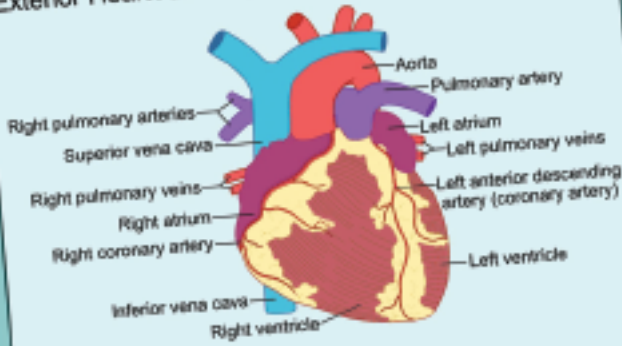
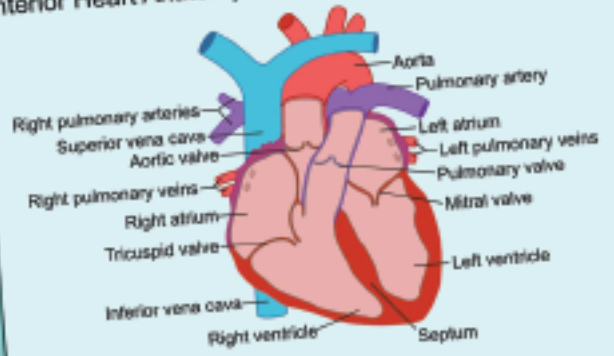


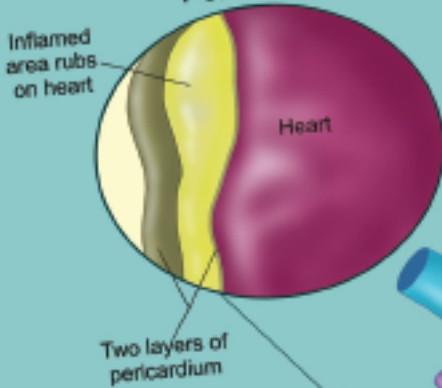
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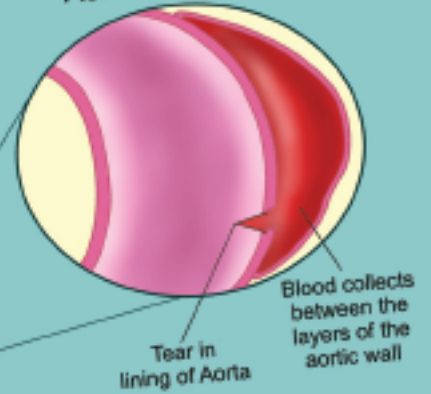
### Interior Heart Anatomy



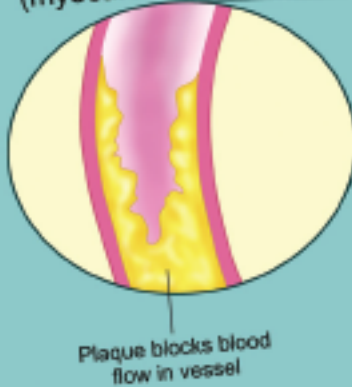
### Pericarditis



### Aortic Dissection



### Heart attack (myocardial infarction)



### Angina

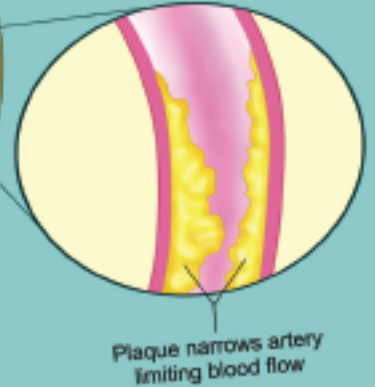


ILLUSTRATION TINA PAVLATOS

# The Heart of the Matter

BY PAM KAUFMAN

## WHEN CHEST PAIN DOES—& DOES NOT— INDICATE HEART ATTACK

“9-1-1, where’s your emergency?”

*“I need an ambulance right away at 755 County Road 14 West.”*

“What’s your telephone number?”

*“944-2447”*

“What’s the problem?”

*“My husband just woke up, and he’s having terrible chest pain. I think he’s having a heart attack!”*

### INTRODUCTION

Chest pain is one of the most common reasons people call for emergency medical help. Every year, millions of people are evaluated and treated by emergency room doctors for chest pain. Although chest pain doesn’t always signal a heart attack, it is a symptom of a number of serious conditions and is generally considered a medical emergency.

Chest pain has many possible causes, which can vary from minor problems to serious medical emergencies. The specific cause of chest pain is sometimes difficult to pinpoint. However, as with any other sudden, unexplained pain, victims should seek medical evaluation, and 9-1-1 telecommunicators should dispatch EMS providers immediately.

### CARDIAC CAUSES OF CHEST PAIN

*Acute coronary syndrome* (ACS) is an umbrella term that refers to chest pain and other symptoms that occur because the heart is not receiving enough blood. Two conditions ACS may describe are unstable angina and heart attack (i.e., acute myocardial infarction, or MI).

*Angina* is a medical term for chest pain or discomfort and is a symptom of a condition called *myocardial ischemia*. Angina occurs when the heart muscle (myocardium) doesn’t get as much blood and oxygen as it needs. Angina usually happens because one or more of the coronary arteries is narrowed or blocked. Insufficient blood supply is referred to as *ischemia*.

When blood flow to an area of the heart is decreased, it impairs the delivery of oxygen to the heart muscle.

When this happens, the heart muscle must use alternative, less-efficient fuel so it can still pump blood to the body. The byproduct of using this less-efficient fuel is lactic acid, which builds up in the muscle and causes pain.

Typically, angina is described as an uncomfortable pressure, fullness, squeezing or pain in the center of the chest. The discomfort could also be felt in the neck, jaw, shoulder, back or arm. Types of angina are:

- **Stable angina**—People with stable or chronic stable angina have episodes of chest discomfort that are usually predictable. The pain occurs during exertion or extreme emotional stress and disappears with rest, nitroglycerin or both.
- **Unstable angina**—People with unstable angina have chest pain that is unexpected and different from their regular chest pain, and it usually occurs while they are resting. The pain may occur more frequently and more easily at rest, be more severe, last longer or come on with minimal activity. Although this type of angina can be relieved with medications taken by mouth, it is unstable and could progress to a heart attack. More intense medical treatment or procedures are usually needed.
- **Variant angina (Prinzmetal’s angina)**—People with variant angina have chest pain that usually occurs spontaneously, and, unlike typical angina, it almost always occurs when a person is resting. It doesn’t follow emotional stress or physical exertion. The attacks can be very painful and typically occur between midnight and 8 a.m. Symptoms are

caused by decreased blood flow to the heart muscle or by a spasm of a coronary artery. The majority of people with this type of angina have coronary artery disease. The spasm usually occurs near the blockage.

*Heart attack (myocardial infarction, or MI)* occurs when an artery that supplies oxygen to the heart muscle becomes blocked and the heart is damaged. Without blood flow and oxygen, part of the heart starts to die.

A heart attack generally causes chest pain that lasts longer than 15 minutes. But a heart attack can also be silent and produce no signs and symptoms.

Many people who suffer a heart attack have warning symptoms hours, days or weeks in advance. The earliest predictor may be recurrent chest pain that is triggered by exertion and relieved by rest.

ACS occurs when plaque blocks or narrows the arteries that supply the heart with blood. Plaque consists of fat, cholesterol, calcium and other substances found in the blood. Over time, plaque can build up in the arteries and cause coronary artery disease.

Plaque causes angina by narrowing the arteries. A heart attack happens when a piece of plaque breaks open and forms a clot that blocks the artery.

Signs and symptoms of ACS include:

- Chest pain: Different people experience chest pain differently. Callers may describe pain that feels like pressure or squeezing; they may say their chest feels tight or heavy; they may feel a dull ache or burning sensation. Some people have no chest pain.
- Pain in the jaw, neck, arms, back or stomach: Some people may have pain in these areas instead of chest pain or included with chest pain.
- Nausea.
- Vomiting.
- Severe sweating.
- Dizziness or lightheadedness.
- Fainting.
- Shortness of breath.
- Change in skin color (ashen gray or pale).
- Anxiety.
- A feeling of impending doom.

Other cardiac causes of chest pain include inflammation of the sac surrounding the heart (pericarditis) and aortic dissection. Pericarditis is a short-lived condition often related to a viral infection that causes sharp, piercing and centralized chest pain. A sick feeling and fever may also be present.

Aortic dissection is a rare, life-threatening cause of chest pain that involves the aorta, the main artery leading from the heart. If the inner layers of the aorta separate, blood is forced between them causing a sudden and tearing chest and back pain. An aortic dissection can result from a sharp blow to the chest or develop as a complication from uncontrolled high blood pressure.

### RISK FACTORS

Heart attacks strike both men and women. However, some people are more apt to have a heart attack than others due to their risk factors (i.e., behaviors or conditions that increase the likelihood of disease). Some risk factors of heart disease cannot be controlled, but most can be modified to lower the risk of having the first or a repeat heart attack.

Factors that cannot be controlled include:

- Preexisting heart disease, including a previous heart attack, prior angioplasty or bypass surgery, or angina;
- Age—in men, the risk increases after age 45, and in women, the risk increases after age 55; and
- Family history of early heart disease, including a father or brother that was diagnosed before age 55 or a mother or sister diagnosed before age 65.

Factors that can be controlled include:

- Smoking;
- High blood pressure;
- High blood cholesterol;
- Overweight and obesity;
- Physical inactivity; and
- Diabetes.

Other factors that contribute to risk include:

- Stress;
- Alcohol use; and
- Diet and nutrition.

Risk factors don't add their effects in a simple way. But it is true that the more risk factors you have, the greater your chance of developing coronary heart disease. Also, the greater the level of each risk factor, the greater the risk.

Most people having a heart attack wait too long to seek medical help. Patient delay—rather than transport or hospital delay—is the biggest cause of not getting rapid care for heart attacks.

*Being uncertain is normal.* Expectations don't always match reality when it comes to heart attacks. In movies, a man clutches his chest and falls over, but heart attacks in real life seldom happen as they do in the movies. Because of unrealistic expectations about what happens during a heart attack, people aren't sure if they're having one. So they take a wait-and-see approach instead of seeking medical care. This approach may even be taken by those who have already had a heart attack. They may not recognize the symptoms because a second heart attack may have entirely different signs and symptoms from the first.

The wait-and-see approach is often taken because people don't understand the symptoms. They think what they are feeling is caused by something else; are afraid or unwilling to admit their symptoms could be serious; are embarrassed about "causing a scene" or going to the hospital to find out it's a false alarm; or don't understand the importance of time in saving lives and function. Statistically, those more likely to delay getting help include women, older persons and members of minority ethnic groups.

For these reasons, most heart attack victims wait two hours or more after the onset of their signs and symptoms before they seek medical help. This delay could result in death or permanent heart damage.

Many comm centers and EMS agencies focus at least some of their public education efforts on encouraging people to call 9-1-1 immediately if they even suspect they may be experiencing the signs and symptoms of a heart attack. Anyone presenting with heart attack signs and symptoms needs to receive medical treatment as soon as possible.

## EMD & CHEST PAIN

When the emergency medical dispatcher (EMD) receives the 9-1-1 call reporting chest pains, the telecommunicator must ask the appropriate Vital Points Questions to help determine if the patient is experiencing any of the critical criteria and to determine the appropriate EMS response. After EMS is dispatched, pre-arrival instructions are given to assist the patient until responders arrive on scene. These instructions may include:

- Have the patient sit or lie down, whichever is more comfortable;
- Keep the patient calm;
- Loosen tight clothing;
- Have the patient take nitroglycerin, if appropriate and approved by local medical direction;
- Have the patient take aspirin, if appropriate and approved by local medical direction;
- Gather the patient's medication(s) for EMS to take with the patient to the hospital; and
- If the call is discontinued, have someone call back if the patient's condition changes or worsens.

## AT THE HOSPITAL

At the emergency room or chest pain center (some larger hospitals designate areas just for the evaluation of chest pain), the patient's vital signs will be checked right away. In addition, questions will be asked about the chest pain. Many of these same questions will have already been asked by the EMD and EMS, such as: Where is the pain located? How would you describe the pain? Do you have any other signs or symptoms with the pain?

Even though chest pain doesn't always signal a heart attack, doctors will most likely test for it first because it's the most life threatening. Tests that help determine the cause of chest pain include:

- **Electrocardiogram (ECG)** to help diagnose a heart attack as well as any other heart problems.
- **Blood tests** to check for increased levels of certain enzymes normally found in heart muscle. Damage from a heart attack may allow these enzymes to leak into the blood over a period of hours.
- **Chest X-ray** to allow doctors to

check the condition of the lungs and the size and shape of the heart and major blood vessels.

- **Stress tests** to measure how the heart and blood vessels respond to exertion, which may indicate if the chest pain is heart related.
- **Other tests as needed**, including nuclear scans, angiogram, MRI (magnetic resonance imaging), EBCT (electron beam computerized tomography), echocardiogram and endoscopy.

At first, many types of chest pain may seem to be heart-related problems. However, after careful evaluation, doctors are often able to distinguish between the symptoms of noncardiac chest pain and chest pain caused by a heart condition.

Treatment is dependent upon the underlying problem. If the chest pain appears to be heart related, such medications as aspirin, nitroglycerin, beta blocker, ace inhibitor, calcium channel blocker, diuretic or blood cholesterol lowering agent may be prescribed. If it's determined that the chest pain is actually a heart attack, the patient may be treated with clot-busting drugs or have to undergo a surgical procedure, such as angioplasty, stenting or coronary artery bypass surgery.

## NONCARDIAC CAUSES OF CHEST PAIN

*Gastroesophageal reflux disease (GERD)*, in which acid washes back up from the stomach into the esophagus (the tube that runs from the mouth to the stomach), can cause pain just below the breastbone. Often the pain is accompanied by a sour taste and the sensation of food reentering the mouth (regurgitation). Many people will say they have heartburn. Heartburn-related chest pain usually follows a meal and may last for hours. The signs and symptoms occur more frequently when bending forward from the waist or lying down. The pain is usually relieved by taking an antacid or eating.

*Costochondritis* (i.e., chest wall pain) is pain in the muscles or bones of the chest that often occurs when activities are

## RESOURCES

- APCO Institute: Emergency Medical Dispatch Guidecards: [www.apcointl.com/institute/index.htm](http://www.apcointl.com/institute/index.htm)
- APCO Institute: Emergency Medical Dispatcher Manual, Version 5.2: [www.apcointl.com/institute/index.htm](http://www.apcointl.com/institute/index.htm)
- Web MD: [www.webmd.com](http://www.webmd.com)
- Mayo Clinic: [www.mayoclinic.com](http://www.mayoclinic.com)
- American Heart Association: [www.americanheart.org](http://www.americanheart.org)
- Department of Health and Human Services, National Institutes of Health, National Heart, Lung and Blood Institute: [www.nhlbi.nih.gov](http://www.nhlbi.nih.gov)

increased or exercise is added to one's schedule. The pain may occur suddenly and be intense, leading people to assume they're having a heart attack. The location of the pain is different though. Costochondritis causes the chest to hurt when the sternum (breastbone) or the ribs near the sternum are pushed.

*Anxiety* and periods of intense fear can be accompanied by chest pain, rapid heartbeat, rapid breathing (hyperventilation), profuse sweating and shortness of breath. People experiencing these symptoms may be having a panic attack—a form of anxiety.

