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## Overview

A heart attack is heart damage caused by reduced or blocked blood flow to the heart muscle. Another name for the condition is myocardial infarction. A heart attack is a medical emergency. First aid for a heart attack includes cardiopulmonary resuscitation (CPR).. It can help save a person's life.

## When to seek emergency help

Call 911 or emergency medical help if you think you or someone else might be having a heart attack.

## Symptoms

Symptoms of a heart attack may include:

- Chest pain that may feel like pressure, tightness, pain, squeezing or aching.
- Pain or discomfort that spreads to the shoulder, arm, back, neck, jaw, teeth or sometimes the upper belly.
- Cold sweats.
- Fatigue.
- Heartburn or indigestion.
- Lightheadedness or sudden dizziness.
- Nausea.
- Shortness of breath.

A heart attack usually causes chest pain that lasts more than 15 minutes. The chest pain may be mild or severe. Some people don't have any chest pain or pressure. Symptoms may be less obvious in some people, especially for women. For example, heart attack symptoms may include nausea or a brief or sharp pain felt in the neck, arm or back.

Some heart attacks happen suddenly. But many people have warning signs hours or days in advance.

## Treatment

- **Call 911 or your local emergency number.** Don't ignore the symptoms of a heart attack. If you can't get an ambulance or emergency vehicle to come to you, have someone drive you to the nearest hospital. Drive yourself only if you have no other option.
- **Take aspirin, if recommended.** Aspirin helps prevent blood clotting. Taking aspirin during a heart attack may reduce heart damage. Don't take an aspirin unless a healthcare professional says to do so. Don't delay calling 911 to take an aspirin. Call for emergency help first.
- **Take nitroglycerin, if prescribed.** If you think you're having a heart attack and you have a prescription for this medicine, take it as directed while waiting for emergency medical help.
- **Start CPR if the person doesn't have a pulse or isn't breathing.** If you're untrained in CPR, do hands-only CPR. That means push hard and fast on the person's chest. Do this about 100 to 120 times a minute. If you're trained in CPR and confident in your ability, start with 30 chest compressions before giving two rescue breaths.
- **Use an automated external defibrillator (AED)** if one is available and the person is unconscious. The device delivers shocks to reset the heart rhythm. AEDs come with step-by-step voice instructions for their use. They're programmed to allow a shock only when appropriate.

## Prevention

Lifestyle changes can keep the heart healthy and may help prevent a heart attack.

- Don't smoke or use tobacco.
- Get regular exercise.
- Keep a healthy weight.
- Eat nutritious foods and use less salt and saturated fats.
- Limit alcohol.
- Manage stress.
- Control blood pressure, blood sugar and cholesterol.
- Get 7 to 8 hours of sleep daily.

Also it's a good idea to learn CPR and how to use an AED so you can help someone who's having a heart attack. Ask your healthcare team if any accredited first-aid training courses are available in your area.

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## Overview

Sudden cardiac arrest (SCA) is the sudden loss of all heart activity due to an irregular heart rhythm. Breathing stops. The person becomes unconscious. Without immediate treatment, sudden cardiac arrest can lead to death.

Emergency treatment for sudden cardiac arrest includes cardiopulmonary resuscitation (CPR) and shocks to the heart with a device called an automated external defibrillator (AED). Survival is possible with fast, appropriate medical care.

Sudden cardiac arrest isn't the same as a heart attack. A heart attack happens when blood flow to a part of the heart is blocked. Sudden cardiac arrest is not due to a blockage. However, a heart attack can cause a change in the heart's electrical activity that leads to sudden cardiac arrest.

## Symptoms

Symptoms of sudden cardiac arrest are immediate and severe and include:

- Sudden collapse.
- No pulse.
- No breathing.
- Loss of consciousness.

Sometimes other symptoms occur before sudden cardiac arrest. These might include:

- Chest discomfort.
- Shortness of breath.
- Weakness.
- Fast-beating, fluttering or pounding heart called palpitations.

