

Tikrit University

College of Nursing

Basic Nursing Sciences



Second Year - 2023-2024

Health assessment and physical examination

(Assessment of the Thorax and Lungs)

by:

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Anterior Thoracic Landmarks

- **Suprasternal Notch:** Feel this hollow U-shaped depression just above the sternum, between the clavicles.
- **Sternum:** The “breastbone” has three parts: the manubrium, the body, and the xiphoid process.
- **Sternal Angle:** Often called the angle of Louis, this is the articulation of the manubrium and body of the sternum, and it is continuous with the second rib.
- **Costal Angle:** The right and left costal margins form an angle where they meet at the xiphoid process.
- Usually 90 degrees or less, this angle increases when the rib cage is chronically overinflated, as in emphysema.

Posterior Thoracic Landmarks

- **Vertebra Prominens:** Start here. Flex your head and feel for the most prominent bony spur protruding at the base of the neck. This is the spinous process of C7.
- **Spinous Processes:** Count down these knobs on the vertebrae, which stack together to form the spinal column.
- **Inferior Border of the Scapula:** The scapulae are located symmetrically in each hemithorax. The lower tip is usually at the seventh or eighth rib.
- **Twelfth Rib:** Palpate midway between the spine and the person’s side to identify its free tip.

Reference Lines

Anterior Chest:

- Midsternal Line
- Midclavicular Line
- Anterior Axillary Line

Lateral Chest:

- Anterior Axillary Line
- Midaxillary Line

- Posterior Axillary Line
- ❑ **Posterior Chest:**
 - Vertebral (midspinal) Line
 - Scapular Line

Lung Borders

❑ **Anterior Chest**

- The apex or highest point of lung is 3 or 4 cm above the inner third of the clavicles.
- The base, or lower border rest on the diaphragm at about the 6th rib in the midclavicular line.

❑ **Laterally**

- Lung extends from apex of axilla down to 7th or 8th rib.

❑ **Posteriorly**

- The apex of lung at C7 & the base at T10.

Changing Chest Size

- Respiration is the physical act of breathing
- Air rushes into the lungs as the chest size increases (inspiration)
- Air expelled from the lungs as the chest recoil (expiration)
- **The size of the chest increase by two mechanisms:**
 1. Vertical diameter lengthen or shorten (diaphragm)
 2. Anteroposterior diameter increase or decrease (ribs).

I- Subjective Data

1. Cough
2. Shortness of breath (SOB)
3. Chest pain with breathing

4. Past history of respiratory infections
5. Smoking history
6. Environmental exposure
7. Patient-centered care; Last TB skin test, chest x-ray

☐ **Cough**

- How long, how often, & at any special time of day
- Continuous cough / day: respiratory infection
- Early morning: chronic bronchitis of smokers
- Afternoon: exposure to irritant
- Night: Sinusitis
- **Presence of sputum & color:**
- Yellow or Green: Bacterial infection
- White or Clear: Colds, Bronchitis & Viral infection.
- Cough up any blood: Hemoptysis
- Rust: Tuberculosis (TB) infection
- Pink, frothy—pulmonary edema

☐ **Shortness of breath (SOB)**

- Is it affected by position?
- Orthopnea: difficulty breathing when supine
- Occur at any specific time of day or night
- Paroxysmal nocturnal dyspnea: awakening from sleep with SOB & needing to be upright to achieve comfort.

☐ **Chest pain with breathing**

- Point to the exact location, describe the pain, is it associated with fever, deep breathing.

II- Objective Data

☐ Preparation

- Position: Ask the person to sit upright
- Draping, warm room
- Private examination time
- Cleaning stethoscope end piece

☐ Equipment's

- Stethoscope, Small ruler, Marking pen, Alcohol swab

☐ Techniques: inspection, palpation, percussion, and auscultation

- Start on the posterior and lateral thorax. Then move to face the person and repeat the four maneuvers on the anterior chest.
- Respiratory rate (normal 10-20 b/min, depth 500-800 ml)
 - Tachypnea: rapid & shallow breathing
 - Hyperventilation: rapid & deep breathing
 - Bradypnea: decreased but regular breathing
 - Hypoventilation: Irregular and shallow

☐ Posterior Chest-Inspection

▪ Thoracic Cage

- **Shape & configuration of chest wall**
- Normal Findings: the spinous processes in a straight line, thorax is symmetric.

-Anteroposterior (AP) diameter: less than transverse diameter. The ration is from 1:2

- Abnormal Findings: Scoliosis, Kyphosis, & Barrel chest (Emphysema, COPD)
- **Position of person takes to breath**

- Abnormal: tripod position-COPD

- **Skin color and condition**

- No cyanosis or pallor should be present.

❑ **Posterior chest-Palpate**

- **Symmetric Chest Expansion**

- Place your warmed hands sideways on the posterolateral chest wall with thumbs pointing together at the level of T9 or T10.
- Slide your hands medially to pinch up a small fold of skin between your thumbs.
- Ask the person to take a deep breath; as the person inhales deeply, your thumbs should move apart symmetrically.
 - **Abnormal**: asymmetric (Unequal) expansion occurs with Atelectasis, Pneumonia, Thoracic trauma, Pneumothorax.

