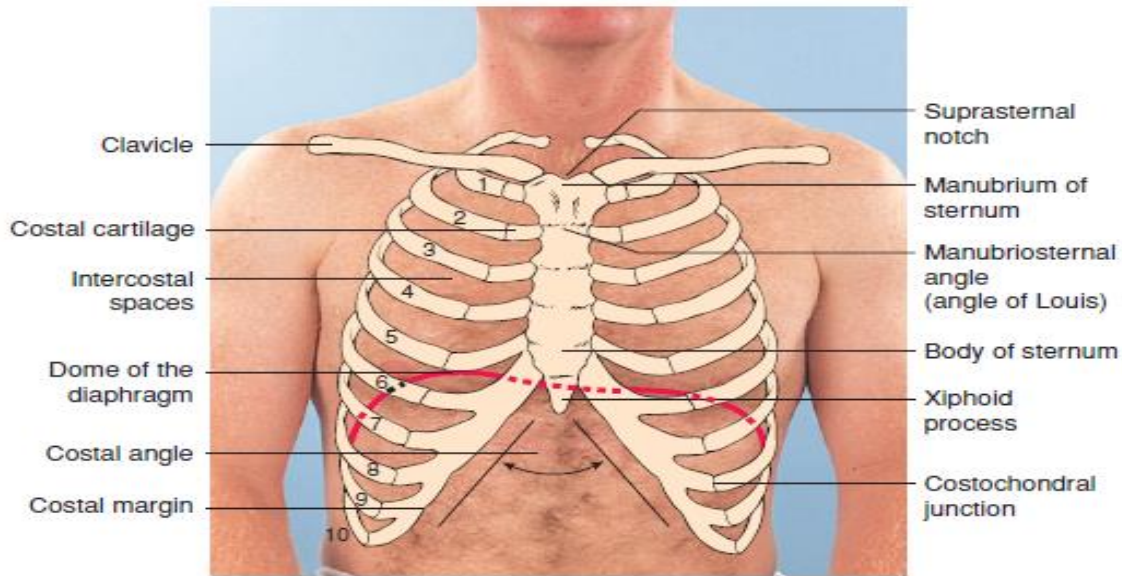


## Module Four

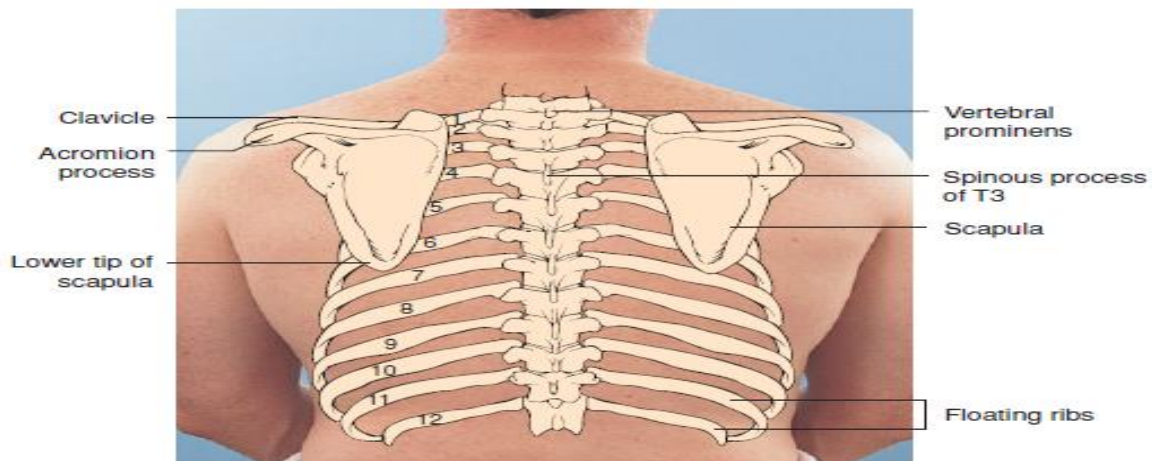


# Physical examination of Respiratory Assessment

**THORACIC CAGE:**



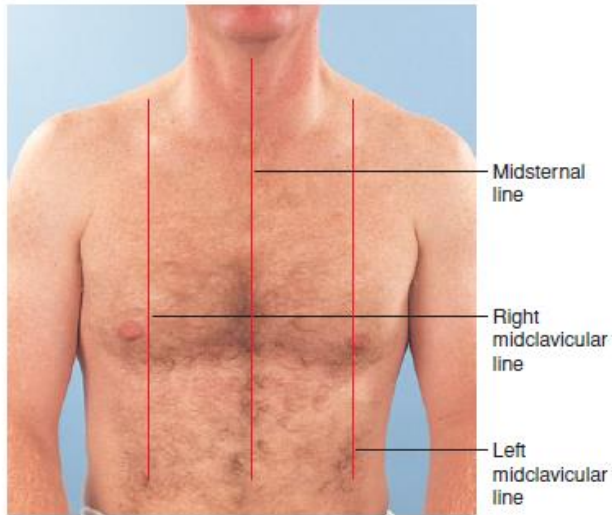
**Anterior thoracic cage**



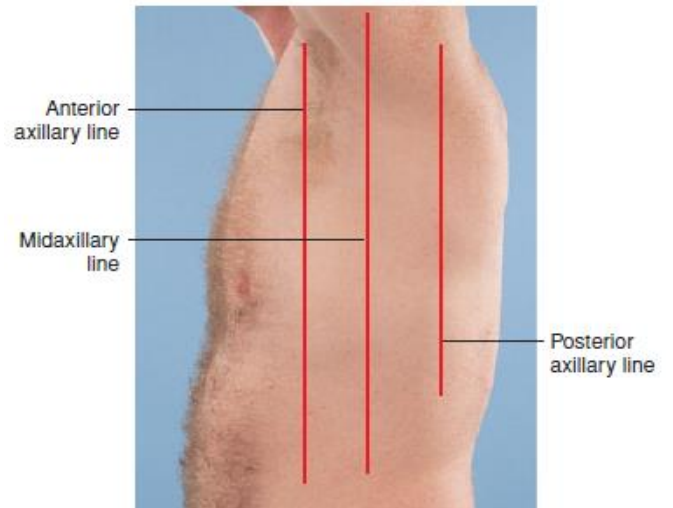
**Posterior thoracic cage**

## Reference lines:

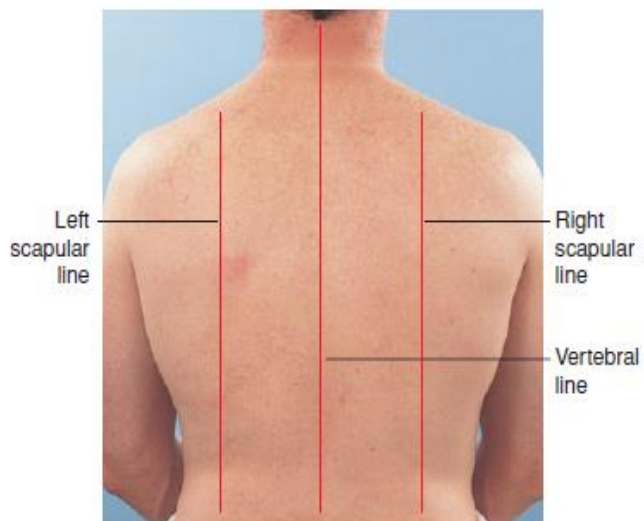
### Anterior vertical lines



### Lateral vertical line

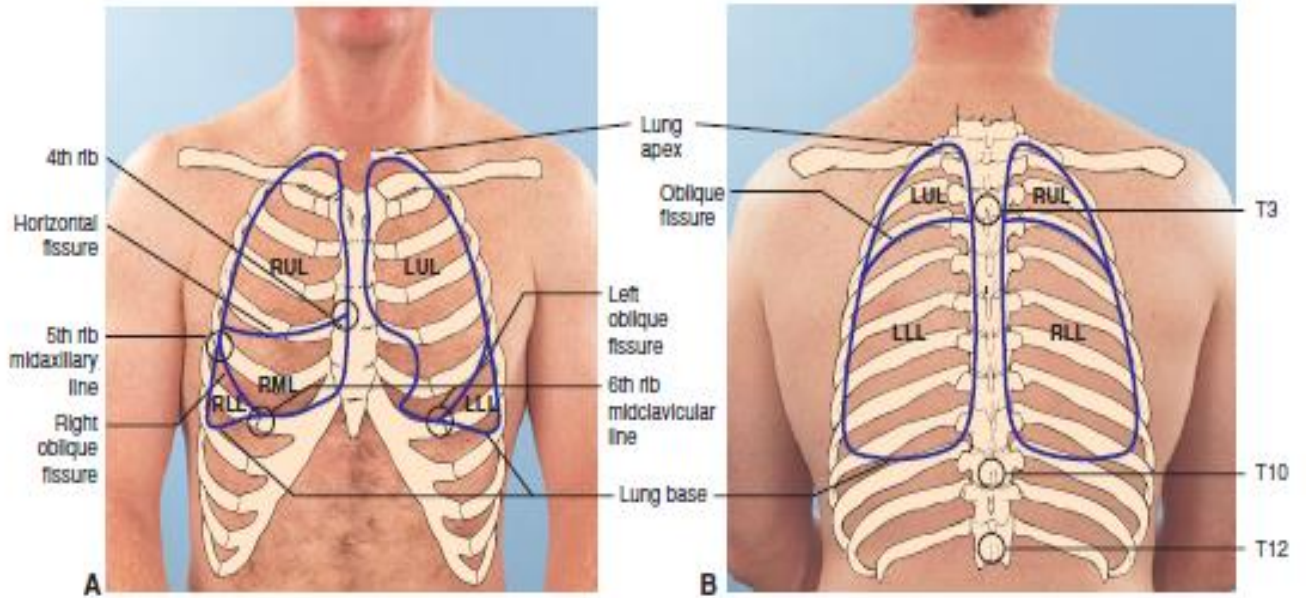


### Posterior vertical lines

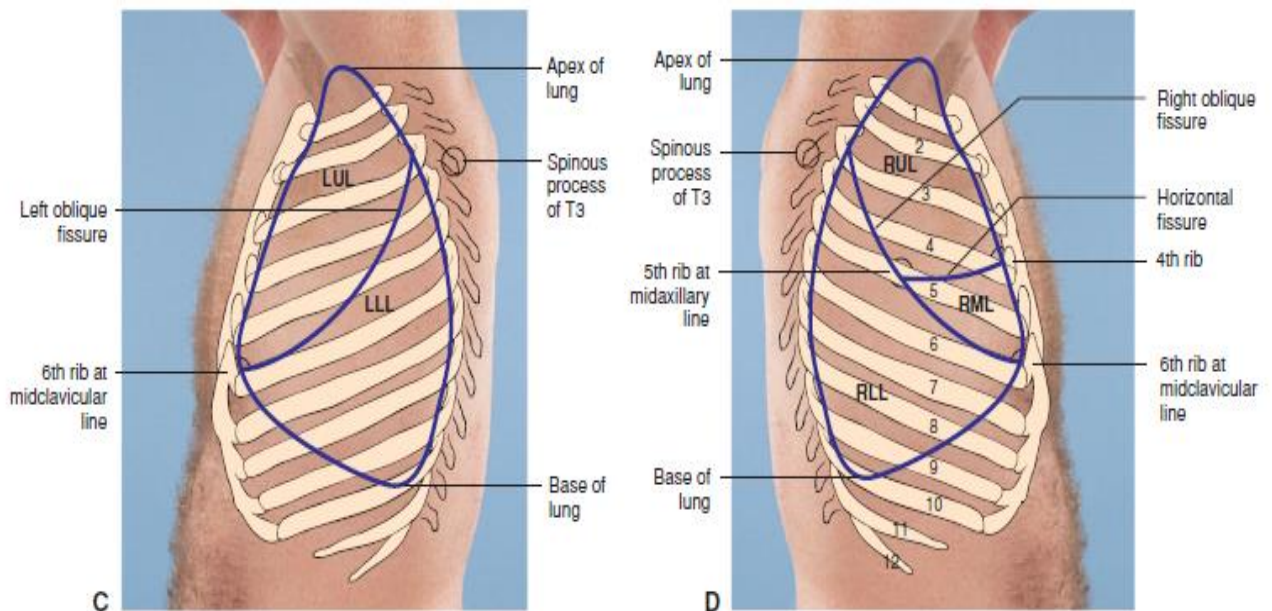




### Position of the Lungs:



**(A) Anterior view of lung position (B) Posterior view of lung position**



**(C) Lateral view of left lung position (D) Lateral view of Right lung position**

**Equipment:**

- EXAMINATION GOWN AND DRAPE
- GLOVES
- STETHOSCOPE
- LIGHTSOURCE
- MASK
- SKIN MARKER
- METRIC RULER



| Assessment Procedure                                       | Normal finding  | Abnormal finding   |
|--|---|--|