But sudden cardiac arrest often occurs with no warning.

## **When to see a doctor**

When the heart stops, the lack of oxygen-rich blood can quickly cause death or permanent brain damage.

Call 911 or emergency medical services for these symptoms:

- Chest pain or discomfort.
- Feeling of a pounding heartbeat.
- Rapid or irregular heartbeats.
- Unexplained wheezing.
- Shortness of breath.
- Fainting or near fainting.

- Lightheadedness or dizziness.

If you see someone who's unconscious and not breathing, call 911 or local emergency services. Then start CPR. The American Heart Association recommends doing CPR with hard and fast chest compressions. Use an automated external defibrillator, called an AED, if one is available.

## How to do CPR

Do CPR if the person isn't breathing. Push hard and fast on the person's chest — about 100 to 120 pushes a minute. If you've been trained in CPR, check the person's airway. Then deliver rescue breaths after every 30 compressions.

If you haven't been trained, just continue chest compressions. Allow the chest to rise completely between compressions. Keep doing this until an AED is available or emergency workers arrive.

Portable automated external defibrillators, called AEDs, are available in many public places, including airports and shopping malls. You can also buy one for home use. AEDs come with step-by-step voice instructions for their use. They're programmed to allow a shock only when appropriate.

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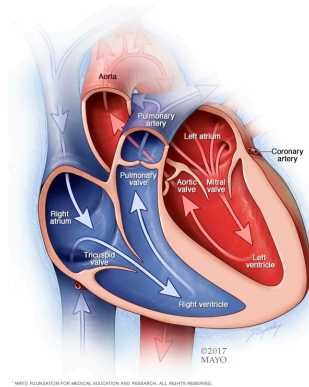
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## Causes

A change in the heart's electrical activity causes sudden cardiac arrest. The change makes the heart stop pumping blood. No blood flow goes to the body.

## How the heart beats



**Chambers and valves of the heart**

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To understand sudden cardiac arrest, it may help to know more about the heart's signaling system.

Electric signals in the heart control the rate and rhythm of the heartbeat. Faulty or extra electrical signals can make the heart beat too fast, too slowly or in an uncoordinated way. Changes in the heartbeat are called arrhythmias. Some arrhythmias are brief and harmless. Others can lead to sudden cardiac arrest.

## Heart conditions that can lead to sudden cardiac arrest

The most common cause of sudden cardiac arrest is an irregular heart rhythm called ventricular fibrillation. Rapid, erratic heart signals cause the lower heart chambers to quiver uselessly instead of pumping blood. Certain heart conditions can make you more likely to have this type of heartbeat problem.



However, sudden cardiac arrest can happen in people who have no known heart disease.

Heart conditions that can cause sudden cardiac arrest include:

- **Coronary artery disease.** Sudden cardiac arrest may occur if the heart arteries become clogged with cholesterol and other deposits, reducing blood flow to the heart.
- **Heart attack.** If a heart attack occurs, often as a result of severe coronary artery disease, it can trigger ventricular fibrillation and sudden cardiac arrest. Also, a heart attack can leave scar tissue in the heart. The scar tissue can cause changes in the heartbeat.
- **Enlarged heart called cardiomyopathy.** This condition usually happens when the walls in the heart muscle stretch. The heart muscle gets bigger or thicker.
- **Heart valve disease.** Leaking or narrowing of the heart valves can lead to stretching or thickening of the heart muscle. When the chambers become enlarged or weakened because of stress caused by a tight or leaking valve, there's an increased risk of developing a heart rhythm problem.
- **Heart problem present at birth, called a congenital heart defect.** Sudden cardiac arrest in children or adolescents is often due to a heart problem that they're born with. Adults who've had repair surgery for a congenital heart defect also have an increased risk of sudden cardiac arrest.
- **Long QT syndrome (LQTS) and other heart signaling problems.** Conditions such as long QT syndrome and Brugada syndrome cause the heart to beat in an unorganized way. If the heart rhythm isn't quickly restored, sudden death can occur. Young people with LQTS are especially at risk of sudden death.