❑ **Tactile (or vocal) Fremitus**

- **Fremitus**: is a palpable vibration on the chest wall when the client speaks.
- Use either the palmar base of the fingers or the ulnar edge of one hand and touch the person's chest while he or she repeats the words "ninety-nine" or "blue moon."
- Symmetry is most important; the vibrations should feel the same in the corresponding area on each side.
 - Normally: fremitus is most prominent between the scapulae and around the sternum.
 - Fremitus normally decreases as you progress down because more and more tissues impede sound transmission.
 - Abnormal Findings: Absence, decreased Or increased fremitus
 - It decreased with obstructed bronchus, effusion, pneumothorax, emphysema
 - It increased with consolidation of lung tissue (pneumonia)
 - **Pleural friction fremitus**; (inflammation of pleura)
 - **Palpate the entire chest wall**

- Check Crepitus, tenderness, moisture, masses.
- **Crepitus:** is a coarse, crackling sensation palpable over the skin surface. (e.g; subcutaneous emphysema)

❑ **Posterior chest-Percussion**

➤ **Lung Fields**

- Start from the above to the bottom
- Make side to side comparison. Avoid scapula & ribs
- Normal Findings: Resonance (low pitched, clear, hollow sound)
- Abnormal Findings: hyper resonance (emphysema or pneumothorax), dull (pneumonia, atelectasis, tumor).

➤ **Diaphragmatic Excursion:**

- Percuss to map out the lower lung border in both expiration and inspiration.
- **First** ask the person to “exhale & hold it” briefly while you percuss down the scapular line until the sound changes from resonant to dull on each side. Mark the spot.
- **Second;** ask the person to “take a deep breath & hold it.” Continue percussing down from your first mark and mark the level where the sound changes to dull on this deep inspiration.
- Third; Measure the vertical difference.
- May be higher on the right side due to the liver
- Diaphragmatic excursion should be equal bilaterally & measure about **3-5 cm**
- Abnormal: high level of dullness and absence of excursion (pleural effusion or atelectasis of the lower lobes)

❑ **Posterior chest-Auscultation**

- **Breath Sounds:** listen to one full respiration in each location.
- Instruct the person to breathe through the mouth, a little bit deeper than usual

- While standing behind the person, listen to the following lung areas: posterior from the apices at C7 to the bases (around T10) and laterally from the axilla down to the 7th or 8th rib.
- **Three types of normal breath sounds:**
 - **Bronchial-** over trachea: (High pitch, loud, & inspiration less than expiration) on trachea & larynx
 - **Bronchovesicular-** major bronchi (Moderate pitch, moderate, inspiration equal expiration (between scapula, around sternum, 1st & 2nd Intercostal space)
 - **Vesicular-** peripheral lung (low pitch, soft, inspiration more than expiration)
- Abnormal Findings: decreased or absent breath sounds: bronchial tree is obstructed, emphysema, pleurisy, pneumothorax, pleural effusion.
- Increased breath sounds: Pneumonia
- **Adventitious Sounds:** not normally heard in the lungs
 - Crackles (pulmonary edema) and wheeze (Asthma)
- **Voice Sounds:** spoken voice auscultation over the chest wall (table 19-8)
- **Bronchophony:** Ask the person to repeat **ninety-nine** while you listen with the stethoscope over the chest wall.
- Normally, the sound of the patient's voice is soft, less distinct; cannot distinguish exactly what is being said.
- Abnormal Findings: auscultate a clear “ninety-nine”, the words are more distinct than normal and sound close to your ear (Pneumonia).
- **Egophony:** Auscultate the chest while person phonates a long “ee-ee-ee-ee” sound. (also known as “E” to “A” change)
- Normally you should hear “eeeeee” through your stethoscope
- Abnormal finding: over area of consolidation or compression the spoken “eee” sound changes to a bleating long “aaa” sound. (e.g. fibrosis).
- **Whispered pectoriloquy:** Ask the person to whisper a phrase such as “one-two-three” as you auscultate.

- The normal response is faint, muffled, & almost inaudible
- Abnormal finding: over area of small consolidation the whispered voice is transmitted very clearly & distinctly, although still somewhat faint; it sounds as if the person is whispering right into your stethoscope, “one-two-three” (e.g. pneumonia)

☐ Anterior Chest-Inspection

- **Shape & configuration of chest wall**
- Abnormal Findings: Retraction of intercostal space indicate (obstruction, Atelectasis)
 - Bulging of intercostal space (Emphysema)
- Note the person’s Facial expression; should be relaxed
- Level of consciousness
- Note Skin color and condition; the lips and nail beds are free of cyanosis or unusual pallor.
- Assess the Quality of respiration
- Rib interspaces
- Use of Accessory Muscles; normally not used (COPD, Asthma)
- Assess Respiratory rate

☐ Anterior Chest-Palpation

- **Symmetric chest expansion**; Place your hands on the anterolateral wall with the thumbs along the costal margins & pointing toward the xiphoid process.
- Ask the person to take a deep breath. Watch your thumbs move apart symmetrically and note smooth chest expansion with your fingers
- **Tactile (vocal) fremitus**
- Compare vibrations from one side to the other as the person repeats “ninety-nine.”
- Palpate the anterior chest wall: normally non tender.

❑ Anterior chest-Percussion

- Predominant note over lung fields
- Note the borders of cardiac & liver dullness
- Abnormal Finding: instead of cardiac dullness you hear hyperresonance- chronic emphysema because lungs are hyper inflated.

❑ Anterior chest-Auscultation

- **Breath sounds**: Auscultate the lung fields from the apices in the supraclavicular areas down to the 6th rib.
- Use the sequence indicated for percussion.
- Evaluate normal breath sounds, noting any abnormal breath sounds and adventitious sounds.
- If the situation warrants, assess the voice sounds on the anterior chest.
- **Adventitious sounds**