| <b>General Inspection</b>                                  |   |  |
| <b>Inspect for nasal flaring and pursed lip breathing.</b> | Nasal flaring is not observed.  | Nasal flaring is seen with labored respirations (especially in small children) and is indicative of hypoxia.<br><br>Pursed lip breathing may be seen in asthma, emphysema, or CHF.   |
| <b>Observe color of face, lips, and chest.</b>             | The client has evenly colored skin tone, without unusual or prominent discoloration.                                | Ruddy to purple complexion may be seen in clients with COPD or CHF as a result of polycythemia. Cyanosis may be seen if client is cold or hypoxic.<br><br>Cyanosis makes white skin appear blue-tinged, especially in the perioral, nailbed, and conjunctival areas. Dark skin appears blue, dull, and lifeless in the same areas. |
| <b>Inspect color and shape of nails.</b>                   | Pink tones should be seen in the nailbeds. There is normally a 160-degree angle between the nail base and the skin. | Pale or cyanotic nails may indicate hypoxia. Clubbing can occur from hypoxia.  |

**Posterior Thorax**

**INSPECTION**

**Inspect configuration.** While the client sits with arms at the sides, stand behind the client and observe the position of scapulae and the shape and configuration of the chest wall.



Normal chest configuration.



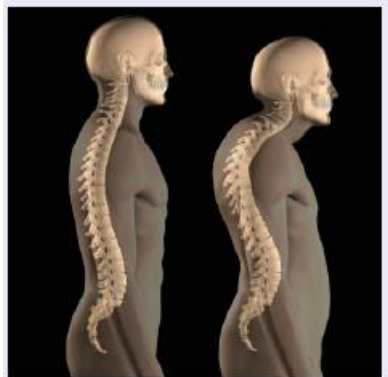
Scapulae are symmetric and nonprotruding. Shoulders and scapulae are at equal horizontal positions. The ratio of anteroposterior to transverse diameter is 1:2.

Spinous processes appear straight, and thorax appears symmetric, with ribs sloping downward at approximately a 45-degree angle in relation to the spine.

**OLDER ADULT CONSIDERATIONS**

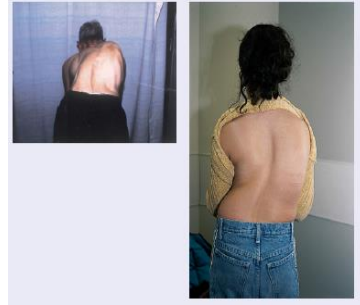
Kyphosis (an increased curve of the thoracic spine) is common in older. It results from a loss of lung resiliency and a loss of skeletal muscle. It may be a normal finding.

