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Are you ready to learn the ins and out of breath sounds and auscultation? I sure hope so because that is what this study guide is all about.

As a Respiratory Therapist (or student), it goes without saying that you absolutely must fully know and understand everything there is to know about breath sounds.

The good news is — we created this study guide to help you do just that.

So if you’re ready, let’s go ahead and dive right in!
Breath sounds are the noises that come from your lungs when you inhale and exhale. Any abnormality in breath sounds indicates a problem in the lungs such as:

- Accumulation of fluid
- Asthma
- Chronic obstructive pulmonary disease (COPD)
- Foreign body in the lungs or airways
- Heart failure
- Infection
- Inflammation of the airways
- Obstruction
- Pneumonia

By listening to the quality, duration, and intensity of breath sounds, healthcare providers can come up with a proper diagnosis and medical management.

**What is Auscultation?**

Auscultation is a simple, non-invasive procedure that involves the use of a stethoscope to listen to the sounds produced by the body.

For the sake of this guide, we're focusing specifically on the lungs.

A stethoscope is used to amplify the sounds within the lungs so that you can listen and get idea of what's going on inside.

This is precise why Respiratory Therapist and medical professionals should invest in a high-quality stethoscope.

[Click Here to See Our Top Recommend Stethoscopes](#)

When performing lung auscultation, the bell or diaphragm of the stethoscope is placed on the patient's chest and/or back. Both
sides can be compared with one another. Not only that, the sounds within each lung should be compared as well.

**Types of Breath Sounds:**

As a medical professional, you have to be able to differentiate the difference between all the different types of breath sounds.

Here are the lung sounds that you should be familiar with:

1. **Vesicular (Normal)**

Vesicular or normal breath sounds are usually soft and low-pitched. They are heard over the auscultation of the chest and lung surfaces of a healthy person.

The sound typically has a rustling quality during inspiration. This is generated by turbulent airflow within the lobes of the lungs.

During expiration, the sound becomes softer as air flows within the larger airways. The inhalation process is normally 2-3 times the length of the exhalation process.

2. **Crackles (Rales)**

Crackles, also known as rales, are short, explosive, nonmusical sounds. They are heard in lung fields that have fluid in the small airways.

Crackles can occur on both inspiration and expiration but are more common during the inspiratory phase.

There are two types of crackles:

- Fine crackles
- Coarse crackles
The difference between the two is that fine crackles have a higher frequency and a shorter duration. They are caused by a sudden opening of a narrowed or closed airway.

The sound of fine crackles can be compared to that of salt heated on a frying pan.

Coarse crackles, on the other hand, are louder, lower in pitch and last longer. They are caused by secretions in the airways. The sound of coarse crackles is like pouring water out of a bottle.

Crackles are often associated with lung inflammation or infection. If they do not clear after a cough, this may indicate that fluid is in the alveoli. It could also be an indication of acute respiratory distress syndrome or pulmonary fibrosis.

3. Wheezes

Wheezes are continuous tones that commonly occur at the end of the inspiratory phase or early expiratory phase. The wheezing sound is made as a result of the gradual opening or closing of a collapsed airway.

Wheezes are either high-pitched or low-pitched.

They sound like a whistle when you breathe and are most audible during the expiratory phase. Wheezing is usually caused by bronchoconstriction but can also occur when the patient is fluid overloaded as well.

Aside from narrowed airways, wheezes can also be caused by inflammation secondary to asthma and bronchitis.

4. Rhonchi

When you hear rhonchi breath sounds, it typically means that there are secretions in the large airways. In this case, as a
Respiratory Therapist, you should recommend bronchial hygiene therapy or suctioning.

These lung sounds are often low-pitched and are audible during the expiratory phase. The main difference between rhonchi and wheezes is that rhonchi sounds are low and dull while wheezes are high and squeaky.

