Remember the Respiratory System
Apnea
Dyspnea
Hypoxia
“pneumo”
pulmonary

Rhino
Nare(s)
Epistaxis
ENT or EENT
Acute vs Chronic

2.05 Remember the structures of the respiratory system
11) **Outline the gross normal structure and function of all body systems and summarize appropriate medical texts in order to relate sign and symptoms of common diseases and disorders associated with each.**

   *(the respiratory system)*
OBJECTIVES

- Identify the structures and functions of the respiratory system
- Measure respiratory rates
- Discuss the costs and health risk associated with smoking
What is the respiratory system?
The respiratory system consists of the nose, pharynx, larynx, trachea, bronchi, and lungs.

The primary function of this system is to furnish oxygen for individual tissue cells, and to take away the waste products and carbon dioxide produced by those same cells.
Structures of the respiratory system

**UPPER RESPIRATORY SYSTEM**
- Nose
- Sinuses
- Pharynx
- Larynx

**LOWER RESPIRATORY SYSTEM**
- Trachea
- Lungs
Structures of the Upper Respiratory System

**Nose**

**Nasal cavity** — space behind the nose
- Vestibular region
- Olfactory region
- Respiratory region

**Nasal septum** — cartilage that divides the nose into right and left sides

**Turbinates (Choncae)** — scroll-like bones in the respiratory region

**Cilia** — nose hairs

Why do we have nose hair?
The nose has 5 functions:

1. It serves as an air passageway.
2. It warms and moistens inhaled air.
3. Its cilia and mucous membrane trap dust, pollen, bacteria, and foreign matter.
4. It contains olfactory receptors, which smell odors.
5. It aids in phonation and the quality of voice.
Structures of the Upper Respiratory System

**Sinuses** - Cavities in the skull.

- Ducts connect sinuses to the nasal cavity
- Lined with mucous membrane to warm and moisten the air
- Provide resonance to the voice

2.05 Remember the structures of the respiratory system
Structures of the Upper Respiratory System

**PHARYNX**

- Throat
  - Nasopharynx
  - Oropharynx
  - Laryngopharynx
- About 5” long

The pharynx is the correct term for the throat. It is a muscular and membranous tube that is about 5 inches long, extending downward from the base of the skull. It eventually becomes the esophagus.
The pharynx...

There are 7 openings into the pharynx.

In the nasopharynx, there are two openings from the eustachian tubes of the ear ○, and two openings from the posterior nares of the nose ○.

In the oropharynx is one opening from the mouth ○.
Discuss:

- What are some examples of how all of these openings relate or "communicate"?
- How do these structures affect each other?
- How do complications of these altogether affect a person?
The pharynx...

The pharynx also contains 3 pairs of tissues that are part of the lymphatic system:

1. the pharyngeal tonsils... the adenoids
2. the palatine tonsils
3. the lingual tonsils

The pharynx has 3 functions:

1. serves as a passageway for air
2. serves as a passageway for food
3. aids in phonation by changing its shape.
The larynx...

The larynx, commonly called the voicebox, is located at the upper end of the trachea, below the root of the tongue and hyoid bone. It is lined with mucous membrane.

The larynx contains vocal cords, which produce sound. Short, tense vocal cords produce high notes; long relaxed vocal cords produce low notes.
The larynx...

We can see several of the cartilage structures of the larynx in this side view:

1. The thyroid cartilage or Adam’s apple is usually larger in the male, allowing longer vocal cords and contributing to a deeper male voice.

2. The epiglottis covers the entrance of the larynx while swallowing, to avoid choking.

3. The cricoid (KRY koid) cartilage contains the vocal cords.
Structures of the Lower Respiratory System

**TRACHEA**

- The trachea or **windpipe** is a smooth, muscular tube leading from the larynx to the main bronchi.
  - Approximately 4 ½” long
  - The walls are composed of alternate bands of membrane and **C-shaped rings of hyaline** cartilage.
  - Lined with ciliated mucous membrane
The trachea is the passageway for air to and from the lungs. It is lined with cilia (hairs), which sweep foreign matter out of the pathway.

Cartilage rings prevent crushing of the trachea

C-shaped rings of cartilage provide protection on the front and sides
Structures of the Lower Respiratory System

- At the lower end of trachea, the bronchus divide into right and left branches.