Kyphosis.



Spinous processes that deviate laterally in the thoracic area may indicate scoliosis.

Scoliosis.





Spinal configurations may have respiratory implication. Ribs appearing horizontal at an angle greater than 45 degrees with the spinal column are frequently the result of an increased ratio between the anteroposterior transverse diameter (barrel chest).

Barrel chest.



This condition (barrel chest) is commonly the result of emphysema due to hyperinflation of the lungs.

|  |  |   |
|--|--|---|
| <p><b>Observe use of accessory muscles.</b><br/>Watch as the client breathes and note use of muscles.</p>  | <p>The client does not use accessory (trapezius/ shoulder) muscles to assist breathing.</p>                | <p>Trapezius, or shoulder, muscles are used to facilitate inspiration in cases of acute and chronic airway obstruction or atelectasis.</p>  |
| <p><b>Inspect the client's positioning.</b> Note the client's posture and ability to support weight while breathing comfortably.</p>   | <p>Client should be sitting up and relaxed, breathing easily with arms at sides or in l</p>                | <p>Client leans forward and uses arms to support weight and lift chest to increase breathing capacity, referred to as the tripod position. This is often seen in COPD.</p>    |
| <p><b>PALPATION</b></p>  |  |   |
| <p><b>Palpate for tenderness and sensation.</b> Palpation may be performed with one or both hands, but the sequence of palpation is established. Use your fingers to palpate for tenderness, warmth, pain, or other sensations. Start toward the midline at the level of the left scapula (over the apex of the left lung) and move your hand left to right, comparing findings bilaterally. Move systematically downward and out to cover the lateral portions of the lungs at the bases.</p>  | <p>Client reports no tenderness, pain, or unusual sensations. Temperature should be equal bilaterally.</p> | <p>Tender or painful areas may indicate fibrous connective tissue.</p> <p>Pain over the intercostal spaces may be from inflamed pleurae.</p> <p>Pain over the ribs is a symptom of fractured ribs.</p> <p>Muscle soreness from exercise or the excessive work of breathing (as in COPD) may be palpated as tenderness.</p> <p>Increased warmth may be related to local infection.</p> |



|   |   |  |
|---|---|--|
| <p><b>Palpate for crepitus.</b> Crepitus, also called subcutaneous emphysema, is a crackling sensation (like bones or hairs rubbing against each other) that occurs when air passes through fluid or exudate. Use your fingers and follow the sequence when palpating.</p>  | <p>The examiner finds no palpable crepitus.</p>   | <p>Crepitus can be occurs after an open thoracic injury, around a chest tube or tracheostomy. It also may be palpated in areas of extreme congestion or consolidation. In such situations, mark margins and monitor to note any decrease or increase in the crepitant area.</p>  |
| <p><b>Palpate for fremitus.</b> Following the sequence described previously, use the ball or ulnar edge of one hand to assess for fremitus (vibrations of air in the bronchial tubes transmitted to the chest wall). As you move your hand to each area, ask the client to say “ninety-nine.” Assess all areas for symmetry and intensity of vibration.</p> <p><b>CLINICAL TIP</b></p> <p>The ball of the hand is best for assessing tactile fremitus because the area is especially sensitive to vibratory sensation</p> | <p>Fremitus is symmetric and easily identified in the upper regions of the lungs. If fremitus is not palpable on either side, the client may need to speak louder. A decrease in the intensity of fremitus is normal as the examiner moves toward the base of the lungs. However, fremitus should remain symmetric for bilateral positions.</p> | <p>Unequal fremitus is usually the result of consolidation (which increases fremitus)</p> <p>Bronchial obstruction, air trapping in emphysema, pleural effusion, or pneumothorax (which all decrease fremitus).</p> <p>Diminished fremitus even with a loud spoken voice may indicate an obstruction of the tracheobronchial tree.</p> |



**Assess chest expansion.** Place your hands on the posterior chest wall with your thumbs at the level of T9 or T10 and pressing together a small skin fold. As the client takes a deep breath, observe the movement of your thumbs.



When the client takes a deep breath, the examiner's thumbs should move 5 to 10 cm apart symmetrically.

**OLDER ADULT  
CONSIDERATIONS**

Because of calcification of the costal cartilages and loss of the accessory musculature, the older client's thoracic expansion may be decreased, although it should still be symmetric.

Unequal chest expansion can occur with severe atelectasis (collapse or incomplete expansion), pneumonia, chest trauma, or pneumothorax (air in the pleural space).

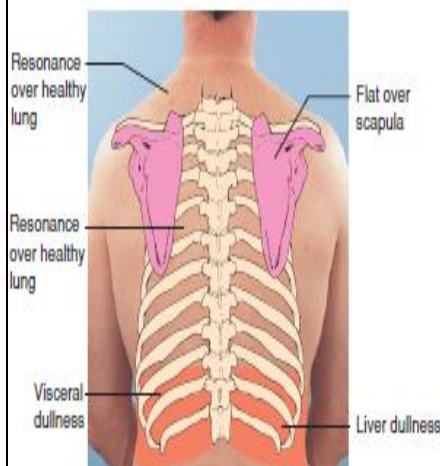
Decreased chest excursion at the base of the lungs is characteristic of COPD. This is due to decreased diaphragmatic function.