Rhonchi is mainly caused by either the accumulation of secretions, lesions, or foreign bodies. Rhonchi is common in certain medical conditions such as pneumonia, chronic bronchitis, and cystic fibrosis.

**5. Stridor**

Stridor, also known as “noisy breathing”, is a high-pitched sound caused by an upper airway obstruction. This sound is commonly heard during the inspiratory phase but can also be present during the expiratory phase as well.

If heard during inhalation, the airway obstruction is typically at the level of the vocal cords or just below the windpipe. If heard during exhalation, the airway obstruction might be in the lower trachea or the bronchi.

Several medical conditions can cause stridor including vocal cord abnormalities, narrowing of the larynx, abnormal growth of blood vessels, lesions, infections, and foreign bodies.

When heard in adults, it's usually caused by post-extubation laryngeal edema.

**6. Pleural friction rub**

A pleural friction rub is a loud grating sound that is usually heard over the lower lung lobes when inflamed pleura rub together. This lung sound is heard in patients with pleurisy.
Because these sounds occur whenever the chest wall moves, they are generally heard throughout inhalation and exhalation.

This lung sound is almost always associated with inflammation of serous membrane lining in the thorax known as pleurae.

**What are Vesicular Breath Sounds?**

Vesicular breath sounds are another name for normal breath sounds. They are low-pitched and sounds like you would expect air to sound as it flows through an airway.

The sounds are usually soft and can be heard throughout the inspiratory and expiratory phase.

**What are Adventitious Breath Sounds?**

Adventitious breath sounds are abnormal sounds that occur over the lungs and airways. The term “adventitious” breath sounds describe the additional audible lung sounds during auscultation.

This includes abnormal lung sounds such as crackles (rales), wheezes, rhonchi, stridor, and pleural friction rubs — just as we discussed earlier in this guide.

Adventitious breath sounds are commonly associated with a wide array of heart and lung conditions. The type, duration, location, and intensity of each adventitious breath sounds can help the healthcare provider determine the root cause of the patient's medical condition.

**Causes of Abnormal Breath Sounds:**

There are several causes of abnormal breath sounds. Each of which is specific to the type of breath sound the patient is experiencing:
• Air moving through narrowed airways due to swelling or obstruction causes wheezes.
• Airway obstruction due to the accumulation of mucus secretions, lesions, or foreign bodies causes rhonchi.
• Fluid accumulation in the small airways or atelectasis causes crackles.
• Obstruction of the upper airway causes stridor.
• Rubbing of inflamed pleural surfaces against each other during respiration causes a pleural friction rub.

There are hundreds of causes of abnormal breath sounds — these are just a few of the common examples that you should be familiar with.

**Treatment for Abnormal Breath Sounds**

Abnormal breath sounds are often associated with common and treatable medical conditions. As a Respiratory Therapist or medical professional, you will be required to recommend the proper medication or treatment for each abnormal breath sound.

**Here are the common treatment strategies for abnormal breath sounds:**

1. **Metered-Dose Inhaler (MDI)**

This is a pressurized inhaler that delivers a bronchodilator (dilates the airways), corticosteroid (suppresses inflammation), or a combination of both.

By opening the airways and suppressing the inflammatory process, it can help restore breath sounds to normal.

2. **Nebulizer**
This delivers an aerosolized form of medication into the alveoli via inhalation. They are commonly used to deliver bronchodilator medications, like albuterol, which can alleviate bronchoconstriction.

Nebulizers can help deliver other medications as well which can treat other types of abnormal breath sounds.

### 3. Incentive spirometry

This is a simple, inexpensive, and effective tool that is useful in helping a patient achieve normal lung function. This device mimics natural sighing or yawning, which in turn improves lung expansion and gas exchange.

To use the device, the patient needs to place the mouthpiece spirometer in their mouth and do deep breathing exercises.

### 4. Chest physiotherapy (CPT)

This is also considered a simple and effective method of normalizing abnormal breath sounds.