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## Risk factors

The same things that increase the risk of heart disease can raise the risk of sudden cardiac arrest. These include:

- A family history of coronary artery disease.
- Smoking.
- High blood pressure.
- High blood cholesterol.
- Obesity.
- Diabetes.
- An inactive lifestyle.

Other things that might increase the risk of sudden cardiac arrest include:

- A previous episode of sudden cardiac arrest or a family history of it.
- A previous heart attack.
- A personal or family history of other forms of heart disease such as heart rhythm problems, heart failure and heart problems present at birth.
- Growing older — the risk of sudden cardiac arrest increases with age.
- Being male.
- Using illegal drugs such as cocaine or amphetamines.
- Low potassium or magnesium levels.
- A sleep disorder called obstructive sleep apnea.
- Chronic kidney disease.

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## Complications

When sudden cardiac arrest occurs, less blood flows to the brain. If the heart rhythm isn't rapidly restored, complications may include brain damage and death.

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## Prevention

Keeping the heart healthy may help prevent sudden cardiac arrest. You can do this by:

- Eating healthy.
- Getting regular checkups.
- Not smoking or using tobacco.
- Being screened for heart disease.
- Controlling blood pressure and cholesterol.

Genetic tests can be done to see if you have long QT syndrome, a common cause of sudden cardiac death. Check with your insurer to see if it is covered. If you have the long QT gene, your health care provider may recommend that other family members also be tested.

If you have a known risk of cardiac arrest, your health care provider might recommend a heart device called an implantable cardioverter-defibrillator (ICD). The device is placed under your collarbone.

You also might consider purchasing an automated external defibrillator (AED) for home use. Discuss this with your health care provider. AEDs help reset the

heart's rhythm when a person has sudden cardiac arrest. But they can be expensive and aren't always covered by health insurance.

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## Diagnosis

Sudden cardiac arrest happens suddenly and requires emergency medical care at a hospital. If the heart is quickly restored, survival is possible. When you are stable, health care providers at the hospital run tests to determine the cause.

## Tests

Tests are done to help determine how well the heart pumps blood and to look for diseases that affect the heart.

Tests for sudden cardiac arrest often include:

- **Blood tests.** Certain heart proteins slowly leak into the blood after heart damage from a heart attack. Blood tests can be done to check for these proteins. Other blood tests are done to check levels of potassium, magnesium, hormones and other body chemicals that affect the heart's ability to work.



- **Electrocardiogram (ECG or EKG).** This quick and painless test checks the electrical activity of the heart. Sensors, called electrodes, are attached to the chest and sometimes the arms and legs. An ECG can tell how fast or how slowly the heart is beating. The test can show changes in the heartbeat that increase the risk of sudden death.
- **Echocardiogram.** Sound waves create images of the heart in motion. This test can show how blood flows through the heart and heart valves. It can show heart valve problems and heart muscle damage.
- **Ejection fraction.** This test is done during an echocardiogram. It's a measurement of the percentage of blood leaving the heart each time it squeezes. A typical ejection fraction is 50% to 70%. An ejection fraction of less than 40% increases the risk of sudden cardiac arrest.
- **Chest X-ray.** This test shows the size and shape of the heart and lungs. It might also show whether you have heart failure.
- **Nuclear scan.** This test is usually done with a stress test. It helps see blood flow problems to the heart. Tiny amounts of radioactive material, called a tracer, are given by IV. Special cameras can see the radioactive material as it flows through the heart and lungs.
- **Cardiac catheterization.** This test helps health care providers see blockages in the heart arteries. A long, thin flexible tube called a catheter is inserted in a blood vessel, usually in the groin or wrist, and guided to the heart. Dye flows through the catheter to arteries in the heart. The dye helps the arteries show up more clearly on X-ray images and video.