**PERCUSSION**

**Percuss for tone.** Start at the apices of the scapulae and percuss across the tops of both shoulders. Then percuss the intercostal spaces across and down, comparing sides. Percuss to the lateral aspects at the bases of the lungs, comparing sides.



Resonance is the percussion tone elicited over normal lung tissue. Percussion elicits flat tones over the scapula.



Hyperresonance is elicited in cases of trapped air such as in emphysema or pneumothorax.

**Percuss for diaphragmatic excursion.**

Ask the client to exhale forcefully and hold the breath. Beginning at the scapular line (T7), percuss the intercostal spaces of the right posterior chest wall. Percuss downward until the tone changes from resonance to dullness. Mark this level and allow the client to breathe. Next ask the client to inhale deeply and hold it. Percuss the intercostal spaces from the mark downward until resonance changes to dullness. Mark the level and allow the client to breathe. Measure the distance between the two marks. Perform this assessment technique on both sides of the posterior thorax.



Excursion should be equal bilaterally and measure 3–5 cm in adults.

The level of the diaphragm may be higher on the right because of the position of the liver.

In well-conditioned clients, excursion can measure up to 7 or 8 cm.

Dullness is present when fluid or solid tissue replaces air in the lung or occupies the pleural space, such as in lobar pneumonia, pleural effusion, or tumor.

Diaphragmatic descent may be limited by atelectasis of the lower lobes or by emphysema

Other possible causes for limited descent can be pain or abdominal changes such as extreme ascites, tumors, or pregnancy.

Uneven excursion may be seen with inflammation from unilateral pneumonia, damage to the phrenic nerve, or splenomegaly

**AUSCULTATION**

**Auscultate for breath sounds.** To best assess lung sounds, you will need to hear the sounds as directly as possible. Do not attempt to listen through clothing or a drape, which may produce additional sound or muffle lung sounds that exist. To begin, place the diaphragm of the stethoscope firmly and

Three types of normal breath sounds may be auscultated—bronchial, bronchovesicular, and vesicular.

**CLINICAL TIP**

Breath sounds are considered normal only in the area specified. Heard elsewhere, they are

Diminished or absent breath sounds often indicate obstruction within the lungs as a result of secretions, mucus plug, or a foreign object

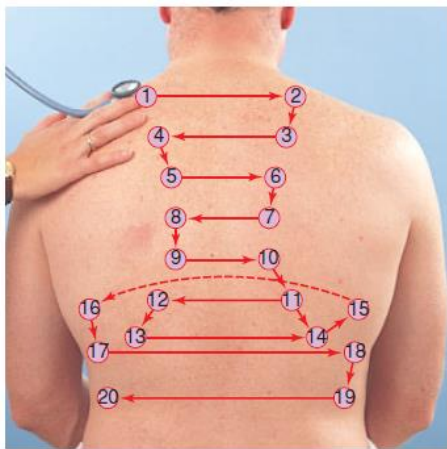
. It may also indicate abnormalities of the pleural space such as pleural thickening, pleural effusion, or

directly on the posterior chest wall at the apex of the lung at C7. Ask the client to breathe deeply through the mouth for each area of auscultation (each placement of the stethoscope) in the auscultation sequence so that you can best hear inspiratory and expiratory sounds. Be alert to the client's comfort and offer times for rest and normal breathing if fatigue is becoming a problem.

### OLDER ADULT CONSIDERATIONS

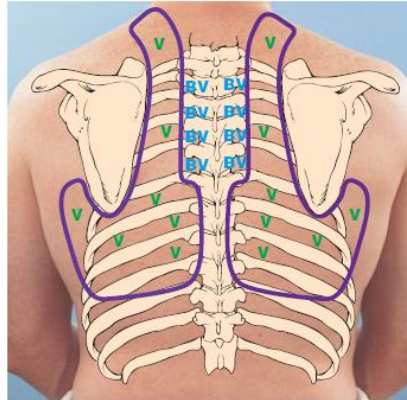
Deep breathing may be especially difficult for the older client, who may fatigue easily. Thus offer rest as needed.

Auscultate from the apices of the lungs at C7 to the bases of the lungs at T10 and later- ally from the axilla down to the seventh or eighth rib. Listen at each site for at least one complete respiratory cycle. Follow the auscultating sequence shown.



considered abnormal sounds. For example, bronchial breath sounds are abnormal if heard over the peripheral lung fields.

locations of normal breath sounds:



Sometimes breath sounds may be hard to hear with obese or heavily muscled clients due to increased distance to underlying lung tissue.



pneumothorax.

In cases of emphysema, the hyperinflated nature of the lungs, together with a loss of elasticity of lung tissue, may result in diminished inspiratory breath sounds.