CPT includes various techniques in order to naturally clear lung secretions through the use of vibrations or shaking.

Other types of CPT include proper positioning, breathing exercises, and coughing techniques.

### 5. Antibiotics

Antibiotic therapy is designed to fight infection and destroy microorganisms that affect lung function. By fighting the infection, antibiotics also help with airway inflammation and secretions which can improve abnormal breath sounds.
What are Bronchial Breath Sounds?

Bronchial breath sounds are tubular, hollow sounds that occur as a result of an abnormal increase in the transmission of airway sounds to the chest surface.

The sound is very similar to the sound produced by blowing through a hollow tube.

These sounds are normal when heard over the trachea, but abnormal when heard over the lungs.

What are Bronchovesicular Breath Sounds?

Bronchovesicular breath sounds are normal sounds that are heard in the mid-chest area or over the scapula. Unlike other normal breath sounds, bronchovesicular breath sounds have tubular quality.

These sounds are the combination of bronchial breath sounds heard near the trachea and vesicular sound in the alveoli.

Bronchovesicular breath sounds have equal periods of inhalation and exhalation, which means the I:E ratio is 1:1.

With that said, the differences in pitch and intensity are often audible during the expiratory phase.

What are Diminished Breath Sounds?

Diminished breath sounds are soft, distant lung sounds with a lower intensity. These sounds are normally heard in patients with decreased lung volumes.

They can be heard in patients with a life-threatening obstructive condition, but they're also heard in other types of patients as well.
Here are some examples:

- Obese patients
- Patients with increased muscle mass
- Patients with air or fluid around the lungs
- Patients with an increased chest wall thickness
- Patients with lung hyperinflation

During diminished breath sounds, the inspiratory phase is usually much longer than the expiratory phase. This means that patient with diminished breath sounds will have an I:E ratio of 3:1.

**When are Coarse Breath Sounds Heard?**

Coarse breath sounds are actually a type of crackles/rales. These sounds are clicking, bubbling, or rattling sounds that occur during the inspiratory process when air opens closed spaces in the lungs.

Coarse breath sounds are louder, low-pitched and have longer duration. Most patients with copious amounts of secretions exhibit coarse breath sounds during auscultation of the affected lung area.

**When are Pneumonia Breath Sounds Heard?**

Pneumonia is a respiratory infection caused by harmful microorganisms and is characterized by a productive cough. Patients with pneumonia often have greenish or yellowish secretions.

If a patient has pneumonia, you will likely hear crackling, bubbling, or rumbling sounds. Wheezing is also a possibility in some areas of the lungs as well.

Crackles in patients with pneumonia are often heard only on one side of the chest or when the patient is lying down. In addition to
crackles and wheezes, low-pitch rhonchi sounds may also be audible during the expiratory phase of breathing.

What are Stridor Breath Sounds?

Stridor is a high-pitched lung sound that is created by an airway obstruction. It is mostly audible during inhalation but can also be heard during exhalation in patients with a deteriorating condition.

These sounds commonly occur in extubated patients as a complication of endotracheal intubation. In children, stridor is very audible when lying on the back in the supine position.

Some common causes of stridor include:

- Croup
- Pertussis
- Aspiration
- Epiglottis
- Choking
- Severe anaphylactic shock
- Tonsillitis
- Laryngitis
- Lung cancer
- Deviated septum
- Blood transfusion reactions

How to Perform Auscultation?

Auscultation is used to examine the heart and lungs but can also be used in the abdomen and other areas of the body with major blood vessels.

But for the sake of this article, we're focusing strictly on the lungs.
In order to assess a patient’s breath sounds, auscultation must be performed using a stethoscope to hear the lung sounds. Let’s go through the process of auscultating a patient.