A treatment called balloon angioplasty can be done during this test to treat a blockage. If a blockage is found, the health care provider may treat place a tube called a stent to hold the artery open.

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## Treatment

Treatment for sudden cardiac death includes:

- **CPR.** Immediate CPR is needed to treat sudden cardiac arrest and prevent death.
- **Resetting the heart rhythm.** This is called defibrillation. You can do this by using an automated external defibrillator, called an AED, if one is available. They are found in many public places.
- **Medicines** to treat irregular heartbeats and to manage symptoms.
- **Heart procedure or surgery** to place heart devices or to treat a blockage.

At the emergency room, health care providers run tests to check for the cause, such as a possible heart attack, heart failure or changes in electrolyte levels. Treatments depend on the causes.

## Medications

Medicines may be used to help restore the heart rhythm. These medicines are called anti-arrhythmic drugs.

Other medicines that might be used to treat causes of sudden cardiac death or lower the risk of it include:

- Beta blockers.
- Angiotensin-converting enzyme (ACE) inhibitors.
- Calcium channel blockers.

## Surgery or other procedures

Surgeries and other treatments may be needed to correct a heart rhythm problem, open a blockage, or place a device to help the heart work better. They may include:

- **Implantable cardioverter-defibrillator (ICD).** An ICD is a battery-powered unit that's implanted under the skin near the collarbone — similar to a pacemaker. The ICD continuously monitors the heart rhythm. If the device finds an irregular heartbeat, it sends out shocks to reset the heart's rhythm. It can stop a potentially life-threatening change in the heartbeat.
- **Coronary angioplasty.** Also called percutaneous coronary intervention, this treatment opens blocked or clogged heart arteries. It can be done at the same time as a coronary catheterization, a test that doctors do to find narrowed arteries to the heart.

The health care provider inserts a thin, flexible tube into a blood vessel, usually in the groin, and moves it to the area of the blockage. A tiny balloon on the tip of the tube is widened. This opens the artery and improves blood flow to the heart.

A metal mesh tube called a stent may be passed through the tube. The stent stays in the artery and helps keep it open.

- **Coronary artery bypass surgery.** Also called coronary artery bypass grafting or CABG, this surgery creates a new pathway for blood to flow around a blocked artery to the heart. This restores blood flow to the heart.
- **Radiofrequency catheter ablation.** This treatment is done to block a faulty heart signaling pathway. A problem with heart signaling can cause an irregular heartbeat. One or more flexible tubes called catheters are thread

through the blood vessels to inside the heart. Heat, called radiofrequency energy, on the end of the catheter is used to create small scars in the heart. This blocks the irregular heart signals.

- **Corrective heart surgery.** Surgery may be done to correct heart problems present at birth, heart valve disease or diseased heart muscle.

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## Lifestyle and home remedies

Preventing sudden cardiac arrest starts with keeping the heart and blood vessels in good shape. To live a heart-healthy lifestyle:

- Don't smoke.
- Achieve and maintain a healthy weight.
- If you drink alcohol, do so in moderation — no more than one drink a day for women and men older than 65 and no more than two drinks a day for younger men.

- Eat a heart-healthy diet.
- Get regular exercise.
- Manage stress.

## Training

If you live with someone who is at risk of sudden cardiac arrest, it's important that you be trained in CPR. The American Red Cross and other organizations offer courses in CPR and defibrillator use.

Being trained will help not only your loved one, but your training might help others. The more people know how to respond to a heart emergency, the greater the survival rate for sudden cardiac arrest is likely to be.

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## Diagnosis

Ideally, a health care provider should screen you during regular checkups for risk factors that can lead to a heart attack.

A heart attack is often diagnosed in an emergency setting. If you've had or are having a heart attack, care providers will take immediate steps to treat your condition. If you're able to answer questions, you may be asked about your symptoms and medical history.

Diagnosis of a heart attack includes checking blood pressure, pulse and temperature. Tests are done to see how the heart is beating and to check overall heart health.