*Pleurisy* is a condition that occurs when the membrane that lines the chest cavity and covers the lungs becomes inflamed. Pleurisy may cause a sharp, localized chest pain that is made worse when a person coughs or inhales deeply. Pleurisy may result from a wide variety of underlying conditions, including pneumonia.

*Pulmonary embolism* is a condition that occurs when a blood clot becomes lodged in an artery of the lung and blocks blood flow to the lung tissue. Symptoms of this life-threatening condition can include sudden, sharp chest pain that begins or worsens with a deep breath or cough, shortness of breath, rapid heartbeat, anxiety and faintness. Preceding risk factors for a pulmonary embolism include recent surgery or immobilization.

*Other lung conditions*, such as a collapsed lung (pneumothorax), high blood pressure in the arteries carrying blood to the lungs (pulmonary hypertension) and asthma, can also produce chest pain.

*Swallowing disorders or disorders of the esophagus* can make swallowing difficult and even painful. These conditions can also produce chest pains in some people.

## THE HEART OF THE MATTER

*Injured ribs* or *pinched nerves* can cause chest pain that tends to be localized and sharp.

*Sore muscles* or *muscle-related chest pain* tends to come on when twisting from side to side or when raising the arms. Chronic pain conditions, such as fibromyalgia, can produce persistent muscle-related chest pain.

*Shingles* is an infection of nerves caused by the chickenpox virus and can produce pain and blisters on the back and around the chest wall. The sharp, burning pain caused by shingles may begin several hours to a day or so

before blisters appear.

*Gall bladder* or *pancreas problems* can cause acute abdominal pain that radiates to the chest.

*Cancer* that involves the chest or cancer that has spread from another part of the body or the ribs, although rare, can also cause chest pain.

### SUMMARY

As stated earlier, chest pain is one of the most common reasons people call for emergency medical help. However, chest pain can be one of the most difficult symptoms to interpret. People

shouldn't try to tough out the symptoms for more than five minutes. Public education programs should encourage people with chest pain to call 9-1-1. EMS must be dispatched. A few hours in the emergency room can make the difference between life and death and, at the very least, offer peace of mind to those individuals suffering noncardiac-related chest pain.

||PSC||

**PAM KAUFMAN** is the EMD program manager for APCO Institute. Contact her via e-mail at [kaufmanp@apco911.org](mailto:kaufmanp@apco911.org).

1. **Acute coronary syndrome is chest pain and other symptoms that occur due to the heart not receiving enough blood and includes angina and heart attack.**
  - a. True
  - b. False
2. *Fill in the blank:* \_\_\_\_\_ **is a medical term for chest pain or discomfort.**
3. **Heart attack, or MI, occurs when an artery that supplies oxygen to the heart muscle becomes blocked and the heart is damaged.**
  - a. True
  - b. False
4. *Fill in the blanks:* \_\_\_\_\_ **causes angina by narrowing the arteries. A heart attack happens when a piece of \_\_\_\_\_ breaks open and forms a clot that blocks the artery.**
5. **Risk factors that can be controlled include:**
  - a. Smoking
  - b. High blood pressure
  - c. High blood cholesterol
  - d. Overweight, obesity and inactivity
  - e. All of the above
6. *Fill in the blank:* **Most heart attack victims wait \_\_\_\_\_ hours or more after the onset of their signs and symptoms before they seek medical help.**
7. *Fill in the blank:* \_\_\_\_\_ **can cause pain just below the breastbone when stomach acid washes back up from the stomach into the esophagus.**
8. *Fill in the blank:* \_\_\_\_\_ **is a condition that occurs when a blood clot becomes lodged in an artery of the lung and blocks blood flow to the lung tissue.**
9. *Fill in the blanks:* \_\_\_\_\_ **or \_\_\_\_\_ can cause acute abdominal pain that radiates to the chest.**
10. **Spending a few hours in the emergency room having chest pain evaluated can bring peace of mind and may even save a life.**
  - a. True
  - b. False

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1. Study the CDE article in this issue.
2. Answer the test questions using this form. Photocopies are acceptable, but don't enlarge them.
3. Fill out the appropriate information section(s), and submit the form to:

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