Assessing the respiratory system means knowing where to look and what to listen for. This photo guide takes you on a tour of the thoracic landscape and describes the breath sounds you'll hear.
William Franklin, age 58, is brought to the emergency department (ED) complaining of shortness of breath and fatigue. He also has a fever, and his ankles are swollen.

After examining Mr. Franklin, an ED doctor makes a diagnosis of pneumonia and congestive heart failure. He tells Mr. Franklin that he'll be admitted to the hospital.

If you were the admitting nurse on the medical/surgical unit, you'd have to assess Mr. Franklin's respiratory status to obtain baseline information. You might have only a few minutes for a respiratory assessment that includes inspecting the thorax and auscultating subtle breath sounds.

How do you meet this challenge? One word—preparation. This review of thoracic landmarks and breath sounds will prepare you to assess patients like Mr. Franklin quickly and accurately, using the same organized approach each time.

All you need is a stethoscope
The only equipment you'll need is a good stethoscope with some basic features. The earpieces should fit snugly but comfortably; the binaurals should be angled forward, toward your temples, so you get the best possible sound transmission. Make sure the stethoscope has a sturdy 1-inch bell and a 1½-inch diaphragm. For respiratory assessment, you'll use the diaphragm, which works well for high-pitched sounds, such as breath sounds. You'll use the bell when listening for low-pitched sounds—certain heart sounds, such as S₃, for instance.

**Inspection first**
Begin your assessment of the patient's respiratory status with a systematic inspection. To save time, start your inspection as you're obtaining a brief history and continue it as you auscultate breath sounds.

First, observe the patient's respiratory rate and rhythm and the quality of his breathing. If his respiratory rate is less than 8 breaths/minute, check for other changes in vital signs, a decreased level of consciousness, and pupillary constriction. If the rate is greater than 16 breaths/minute, look for signs of labored breathing—the use of accessory neck, shoulder, and abdominal muscles; intercostal, substernal, or supraclavicular retractions; nasal flaring; and pale or cyanotic nail beds or mucous membranes. Also, take note of the patient's posture. He'll most likely lean forward when he sits if he's having trouble breathing.

The patient's respiratory rhythm should be regular, with expirations taking about twice as long as inspirations. A prolonged expiratory phase may indicate an obstructive pulmonary disease, such as asthma or emphysema. When a patient's expirations are prolonged, you may also note labored, pursed-lip breathing. Irregular rhythms, such as ataxic breathing or Cheyne-Stokes respirations, are usually associated with central nervous system or metabolic disorders. They require immediate intervention.

Next, observe the patient's anteroposterior (AP) and transverse diameters. Normally, the transverse diameter is about twice the AP diameter. If the AP diameter is as large as (or almost as large as) the transverse diameter, the patient could have emphysema. In an elderly patient, however, such a large AP diameter could be a normal finding.

As the patient breathes, watch how his chest moves. On inspiration, the chest should move up and out sym-
metrically. If one side of the chest doesn’t expand as much as the other, the patient may have atelectasis or an underlying pulmonary disease. Certain thoracic and spinal deformities—kyphosis, scoliosis, and pectus excavatum, for example—may also restrict chest expansion.

Now listen to the patient breathe, without using your stethoscope. Normal respirations are quiet and unlabored. Labored breathing may be accompanied by audible wheezes, gurgling, or stridor (an inspiratory high-pitched crowing). Any of these sounds require immediate intervention.

**Posterior chest landmarks**
The next step in your assessment is auscultating breath sounds. But first, you need to be familiar with certain thoracic landmarks and their underlying structures. So let’s take a tour of the thoracic landscape.

Starting with the posterior chest, the first landmark you’ll need to locate is C7 (see Photograph 1). This is the most prominent spinous process. You’ll find it at the base of the neck when the patient lowers his head. From C7, you can slide your fingers down the spinal column, moving from T1 to T12. Each of these spinous processes articulates with a rib. Below each rib is the corresponding intercostal space (ICS).