Here are the Steps for Performing an Auscultation:

1. Explain the procedure to the patient to establish trust and rapport.
2. Stand close to the patient to gain access to the target area. In this case, the lungs.
3. If the diaphragm is cold, warm it by rubbing the surface to avoid startling the patient.
4. Place the ear-tips of the stethoscope in your ears and adjust them as desired.
5. Hold the diaphragm firmly against the patient’s skin with enough pressure and have the patient take slow, deep breaths through an open mouth.
6. Listen to the sounds and try to identify their intensity, location, strength, pattern, and duration.
7. Always listen to the patient’s anterior side first. Start at the apices and then move downward to the lung bases. Then proceed to do the same on the posterior side.
8. Compare the right lung to the left lung. Also compare the anterior to the posterior side.

What is the Best Stethoscope for Auscultation?

In order to perform auscultation and listen to breath sounds the right way, you need the right stethoscope. Our favorite is the:

- 3M Littmann Classic III

When it comes to getting great value at an affordable price, this stethoscope is the best of the best. It’s our top recommendation for medical professionals.
While the 3M Littmann Classic III is our favorite, there are plenty of other high-quality stethoscopes as well.

Visit this link to see our Full List of High-Quality Stethoscopes to see if yours made the cut.
Now that you have a good understanding of breath sounds and auscultation, let’s take it a step further by going through some sample TMC Practice Question on this topic.

1. A 63-year-old male patient was just admitted to the ICU. While auscultating his lungs, you hear bronchial breath sounds over the right lower lobe. This would indicate which of the following?
   A. Pneumothorax
   B. Normal lungs
   C. Pleural effusion in the patient’s right lower lobe
   D. Consolidation in the patient’s right lower lobe

Bronchial breath sounds are normal when heard over the trachea. However, if you hear bronchial breath sounds over the lung periphery, this is an abnormal finding.

To get this one right, you had to know that bronchial breath sounds are sometimes heard in patients with pneumonia. And for the TMC Exam, you must remember that patient’s with pneumonia have consolidation.

A pneumothorax or pleural effusion are not identified by bronchial breath sounds, so we can rule those out immediately.

After taking everything into consideration, we know that the correct answer has to be D.

**The correct answer is:** D. Consolidation in the patient’s right lower lobe
2. A patient that is having an asthma attack arrives to the emergency room in respiratory distress with diminished breath sounds. After continuous bronchodilator therapy, auscultation reveals wheezing. This change suggests which of the following?
   A. The onset of pneumonia
   B. The development of a pneumothorax
   C. The improvement of air flow
   D. The development of pulmonary edema

You must know that a patient who is having an asthma attack with diminished breath sounds — this is a sign of severe bronchoconstriction.

After bronchodilator therapy, the patient, whose breath sounds were diminished, is now wheezing. Although wheezing is abnormal, this finding suggests that the patient’s air flow has improved and their airways have opened up some thanks to the bronchodilator therapy.

None of the other answer choices really make sense in this situation, so we know that the correct answer has to be C.

**The correct answer is:** C. The improvement of air flow

3. A patient was just orally intubated with an endotracheal tube. Which of the following should you INITIALLY perform to confirm that the tube is in the proper position?
   A. Auscultate the chest and abdomen
   B. Perform a STAT chest x-ray
   C. Use capnography to verify exhaled CO2
   D. Observe chest wall movement

For the TMC Exam, you must know how to confirm that the tube is in the proper position. This question is tricky because the answer
choices are all correct methods of confirming tube placement. The question requires that you know which one to perform FIRST.

So immediately after intubation, the first thing you should do is auscultate the lungs to listen for bilateral breath sounds. You should auscultate the abdomen as well and there should be no air movement, otherwise, you can suspect that the tube is in the esophagus instead of the trachea.

All of the answer choices should be performed, just know that auscultation should be performed first. That means that the correct answer has to be A.

The correct answer is: A. Auscultate the chest and abdomen

4. You heard bronchial breath sounds over the patient’s right middle lobe while performing a routine assessment. Due to this finding, which of the following conditions would you expect to be present?
   A. Asthma
   B. Pneumonia
   C. Emphysema
   D. Pleural effusion

This one is very simple as long as you’re familiar with bronchial breath sounds.

