today, you are going to learn about respiratory distress in a hands-on lab activity. Before we proceed, you will need to be familiar with the basic structures of the respiratory system. What are the parts of the respiratory system? What functions do they perform?*

1. **Invite** students to close their eyes and inhale deeply, then exhale completely.

   - **Ask:** *What are the structures of the respiratory system that work to make our bodies breathe?*
   - **Listen for:** Lungs, trachea, nose, bronchi, mouth.
   - **Ask:** *How do you think the respiratory system works to bring oxygen into your body?*
   - **Listen for:** Answers will vary at this point.


3. In their student packets, students should **write** a summary of how the respiratory system works, using the vocabulary/labels from the coloring page and the information they learned from the video.

   - **The YP’s should color** each part of the system a different color.
Encourage collaboration.

4. Invite volunteers to share out their completed work and summaries.

- The point is not for students to memorize the parts of the respiratory system, but to have a basic familiarity with the system’s functions that will help them contextualize the Respiratory Distress Lab.

Data Analysis (20 min)

The Health Sciences is an applied science, meaning it is used in the real world. Health Science involves knowing things about biology, chemistry, and physics, as well as understanding how to answer scientific questions. Those answers are often in the form of numbers, like your data tables from the lab exercise. These numbers then need to be analyzed, usually in the form of a graph. We are now going to interpret and analyze our data from the lab by creating a bar or line graph.

1. Distribute the <Respiratory Distress Lab Graph>.
2. Point out that the horizontal axis of the graph is the x-axis and the vertical axis of the graph is the y-axis. Highlight that this graph should have two y-axes labeled because two different data sources were collected: respiratory rate and pulse. They have different measurements and so need different bars/lines of reference.
3. Model how to plot two points of data on your graph on the projector or on the board. Show students how to plot points for a line graph and how to draw bars for a bar graph, so they can choose either format in their analysis.
5. Point out that in this lab, we conducted an experiment because we actively manipulated variables.
6. Ask: What are the variables in this experiment?
   - Use equity sticks to call on a student to answer.
   - Listen for: The size of the straw, exercise or no exercise, heart rate, and respiratory rate.

7. Provide time for pairs to create their graphs.
   - Each person in the pair should have a completed graph, even if they are sharing their ideas.
8. Circulate and help the young professionals as needed.
Writing to Learn (10 min)

1. Distribute the <Respiratory Rate Reflection Questions>.
2. Tell the young professionals that they should answer the reflection questions using their graphs.
3. When the reflection questions are answered, invite the lab groups to work together to share their answers and revise if needed.

Closure (10 min)

An EMT and Me: Postcard Home

If you enjoy the thought of not only helping people, but also being on the front lines of medical care, entering an unknown situation, and figuring out the problem under pressure, then the job of EMT, paramedic, or emergency room nurse or doctor is for you. Each of those careers have varying levels of required training, from certification programs, to two-year or four-year colleges, or the commitment to get through medical school. In an emergency, the EMT and paramedic play very important roles, as their care can mean the difference between life and death. In this short closure activity, you will think about what elements of the EMT or paramedic career appeal to you—or don’t.

When EMT’s are in college training, they participate in what’s known as “ride time.” This means they shadow a working EMT or paramedic to learn about the career and gain experience. In the past two lessons you have experienced a hint of the work of an Allied Health first responder by evaluating a patient and learning through the scenarios.

1. Ask the YPs to imagine sharing their experience as a first responder with a friend or family member.
2. Invite the YPs to create a postcard that describes the emergency situation and how they helped respond.
3. Ask the YPs to think of 2-3 things they might enjoy about the career of an EMT and a few things they might not like.
   - Highlight the scenarios as resources to find additional details and information.
   - Model the expectations projecting a postcard exemplar.
4. Distribute notecards and optional markers.
   - Encourage students to create an illustration on one side.
o On the other side, students should **write** 2-3 things they enjoyed about the career of EMT, as well as a few things they may not have liked.

o **Remind** them to include their name.
Today’s Learning Objectives:

I can:
- Explain the body as a system of interacting subsystems.
- Describe how respiratory distress affects heart rate.
- Analyze data to summarize results and report conclusions.

I will continue exploring how respiratory distress affects heart rate by analyzing the data collected in the previous lesson. I will work with my group to summarize our results and report conclusions. The respiration unit concludes with a reflective connection to home activity that digs deeper into the career of EMT.

Today’s Activities:

- Human Bar Graph
- Review: The Respiratory System
- Data Analysis
- Writing to Learn
- Lenses on the Future: An EMT and Me
Respiratory System

During inspiration, air passes through the mouth and nose, down the throat, and through the trachea and bronchi to the lungs.

In the lungs, air travels through branching bronchioles which end in small clusters of microscopic sacs called alveoli.

Oxygen molecules are transferred from the alveoli into the bloodstream, and carbon dioxide moves out of the bloodstream and back into the respiratory tract where it is released through the mouth and nose during expiration.
Respiratory Rate Reflection Questions

1. How did the straws represent different levels of respiratory distress?

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

2. Describe how the respiratory rate was affected by mild, medium, and severe respiratory distress in this lab.

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

3. Describe how the pulse was affected by mild, medium, and severe respiratory distress in this lab.

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____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
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 of the test subject?

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
Facilitator Documents:

An EMT and Me: A Postcard Home

Front:

Small illustration: Description of emergency scenario and how you responded (using knowledge from the lesson):

Signed Name

Back:

2-3 things you might like or dislike about the career of EMT: