Heart sounds: Hear the story

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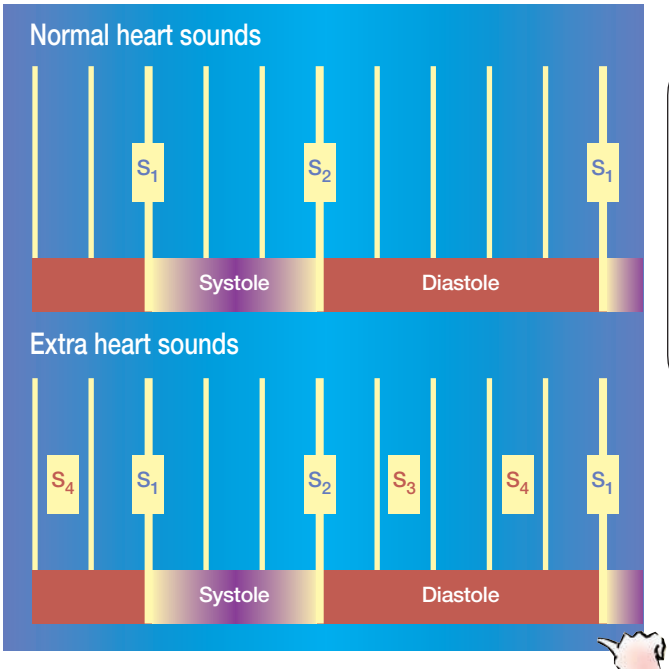
Essential assessment data can be obtained from auscultating your patient's heart sounds. Auscultation of heart sounds should be incorporated into the daily cardiac physical assessment of your patient. Your techniques should consist of a routine pattern that focuses on all four valvular points of origin. You'll need to focus on one normal heart sound at a time: S_1 then S_2.

There are two cardiac cycle phases. S_1 is the initiation of systole; during this phase, the ventricles contract. S_2 is the beginning of diastole; during this phase, the ventricles are relaxed, which permits ventricular filling. The S_1 heart sound represents the mitral and tricuspid valves closing before the contraction of the ventricle. S_1 is auscultated as "lub." The S_2 heart sound signifies aortic and pulmonic valve closure after the ventricles have emptied. S_2 is auscultated as "dub" (see *Picturing heart sounds*).

Picturing heart sounds



Getting started

Explain to your patient that you'll be listening to his or her heart sounds. Make sure to provide privacy. Inform your patient that you'll be listening in multiple locations for a period of time. Perform hand hygiene and ensure that your patient is comfortable and the room environment is quiet.

To begin, assist your patient to the supine position. Keep in mind that you'll also want to auscultate heart sounds in the left lateral position or with the patient sitting upright with a slight lean forward. These additional positions are recommended because they permit the heart to be slightly displaced to the anterior thoracic wall, which may accentuate heart sounds.

Auscultation locations

Begin your assessment of all four locations utilizing the diaphragm of your stethoscope, and then repeat the process with the bell (see *Follow the site path*). S_1 and S_2 are higher pitched sounds that are best heard with the diaphragm. Abnormal heart sounds, such as S_3 and S_4, are best heard with the bell of the stethoscope. S_1 is typically louder at the tricuspid and mitral

space, whereas S_2 is louder at the aortic and pulmonic space.

Aortic. This site is at the right sternal border, second intercostal space. An uncharacteristically loud S_2 in this point of auscultation may indicate systemic hypertension.

Pulmonic. This location is left of the sternal border, second intercostal space. An uncharacteristically loud S_2 in this area of auscultation may correlate with pulmonary artery pressure and can be found in patients with chronic obstructive pulmonary disease.

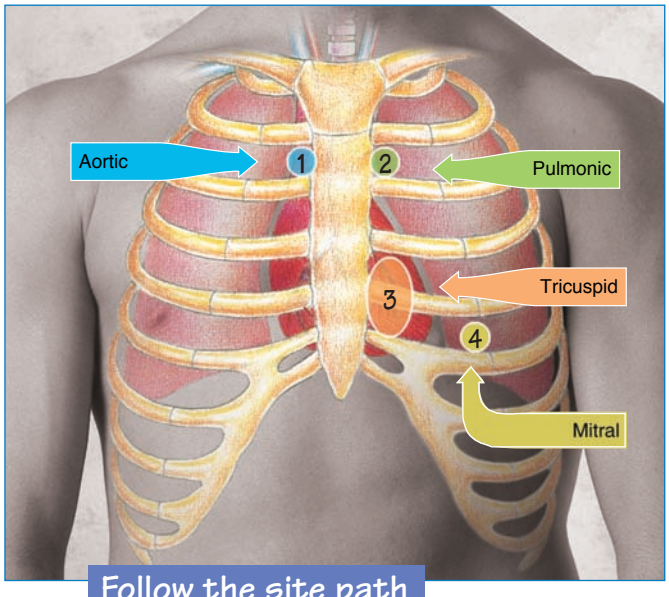
Tricuspid. This site is at the left lower sternal border, fifth intercostal space.

Mitral. This location is at the midclavicular line, fifth intercostal space. This is the location for auscultating apical pulse, and the rate must be counted for a full minute.

While auscultating the heart rate, identify the rhythm as well. Determine if the rhythm is regular or irregular. If irregular, determine if there's a pattern to the irregularity. The mitral location is an area on which to concentrate your assessment when determining the presence or absence of atrial or ventricular gallops. The left lateral side-lying position is recommended.

Abnormal sounds

Ventricular gallop (S_3). An S_3 sound can be a normal assessment finding in children and younger adults, typically less than age 40. In older populations, an auscultated S_3 may be associated with heart failure. An S_3 is normally a silent event that's associated with volume or ventricular filling. Some



Follow the site path

- In the **aortic area,** sounds reflect blood moving from the left ventricle during systole, crossing the aortic valve, and flowing through the aortic arch.
- In the **pulmonic area,** sounds reflect blood being ejected from the right ventricle during systole and then crossing the pulmonic valve and flowing through the main pulmonary artery.
- In the **tricuspid area,** sounds reflect movement of blood from the right atrium across the tricuspid valve and right ventricular filling during diastole.
- In the **mitral area,** also called the *apical area,* sounds reflect blood flow across the mitral valve and left ventricular filling during diastole.

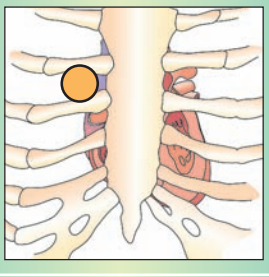
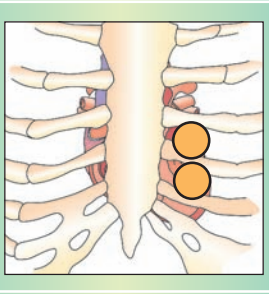
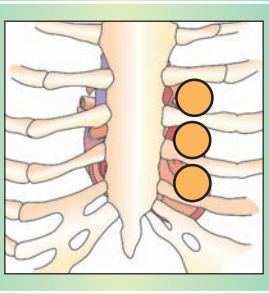
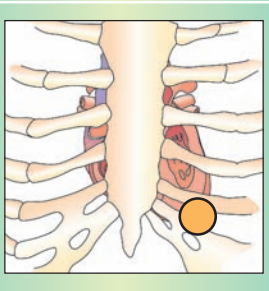
1 Begin auscultating over the **aortic area,** placing the stethoscope over the second intercostal space, along the right sternal border.

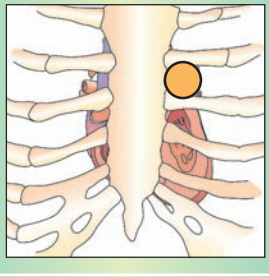
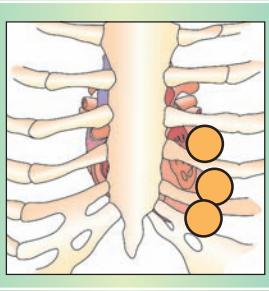
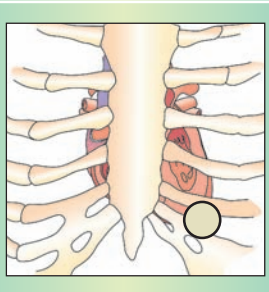
2 Then move to the **pulmonic area,** located at the second intercostal space, at the left sternal border.