Increased (louder) breath sounds often occur when consolidation or compression results in a denser lung area that enhances the transmission of sound.

|  |  |  |
|--|--|--|
| <p><b>Auscultate for adventitious sounds.</b> Adventitious sounds are sounds added or superimposed over normal breath sounds and heard during auscultation. Be careful to note the location on the chest wall where adventitious sounds are heard as well as the location of such sounds within the respiratory cycle.</p>   | <p>No adventitious sounds, such as crackles (discrete and discontinuous sounds) or wheezes (musical and continuous), are auscultated.</p>  | <p>Adventitious lung sounds, such as crackles (formerly called rales) and wheezes (formerly called rhonchi) are evident.</p> <p><b>CLINICAL TIP</b></p> <p>If you hear an abnormal sound during auscultation, always have the client cough, then listen again and note any change. Coughing may clear the lungs.</p>   |
| <p><b>Auscultate voice sounds.</b></p> <p>Bronchophony: Ask the client to repeat the phrase “ninety-nine” while you auscultate the chest wall.</p> <p>Egophony: Ask the client to repeat the letter “E” while you listen over the chest wall.</p> <p>Whispered pectoriloquy: Ask the client to whisper the phrase “one–two–three” while you auscultate the chest wall.</p> | <p>Voice transmission is soft, muffled, and indistinct. The sound of the voice may be heard but the actual phrase cannot be distinguished.</p> <p>Voice transmission will be soft and muffled but the letter “E” should be distinguishable.</p> <p>Transmission of sound is very faint and muffled. It may be inaudible.</p> | <p>The words are easily understood and louder over areas of increased density. This may indicate consolidation from pneumonia, atelectasis, or tumor.</p> <p>Over areas of consolidation or compression, the sound is louder and sounds like “A.”</p> <p>Over areas of consolidation or compression, the sound is transmitted clearly and distinctly. In such areas, it sounds as if the client is whispering directly into the stethoscope.</p> |

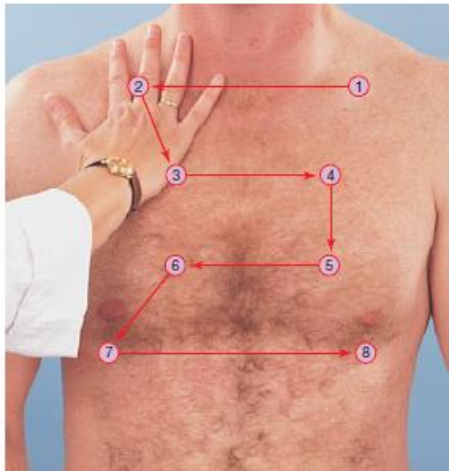


| <b>Anterior Thorax</b>  |   |  |
|---|---|--|
| <b>Inspection</b>   |   |  |
| <p><b>Inspect for shape and configuration.</b><br/>Have the client sit with arms at the sides. Stand in front of the client and assess shape and configuration.</p> | <p>The anteroposterior diameter is less than the transverse diameter. The ratio of anteroposterior diameter to the transverse diameter is 1:2.</p>  | <p>Anteroposterior equals transverse diameter, resulting in barrel chest. This is often seen in emphysema because of hyperinflation of the lungs.</p>  |
| <p><b>Inspect position of the sternum.</b><br/>Observe the sternum from an anterior and lateral viewpoint.</p>  | <p>Sternum is positioned at midline and straight.</p> <p><b>OLDER ADULT CONSIDERATIONS</b></p> <p>The sternum and ribs may be more prominent in the older client because of loss of subcutaneous fat.</p> | <p>Pectus excavatum is a markedly sunken sternum and adjacent cartilages (often referred to as funnel chest). It is a congenital malformation that seldom causes symptoms other than self-consciousness.</p> <p><b>Pectus excavatum (funnel chest).</b></p>  <p>Pectus carinatum is a forward protrusion of the sternum causing the adjacent ribs to slope back ward (often referred to as pigeon chest). Both conditions may restrict expansion of the lungs and decrease lung capacity.</p> <p><b>Pectus carinatum (pigeon chest).</b></p>  |

|  |   |   |
|--|---|---|
| <p><b>Watch for sternal retractions.</b></p>   | <p>Retractions not observed.</p>  | <p>Sternal retraction are noted, with severely labored breathing.</p>   |
| <p><b>Observe quality and pattern of respiration.</b> Note breathing characteristics as well as rate, rhythm, and depth.</p> <p><b>CLINICAL TIP</b></p> <p>When assessing respiratory patterns, it is more objective to describe the breathing pattern, rather than just labeling the pattern.</p> | <p>Respirations are relaxed, effortless, and quiet. They are of a regular rhythm and depth at a rate of 10–20 per minute in adults. Tachypnea and bradypnea may be normal in some clients.</p>  | <p>Labored and noisy breathing is often seen with severe asthma or chronic bronchitis.</p> <p>Abnormal breathing patterns include tachypnea, bradypnea, hyperventilation, hypoventilation, Cheyne-Stokes respiration, and Biot’s respiration.</p>                           |
| <p><b>Inspect intercostal spaces.</b> Ask the client to breathe normally and observe the intercostal spaces.</p>   | <p>No retractions or bulging of intercostal spaces are noted.</p>   | <p>Retraction of the intercostal spaces indicates obstruction of the respiratory tract or atelectasis.</p> <p>Bulging of the intercostal spaces indicates trapped air such as in emphysema or asthma.</p>   |
| <p><b>Observe for use of accessory muscles.</b> Ask the client to breathe normally and observe for use of accessory muscles.</p>   | <p>Use of accessory muscles (sternomastoid and rectus abdominis) is not seen with normal respiratory effort. After strenuous exercise or activity, clients with normal respiratory status may use neck muscles for a short time to enhance breathing.</p> | <p>Neck muscles (sternomastoid, scalene, and trapezius) are used to facilitate inspiration in cases of acute or chronic airway obstruction or atelectasis.</p> <p>The abdominal muscles and the internal intercostal muscles are used to facilitate expiration in COPD.</p> |