While palpating the posterior chest, be sure you locate the spinous processes T3 and T10. You’ll need these key landmarks when auscultating your patient’s posterior lung fields (see Photograph 2). T3 marks the point where the major fissures dividing the upper and lower lung lobes begin. From this point, the fissures are down laterally, behind the scapulae. Note that on the posterior chest the trachea branches into the left and right mainstem bronchi at T4. T10 usually marks the lower border of the lungs. On inspiration,
though, the lower border descends to T12.

Anterior chest landmarks
Now move to the anterior chest (see Photograph 3). The first important landmark here is the sternal notch, located at the top of the sternum. The clavicles extend from the sternal notch. Two or three fingerbreadths below the sternal notch, you'll feel the elevated ridge known as the sternal angle. This is where the second rib joins the sternum.

Locate the second rib, then slide your finger down to the second ICS. From here you can count up or down to find the other ribs and ICSs. Don't try to count the ribs and ICSs by sliding your fingers down along the sternum. The ribs are too close together at the lower sternum. Instead, move your fingers diagonally away from the sternal angle.

The anterior chest has two other important landmarks—the midclavicular lines (MCLs). These imaginary lines begin at the midpoint of the clavicles and run straight down the thorax.

Once you're familiar with the anterior chest landmarks, you can readily identify the locations of the lung lobes. As Photograph 4 shows, the apices of the upper right and left lobes extend just above the clavicles. Keep this in mind during your assessment, and be sure to auscultate above the clavicles. Near the sternal angle, the trachea bifurcates into the two mainstem bronchi. Note that the horizontal fissure between the upper right and middle lobes is located at the fourth rib, on the MCL. The lower right and left lobes begin at the sixth rib, also on the MCL.

Auscultating the lungs
During a quick assessment of a medical/surgical patient like Mr. Franklin, you'll usually go right from inspection to auscultation, skipping palpation and percussion. If a patient complains of pain or has suffered chest trauma, though, you should palpate for point tenderness, which may indicate a rib or soft tissue injury.

Before you begin auscultating your patient's lungs, have him sit on the side
of the bed with his chest exposed. If he can’t sit in this position, help him into the high Fowler’s position. Then ask him to lean forward to expand his chest. When he’s comfortable, tell him to breathe slowly and deeply through his mouth. This will accentuate breath sounds. Explain to him that breathing slowly will prevent hyperventilation and dizziness.

As you did during inspection, use the same approach every time for auscultation. I suggest that you start with the posterior chest, going from one side to the matching area on the other side, checking for symmetrical breath sounds (see Photographs 5 and 6). Then move to the anterior chest, again checking for symmetrical breath sounds.

Here’s an auscultation tip: Place the diaphragm of your stethoscope firmly against the thorax. This creates a seal that will eliminate most extraneous noise. If a male patient’s chest hair causes too much noise, mat it to the chest with water, then apply your stethoscope.

Recognizing normal breath sounds
Normal breath sounds are caused by air moving through the respiratory tract. Depending on their characteristic sound and their location, normal breath sounds are classified as bronchial, bronchovesicular, or vesicular. To distinguish among the three, listen closely to the duration, pitch, and intensity of the sound you hear.

You’ll auscultate bronchial breath sounds over the largest airway, the tra-
AUSCULTATING BRONCHIAL (∗), BRONCHOVESICULAR (○), AND VESICULAR (X) BREATH SOUNDS

Posterior chest

Photograph 7

Anterior chest

Photograph 8

chea. On the posterior chest, that will be on both sides of the spinal column from C7 to T4. On the anterior chest, the trachea extends to about the level of the sternal angle (see Photographs 7 and 8).