3 Next, assess the **tricuspid area,** which lies over the fourth and fifth intercostal spaces, along the left sternal border.

4 Finally, listen over the **mitral area,** located at the fifth intercostal space, near the midclavicular line.

Differentiating murmurs

What you'll hear	Where you'll hear it	What causes it
▪ Medium pitch ▪ Harsh quality ▪ Possibly musical at apex ▪ Loudest with expiration ▪ Grade 4 or higher		Aortic stenosis
▪ Medium pitch ▪ Harsh quality ▪ Variable-grade intensity		Hypertrophic cardiomy-opathy
▪ High pitch ▪ Blowing quality ▪ Grade 1 to 3 intensity		Aortic insufficiency
▪ Medium to high pitch ▪ Blowing quality ▪ Soft to loud grade intensity		Mitral insufficiency

What you'll hear	Where you'll hear it	What causes it
▪ Medium to high pitch ▪ Blowing quality ▪ Variable intensity ▪ Increases slightly with inspiration		Tricuspid insufficiency
▪ High pitch ▪ Harsh quality ▪ Grade 5 or 6 intensity		Ventricular septal defect
▪ Low pitch ▪ Rumbling quality ▪ Grade 1 to 4 intensity		Mitral stenosis

= Bell
= Diaphragm

conditions, such as heart failure, can cause vibrations while the ventricle is filling that can then be auscultated. This extra heart sound (S_3) is heard immediately after S_2. It's sometimes remembered with the pronunciation of the word "Kentucky," with the S_1 being the "ken," the S_2 being the "tuck," and the S_3 being the "y." This is an easy way to remember where in the cardiac cycle you'll listen for a ventricular gallop.

Atrial gallop (S_4). An S_4 sound can be auscultated at the end of diastole and correlates

to ventricular compliance. When an S_4 is present, the ventricle is resistant to filling, so when the atrium contracts to empty its chambers, it ejects blood forward into a noncompliant ventricle. An auscultated S_4 is indicative of pathologic conditions such as hypertension, coronary artery disease, and aortic stenosis. This extra heart sound (S_4) is heard immediately before S_1. The location in the cardiac cycle in which an S_4 is heard is best remembered with the pronunciation of the word "Tennessee," with the S_4 being the "ten," the S_1 being the "nes," and the S_2 being the "see."

Murmur. Typically, as blood flows through normal atria, ventricles, and competent valves, there are no sounds that are auscultated. There are some pathologies that alter turbulence, velocity, or viscosity of blood flow, which creates murmurs. Structural abnormalities of the valves can also create murmurs; for example, in valvular regurgitation or stenosis. When auscultating for a murmur, utilize the bell and the diaphragm and listen to all four valvular sites. A murmur is described as a soft blowing or gentle swooshing sound when auscultated. Murmurs can be heard during diastole (after S_2) or systole (between S_1 and S_2) and can be high- or low-pitched sounds (see *Differentiating murmurs*).

Auscultation tips

- Concentrate as you listen for each sound.
- Avoid auscultating through clothing or wound dressings because these items can block sound.
- Avoid picking up extraneous sounds by keeping the stethoscope tubing off the patient's body and other surfaces.
- Until you become proficient at auscultation, explain to the patient that listening to his chest for a long period doesn't mean that anything is wrong.
- Ask the patient to breathe normally and to hold his breath periodically to enhance sounds that may be difficult to hear.

Become an expert listener

Upon conclusion of your assessment of heart sounds, be sure to document your findings. Notify the primary care provider of any new auscultated heart sounds. Assessing heart sounds can be challenging and requires continued practice and commitment (see *Auscultation tips*). But don't be discouraged—practice makes perfect! ■

Learn more about it

Cardiovascular Care Made Incredibly Visual! Philadelphia, PA: Lippincott Williams & Wilkins; 2007:29-34.

Craven R, Hirnle C. *Fundamentals of Nursing: Human Health and Function.* 6th ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2009:398-399,419-420.

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