You should know that it’s normal to hear bronchial breath sounds over the trachea. However, when they are heard over the lungs, this tells us that consolidation is present. And for the TMC Exam, whenever you have a patient with consolidation, I want you to automatically think pneumonia.
In pneumonia, the consolidation in the lungs allows the turbulent flow sounds of the larger airways to pass directly through the lung, which explains why you hear bronchial sounds in this case.

None of the other answer choices really make sense in this situation, so we know that the correct answer has to be B.

The correct answer is: B. Pneumonia

5. While listening for a patient's breath sounds, you hear what appears to be a bubbling sound in both lung bases. Which of the following best describes this finding?
   A. Wheezes heard in the lung bases
   B. Rhonchi heard in the lung bases
   C. Crackles heard in the lung bases
   D. Bronchial sounds heard in the lung bases

You must be familiar with breath sounds for the TMC Exam. Generally, when you hear bubbling, this describes crackles, which of course is an abnormal breath sound.

There are two types of crackles:

- **Course crackles** – caused by the movement of excessive secretions in the airways.
- **Fine crackles** – caused by collapsed airways opening during inspiration.

Another thing to remember, another name for crackles is rales, and these two can be used interchangeably.

The correct answer is: C. Crackles heard in the lung bases
Well, How’d You Do?

These practice questions were taken straight from our TMC Test Bank. It’s one of our bestselling products where we break down hundreds of these practice questions that cover every topic you need to know for the TMC Exam.

Each question comes with a detailed rationale that explains exactly why the answer is correct.

Thousands of students have already used it to pass the TMC Exam. Are you next?

If you thought the practice questions above were helpful, definitely consider checking it out.

Click Here to Learn More
Now, let’s dive even deeper into some more practice questions so you can truly learn this information and imbed it into your brain.

**Practice Questions About Breath Sounds:**

1. **What are fine crackles?**
   They are high-pitched, discrete, discontinuous crackling sounds heard during the end of respiration; not cleared by a cough.

2. **What are medium crackles?**
   They are lower, moist sounds that are heard during the mid-stage of inspiration; not cleared by a cough.

3. **What is rhonchi?**
   It’s a loud, low, coarse breath sound that sounds like a snore and is most often heard continuously during inspiration or expiration. Coughing may clear this sound and it usually means that there is a mucus accumulation in the trachea or large bronchi.

4. **What are coarse crackles?**
   They are loud, bubbly noises heard during inspiration. They are not cleared by a cough.

5. **What are wheezes?**
   They make a musical noise that sounds like a squeak. They are most often heard continuously during inspiration or expiration but are usually louder during expiration.

6. **What is a pleural friction rub?**
   It is a dry, rubbing, or grating sound, usually caused by inflammation of the pleural surfaces. This sound can be heard during inspiration and expiration. It is usually the loudest over the lower lateral anterior surface.

7. **What is stridor?**
It’s a harsh or high-pitched respiratory sound that is caused by an obstruction of the upper airway.

8. What are vesicular breath sounds?
These are normal breath sounds. They are heard over most lung fields. They are low pitch, soft, and usually have short expirations. They are more prominent in thin people or child and can be diminished in the overweight or very muscular patients.

9. What are bronchovesicular breath sounds?
They are heard over the main bronchus area and over the upper right posterior lung field. They have a medium pitch and the expiration usually equals the inspiration phase.

10. What are bronchial breath sounds?
They are heard only over the trachea in healthy patients. They have a high pitch with loud and long expirations. The expiratory phase is sometimes a bit longer than the inspiratory phase.

11. What is auscultation?
It is the process of listening to sounds of the body with the aid of a stethoscope. As Respiratory Therapists, we are particularly focuses on the lungs.