- As they enter the lungs, the bronchus subdivide into bronchial tubes and into bronchioles.

- At the end of the bronchioles are alveolar ducts and clusters of alveoli.
2.05 Remember the structures of the respiratory system

**Structures of the Lower Respiratory System**

- **BRONCHI**
  - Ciliated mucous membrane and hyaline cartilage

- **BRONCHIAL TUBES**
  - Cartilaginous plates

- **BRONCHIOLES**
  - Thinner walls of smooth muscle
  - Lined with ciliated epithelium
Structures of the Lower Respiratory System

ALVEOLI

- Composed of a single layer of epithelial tissue
- Contain surfactant—mixture of lipids and proteins that reduces surface tension
- Each alveolus is surrounded by capillaries

- Why do we cough?
- Why do we yawn?
The lungs... At the end of each bronchiole are the alveoli (al VEE oh lye). The lungs contain about 300 million alveoli sacs, which are the air cells where the exchange of oxygen and carbon dioxide takes place with the capillaries.

Deoxygenated blood comes in and drops off CO2; oxygenated blood goes out.
Structures of the
Lower Respiratory System

- The lungs are located in the thoracic cavity
  - Apex
  - Base
- Fit snugly over diaphragm.
- Lung tissue is porous and spongy.
  - **Right lung**
    - Larger than the left lung
    - Displaced by the liver
    - 3 lobes
  - **Left lung**
    - Smaller than the right side
    - Displaced by the heart
    - 2 lobes

“Pulmonary”- anything relating to the lungs.
What makes the lungs “spongy”?

2.05 Remember the structures of the respiratory system
What bones protect the lungs? What could possibly happen if these bones were broken?

Why do we hiccup?
Structures of the Lower Respiratory System

**PLEURA**

- Thin, moist slippery membrane that covers lungs
- Double-walled sac
- Space is pleural cavity – filled with pleural fluid
- Discuss: Why do we need pleural fluid?
Structures of the Lower Respiratory System

**MEDIASTINUM**

- A septum or cavity between two principal portions of an organ.
  - Contains the heart and its large vessels, trachea, esophagus, thymus, lymph nodes, and connective tissue
- Also called the interpleural space
- Located between the lungs
2.05 Remember the structures of the respiratory system

https://www.youtube.com/watch?v=kacMYexDgHg
RESPIRATORY MOVEMENT

- 1 inspiration + 1 expiration = 1 respiration
- Normal adult = 14-20 respirations per minute
- Increases with exercise, body temperature and certain diseases
- Newborn - 40-60 /minute
- Sleep – respiration decrease
- Emotions can increase or decrease rates

2.05 Remember the structures of the respiratory system
ACTIVITY WITH A PARTNER:
Measuring Respiratory Rate

- Participant and Investigator
- Time each other breathing for one minute:
  1) at rest
  2) walking in place for one minute
  3) jogging in place for one minute
- Write down your results. Explain how exercise affects breathing in 2-3 sentences.
INDIVIDUAL ACTIVITY: Trace the Flow of Air in the Respiratory System

- Make a chart using boxes and arrows pointing the way oxygen travels through all of the structures of the respiratory system.
- Make sure you end and note where the exchange of oxygen and carbon dioxide occurs.
- After this explain what happens to your voice if you have a sinus cold in 2-3 sentences.
Let’s review the structures of the respiratory system …
Of all body systems we have discussed so far...which is the most important to you?
Day 2 Bellwork: Make a T-Graph

- Compare and Contrast the following two careers related to the respiratory system:
  - Pulmonologist
  - Thoracic Surgeon
- (List as many similarities and differences you can find; use your book and then your technology).
12) Relate a therapeutic procedure or treatment to a specific body system. Create a digital or written artifact explaining anatomy involved with the treatment, reason for treatment, health care professionals assisting or performing treatment and patient education, including precautions that should occur prior to the treatment or procedure.
Objectives

- Identify respiratory diseases/disorders and their treatments.
- Discuss risks of smoking
Make Graphic Organizer: (Make sure you have nine empty spaces).