**PALPATION**

**Palpate for tenderness, sensation, and surface masses.** Use your fingers to palpate for tenderness and sensation. Start with your hand positioned over the left clavicle (over the apex of the left lung) and move your hand left to right, comparing findings bilaterally. Move your hand systematically downward toward the midline at the level of the breasts and outward at the base to include the lateral aspect of the lung. The established sequence for palpating the anterior thorax serves as a guide for positioning your hands.



**CLINICAL TIP**

Anterior thoracic palpation is best for assessing the right lung's middle lobe


No tenderness or pain is palpated over the lung area with respirations.

Tenderness over thoracic muscles can result from exercising (e.g., pushups) especially in a previously sedentary client.

**Palpate for crepitus** as you would on the posterior thorax.

No crepitus is palpated.

In areas of extreme congestion or consolidation, crepitus may be palpated, particularly in clients with lung disease.

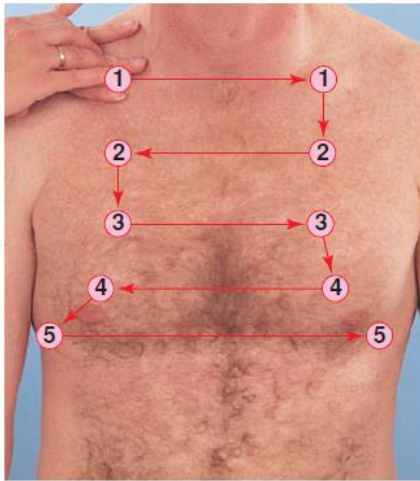
|  |  |  |
|--|--|--|
| <p><b>Palpate for fremitus.</b> Using the sequence for the anterior chest described previously, palpate for fremitus using the same technique as for the posterior thorax.</p> <p><b>CLINICAL TIP</b></p> <p>When you assess for fremitus on the female client, avoid palpating the breast. Breast tissue dampens the vibrations.</p>              | <p>Fremitus is symmetric and easily identified in the upper regions of the lungs. A decreased intensity of fremitus is expected toward the base of the lungs. However, fremitus should be symmetric bilaterally.</p> | <p>Diminished vibrations, even with a loud spoken voice, may indicate an obstruction of the tracheobronchial tree.</p> <p>Clients with emphysema may have considerably decreased fremitus as a result of air trapping.</p> |
| <p><b>Palpate anterior chest expansion.</b> Place your hands on the client's anterolateral wall with your thumbs along the costal margins and pointing toward the xiphoid process. As the client takes a deep breath, observe the movement of your thumbs.</p>  | <p>Thumbs move outward in a symmetric fashion from the midline.</p>  | <p>Unequal chest expansion can occur with severe atelectasis, pneumonia, chest trauma, pleural effusion, or pneumothorax.</p> <p>Decreased chest excursion at the bases of the lungs is seen with COPD.</p>                |



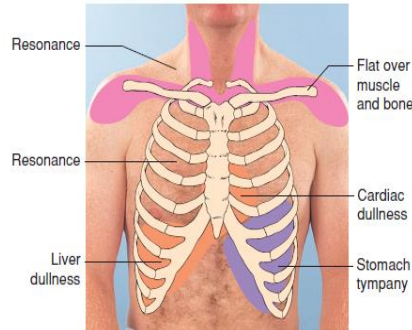
### PERCUSSION

#### Percuss for tone.

Percuss the apices above the clavicles. Then percuss the intercostal spaces across and down, comparing sides.



Resonance is the percussion tone elicited over normal lung tissue.



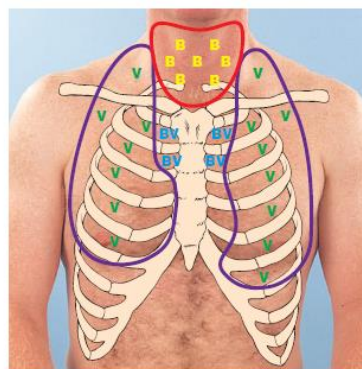
Percussion elicits dullness over breast tissue, the heart, and the liver and flatness is detected over the muscles and bones.

Hyperresonance is elicited in cases of trapped air such as in emphysema or pneumothorax. Dullness may characterize areas of increased density such as consolidation, pleural effusion, or tumor.