Bronchial breath sounds are loud and high pitched. They may remind you of wind blowing through a tunnel. You’ll hear the inspiratory phase for just a short time, but the expiratory phase will sound long and loud. That’s because the stethoscope picks up only the sound of air coming toward it. And when you listen to bronchial sounds, the stethoscope is high on the chest. So on inspiration, air travels only a short distance down to the stethoscope, but on expiration, air must travel a long way up to it.

If you hear bronchial breath sounds in any other area besides over the trachea, suspect consolidation. For example, if Mr. Franklin has consolidation in his lower right lung lobe, you’d hear bronchial breath sounds instead of normal vesicular sounds over that area.

Bronchovesicular breath sounds are heard over the mainstem bronchi. So listen between the scapulae from T4 to T7 on the posterior chest and from the sternal angle to the fourth ribs on the anterior chest. These sounds have a medium pitch and intensity. With bronchovesicular breath sounds, the inspiratory and expiratory phases will last the same amount of time.

You’ll hear vesicular breath sounds over most of the peripheral lung fields where air moves through small airways. So expect these soft, breezy, low-pitched sounds when you’re auscultating away from the trachea and mainstem bronchi. With vesicular sounds, inspiration will sound longer than expiration. Now air must travel a long way to reach the stethoscope on inspiration, but only a short way to reach it on expiration.

Remember that solid tissue transmits sound better than air or fluid does. So over an area of consolidation, breath sounds (as well as spoken or whispered sounds) will be louder than they should be. But if there’s pus, fluid, or air in the pleural space, breath sounds will be quieter than normal. If a foreign body or secretions are obstructing a bronchus, breath sounds will be diminished or absent over distal lung tissue.
Crackles won't clear when the patient breathes deeply and coughs. They indicate increasing pulmonary congestion.

Gurgles (formerly called rales) develop when thick secretions partially obstruct air flow through large upper airways. Loud, coarse, and low-pitched, they sound a lot like snoring. You'll hear gurgles mostly on expiration and sometimes on inspiration, too. A patient may be able to clear gurgles by coughing up secretions.

Like gurgles, wheezes occur on expiration and sometimes on inspiration. Wheezes are continuous, high-pitched, musical squeaks. You'll hear them when air moves rapidly through airways narrowed by asthma or partially obstructed by a tumor or foreign body. In a patient with mild asthma, you'll probably hear bilateral wheezes on expiration. But if his condition worsens, you'd hear wheezes on both expiration and inspiration. Unilateral, isolated wheezes usually indicate a tumor or foreign body obstruction.

A pleural friction rub, the final adventitious breath sound, has a distinctive grating sound. It may remind you of the sound made by rubbing leather. As the name indicates, these breath sounds are caused by inflamed visceral and parietal pleurae rubbing together.

### Recording your findings

Your respiratory assessment isn't complete until you've clearly and concisely documented your findings. Describe exactly what you saw and heard. For instance, you might record the following information about Mr. Franklin:


This note gives other members of the health care team a clear, accurate picture of Mr. Franklin's respiratory status.

### Tuning in to breath sounds

Remember, performing a respiratory assessment takes a fine blend of knowledge and skill. If you're just learning to identify breath sounds, be patient. No one is saying it's easy. But with practice, you'll learn to perform this essential part of respiratory assessment. Here are some suggestions that should help:

* Try observing the breathing patterns of friends and family members, then auscultate their breath sounds. This will help you get used to a broad range of normal findings.

* Learn from more experienced nurses. After you auscultate a patient's breath sounds, have an experienced nurse do the same. Then compare your findings with hers.

* Take advantage of teaching rounds. When a doctor auscultates a patient's breath sounds and comments on his respiratory status, take out your stethoscope and listen to the patient's breath sounds.

The more you practice, the better you'll become at distinguishing breath sounds. After a while, you'll probably be able to auscultate these sounds with confidence in most situations. From then on, it's just a matter of brushing up so you'll always be ready to assess patients like Mr. Franklin.

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**SELECTED REFERENCES**


* Nursing88, January 63*