12. Where are bronchovesicular breath sounds heard?
They are heard around the sternum or center of the chest.

13. What breath sound is common with a pleural effusion?
Decreased or absent breath sounds.

14. What do fine crackles sound like?
The make a popping sounds and are higher pitched.

15. What do coarse crackles sound like?
Bubbling/rumbling, discontinuous, not as sharp as fine crackles.

16. What should be noted when listening to crackles?
The location of the sound, duration, pitch, and when the sound occurs ( inspiration or expiration).

17. What is the mechanical cause of crackles?
The small airways opening during inspiration and collapsing during expiration. They can also occur when air bubbles go through secretions or incompletely closed airways during expiration.

18. What does a wheeze sound like?
It is a continuous, high pitched, hissing sound. Wheezes tend to be longer than crackles and they occur on expiration.

19. What does rhonchi sound like?
It has a much lower pitch than a wheeze. It tends to be longer than crackles.

20. What does rhonchi normally imply?
It implies that a larger airway is obstructed by secretions.

21. What makes stridor sound different than others sounds?
It can usually be heard without a stethoscope.

22. If stridor does exist, what does it mean?
It usually means that there is a medical emergency that requires immediate attention.

23. What does a pleural rub sound like?
Brushing, similar to coarse crackles. In this case, the patient will likely be in pain, and be able to localize it to where the sound can be heard.

24. What is the mechanical main cause of a pleural rub?
The pleural surfaces are inflamed or roughened and are rubbing each other which is why the sound can be heard.

25. How should a patient be positioned before auscultation?
They should preferably be sitting up. Ensure they are not leaning against anything.

26. What are the normal breath sounds? 
Tracheal, Vesicular, Bronchial, and Bronchovesicular.

27. Breath sounds can be classified into what three categories? 
Normal, Abnormal, and Adventitious.

28. What are bronchovesicular breath sounds? 
They are heard over the main bronchus area and upper right posterior lung fields. They are intermediate in intensity and pitch. The expiration phase is usually equal to the inspiration phase. They are normally heard in the 1st and 2nd intercostal spaces.

29. What are vesicular breath sounds? 
Vesicular breath sounds are soft and low pitched lung sounds. They consist of a quiet, wispy inspiratory phase followed by a short, almost silent expiratory phase. They are heard over most of the lung fields. They are more prominent in children and thin adults.

30. What are the abnormal breath sounds? 
Rales, Crackles, Rhonchi, Wheezes, and Absent.

31. What are the adventitious (abnormal) breath sounds? 
Crackles, Rales, Rhonchi, Wheezes, and Pleural friction rub.

32. What is the sequence of steps in the examination of the chest and lungs? 
Inspection, Palpation, Percussion, then Auscultation.

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So there you have it. That wraps up our study guide on breath sounds and auscultation. I hope that this information was helpful for you.

Again, knowing the ins and outs of breath sounds is (obviously) very important for Respiratory Therapists and students. Hopefully this guide can help you increase your knowledge of this topic.

Not only must you know this information for your career, let’s take it back a step.

You MUST know this stuff for the TMC Exam as well!

Not to worry — if you study and prepare like you should, you’ll be just fine.

In fact, our materials have already helped thousands of students pass the exams.

Can we help you next??

You may be interested in the following:

- **TMC Test Bank** – Our massive bank of practice questions just like the ones we took you through earlier in this guide.

- **Hacking the TMC Exam** – Our video course that shares our top tips, tricks, and insights that we learned while taking (and passing) the exam. Ready to get a leg up?

- **Practice Questions Pro** – This gives our members access to our premium TMC Practice Questions and we send them to their inbox on a daily basis. Small bits of knowledge over time adds up to HUGE results.

Keep in mind, our materials are only for those who are truly serious about passing the board exams.
I definitely think you fall into that category, otherwise you wouldn’t have made it this far.

Thank you so much for reading all the way to the end! I wish you the best of luck on your journey, and as always, breathe easy my friend. 😊

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References