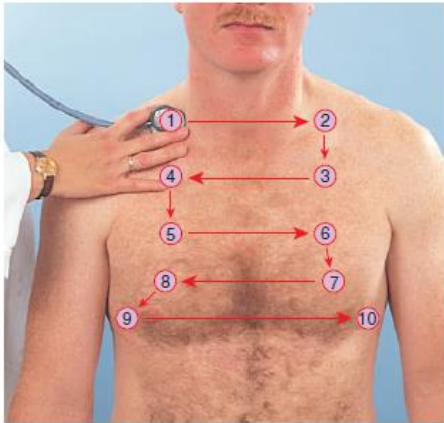
### Auscultation

**Auscultate for anterior breath sounds, adventitious sounds, and voice sounds.** Place the diaphragm of the stethoscope firmly and directly on the anterior chest wall. Auscultate from the apices of the lungs slightly above the clavicles to the bases of the lungs at the sixth rib. Ask the client to breathe deeply through the mouth in an effort to avoid transmission of sounds that may occur with nasal breathing. Be alert to the client's comfort and offer times for rest and normal breathing if fatigue is becoming a problem, particularly for the older client. Listen at each site for at least one complete respiratory cycle.

Three types of normal breath sounds may be auscultated—bronchial, bronchovesicular, and vesicular.



Abnormal voice sounds.



**CLINICAL TIP**

Again, do not attempt to listen through clothing or other materials. However, if the client has a large amount of hair on the chest, listening through a thin T-shirt can decrease extraneous sounds that may be misinterpreted as crackles.

Performance checklist

Respiratory System

**The student nurse should be able to:**

| Performance criteria   | Competency Level   |                          |              |                    |                          |              | Comment |
|--|--------------------|--------------------------|--------------|--------------------|--------------------------|--------------|---------|
|  | Trial 1            |                          |              | Trial 2            |                          |              |         |
|  | Done correctly (2) | Done with assistance (1) | Not done (0) | Done correctly (2) | Done with assistance (1) | Not done (0) |         |
| -Collect appropriate objective data about respiratory system related to general survey.<br>-Collect appropriate subjective data related to respiratory system.<br>- Chest pain, shortness of breath (dyspnea), wheezing, cough dry or produce sputum, sputum or hemoptysis.<br>- Sputum or hemoptysis characteristics: color, odor, amount, frequency and consistency. |                    |                          |              |                    |                          |              |         |
| <b>Physical examination</b>  |                    |                          |              |                    |                          |              |         |
| <b>General</b>   |                    |                          |              |                    |                          |              |         |
| <b>Inspection</b>  | Done correctly (2) | Done with assistance (1) | Not done (0) | Done correctly (2) | Done with assistance (1) | Not done (0) |         |
| Inspect for nasal flaring and pursed lip breathing.<br>Observe color of face, lips, and chest.<br>Inspect color and shape of nails.  |                    |                          |              |                    |                          |              |         |
| <b>Posterior Thorax</b>  |                    |                          |              |                    |                          |              |         |
| Inspection   | Trial 1            |                          |              | Trial 2            |                          |              | Comment |
|  | Done correctly (2) | Done with assistance (1) | Not done (0) | Done correctly (2) | Done with assistance (1) | Not done (0) |         |
| - Inspect configuration.<br>- Observe use of accessory muscles.<br>- Inspect the client's positioning.   |                    |                          |              |                    |                          |              |         |
| <b>Palpation</b>   |                    |                          |              |                    |                          |              |         |
| - Palpate for tenderness and sensation.<br>- Palpate for crepitus.<br>- Palpate for fremitus.<br>- Assess chest expansion.   |                    |                          |              |                    |                          |              |         |

|   |  |  |  |  |  |  |  |
|---|--|--|--|--|--|--|--|
| <b>Percussion</b>   |  |  |  |  |  |  |  |
| - Percuss for tone.<br>- Percuss for diaphragmatic excursion.   |  |  |  |  |  |  |  |
| <b>Auscultation</b>   |  |  |  |  |  |  |  |
| - Auscultate for breath sounds.<br>- Auscultate for adventitious sounds.<br>- Auscultate voice sounds.  |  |  |  |  |  |  |  |
| <b>Anterior Thorax</b>  |  |  |  |  |  |  |  |
| <b>Inspection</b>   |  |  |  |  |  |  |  |
| - Inspect for shape and configuration.<br>- Inspect position of the sternum.<br>- Watch for sternal retractions.<br>- Observe quality and pattern of respiration.<br>- Inspect intercostal spaces.<br>- Observe for use of accessory muscles. |  |  |  |  |  |  |  |
| <b>Palpation</b>  |  |  |  |  |  |  |  |
| - Palpate for tenderness, sensation, and surface masses.<br>- Palpate for crepitus.<br>- Palpate for fremitus.<br>- Palpate anterior chest expansion.   |  |  |  |  |  |  |  |
| <b>Percussion</b>   |  |  |  |  |  |  |  |
| - Percuss for tone.   |  |  |  |  |  |  |  |
| <b>Auscultation</b>   |  |  |  |  |  |  |  |
| - Auscultate for anterior breath sound, adventitious sounds, voice sounds.  |  |  |  |  |  |  |  |
| <b>Documentation.</b>   |  |  |  |  |  |  |  |

Evaluated by: \_\_\_\_\_

Date Evaluated: \_\_\_\_\_

Name and Signature of Faculty

Total grade \_\_\_\_\_