- Bronchitis
- Tuberculosis
- Emphysema
- Pleural Fluid
- Pneumothorax
- Pulmonary Embolism
- Lung Cancer
- COPD
- Pneumonia
Bronchitis

- Infection of the mucous membrane of the trachea and bronchial tubes
- **Acute** - Cough, fever, substernal pain, RALES (raspy sounds), wheezing
- **Chronic** - over 40 years, smoking common cause
- Treat with pain meds, anti-inflammatory, or antibiotics.
- X-ray, allergy tests, other tests to verify source.
- KEEP HANDS WASHED!!!
- QUIT SMOKING!!!!!!
Tuberculosis

- Highly infectious bacterial lung disease
- Increased incidence due to AIDS, increased illegal immigration, homelessness (low immune systems)
- Cough, low grade fever in the afternoon, weight loss, night sweats
- Antibiotics and anti tuberculosis drugs for 1-2 years
- You cannot work in a healthcare facility until your symptoms are cleared.
Emphysema

- Alveoli become over-dilated, loss their elasticity
- Alveoli may rupture
- Air becomes trapped, can’t exhale – forced exhalation required
- Reduced blood levels of O₂ and CO₂
- Alleviate the symptoms, decrease exposure to irritants, prevent infections
- QUIT SMOKING!!!!
Emphysema

PATHOPHYSIOLOGY OF EMPHYSEMA
Pleural Effusion: Abnormal amount of fluid surrounding the pleural space.

- **Leakage from other organs:** This is usually from **congestive heart failure** (when your heart doesn’t pump blood to your body properly). But it can also come from liver or kidney disease when fluid builds up in your body and leaks into the pleural space.

- **Cancer:** Usually lung cancer is the problem, but other cancers that have spread to the lung or pleura can cause it, too.

- **Infections:** Examples are pneumonia or tuberculosis.

- **Autoimmune conditions:** Examples are lupus or rheumatoid arthritis.

- **Pulmonary embolism:** This is a blockage in an artery in one of your lungs.

2.05 Remember the structures of the respiratory system
Pleural effusion treatment: Thoracentesis with possible chest tube.

- This fluid can be various colors due to its cause.
- Heart surgery - red
- Infection - dark yellow, brown, red, purulent
- Sepsis - brown, bloody
- Not to be confused with pneumonia!!
Pleural effusion imaging.

Ultrasound  

Cat Scan

Thoracentesis Video

2.05 Remember the structures of the respiratory system
Pneumothorax

- **Chest injury.** Any blunt or penetrating injury to your chest can cause lung collapse. Some injuries may happen during physical assaults or car crashes, while others may inadvertently occur during medical procedures that involve the insertion of a needle into the chest.

- **Lung disease.** Damaged lung tissue is more likely to collapse. Lung damage can be caused by many types of underlying diseases, including chronic obstructive pulmonary disease (COPD), cystic fibrosis and pneumonia.

- **Ruptured air blisters.** Small air blisters (blebs) can develop on the top of your lung. These blebs sometimes burst — allowing air to leak into the space that surrounds the lungs.

- **Mechanical ventilation.** A severe type of pneumothorax can occur in people who need mechanical assistance to breathe. The ventilator can create an imbalance of air pressure within the chest. The lung may collapse completely.

- **What do you think a spontaneous pneumothorax is?**
Pneumothorax
(sometimes challenging to see)

Chest tube video

2.05 Remember the structures of the respiratory system
Drain nurse or tech will monitor this daily.

Pigtail Catheter Placement
For Traumatic Pneumothorax

2.05 Remember the structures of the respiratory system
Pulmonary Embolism

- Blood clot breaks off and travels to the lungs
- Occurs after surgery or when a person has been on bed rest.
- Common in smokers and those sitting for long periods of time (ex. Truck drivers)
- Sudden severe chest pain, dyspnea; similar to heart attack
- Lung scan, CT, arteriogram
- Anticoagulant therapy
- QUIT SMOKING!!!
If anticoagulants don’t work??

- Surgery to remove clot
- Pulmonary Arteriogram and drip blood thinners
- IVC filter (inferior vena cava filter) to catch large clot
Jigsaw Activity:

- Answer as many questions as you can from the disease and disorder activity on your own sheet of paper.
- Include illustrations and the most important facts on your poster to help you present to the class.
- Lung Cancer
- Pneumonia (various types, bacterial vs. viral)
- Chronic Obstructive Pulmonary Disease (COPD)
smoking material and videos

Question: What two actions can be taken to avoid most respiratory disease and disorders?

2.05 Remember the structures of the respiratory system