### Tests

Tests to diagnose a heart attack include:

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- **Electrocardiogram (ECG or EKG).** This first test done to diagnose a heart attack records electrical signals as they travel through the heart. Sticky patches (electrodes) are attached to the chest and sometimes the arms and legs. Signals are recorded as waves displayed on a monitor or printed on paper. An electrocardiogram (ECG) can show if you are having or have had a heart attack.
- **Blood tests.** Certain heart proteins slowly leak into the blood after heart damage from a heart attack. Blood tests can be done to check for these proteins (cardiac markers).
- **Chest X-ray.** A chest X-ray shows the condition and size of the heart and lungs.
- **Echocardiogram.** Sound waves (ultrasound) create images of the moving heart. This test can show how blood moves through the heart and heart valves. An echocardiogram can help identify whether an area of your heart has been damaged.
- **Coronary catheterization (angiogram).** A long, thin tube (catheter) is inserted into an artery, usually in the leg, and guided to the heart. Dye flows through the catheter to help the arteries show up more clearly on images made during the test.
- **Cardiac computed tomography (CT) or Magnetic resonance imaging (MRI).** These tests create images of the heart and chest. Cardiac CT scans use X-rays. Cardiac MRI uses a magnetic field and radio waves to create images of your heart. For both tests, you usually lie on a table that slides inside a long tubelike machine. Each test can be used to diagnose heart problems. They can help show the severity of heart damage.

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## Treatment

Each minute after a heart attack, more heart tissue is damaged or dies. Urgent treatment is needed to fix blood flow and restore oxygen levels. Oxygen is given immediately. Specific heart attack treatment depends on whether there's a partial or complete blockage of blood flow.

### Medications

Medications to treat a heart attack might include:

- **Aspirin.** Aspirin reduces blood clotting. It helps keep blood moving through a narrowed artery. If you called 911 or your local emergency number, you may be told to chew aspirin. Emergency medical providers may give you aspirin immediately.

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- **Clot busters (thrombolytics or fibrinolytics).** These drugs help break up any blood clots that are blocking blood flow to the heart. The earlier a thrombolytic drug is given after a heart attack, the less the heart is damaged and the greater the chance of survival.
- **Other blood-thinning medicines.** A medicine called heparin may be given by an intravenous (IV) injection. Heparin makes the blood less sticky and less likely to form clots.
- **Nitroglycerin.** This medication widens the blood vessels. It helps improve blood flow to the heart. Nitroglycerin is used to treat sudden chest pain (angina). It's given as a pill under the tongue, as a pill to swallow or as an injection.
- **Morphine.** This medicine is given to relieve chest pain that doesn't go away with nitroglycerin.
- **Beta blockers.** These medications slow the heartbeat and decrease blood pressure. Beta blockers can limit the amount of heart muscle damage and prevent future heart attacks. They are given to most people who are having a heart attack.
- **Blood pressure medicines called angiotensin-converting enzyme (ACE) inhibitors.** These drugs lower blood pressure and reduce stress on the heart.
- **Statins.** These drugs help lower unhealthy cholesterol levels. Too much bad (low-density lipoprotein, or LDL) cholesterol can clog arteries.

## Surgical and other procedures

If you've had a heart attack, a surgery or procedure may be done to open a blocked artery. Surgeries and procedures to treat a heart attack include:

- **Coronary angioplasty and stenting.** This procedure is done to open clogged heart arteries. It may also be called percutaneous coronary intervention (PCI). If you've had a heart attack, this procedure is often done during a procedure to find blockages (cardiac catheterization).

During angioplasty, a heart doctor (cardiologist) guides a thin, flexible tube (catheter) to the narrowed part of the heart artery. A tiny balloon is inflated to help widen the blocked artery and improve blood flow.

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A small wire mesh tube (stent) may be placed in the artery during angioplasty. The stent helps keep the artery open. It lowers the risk of the artery narrowing again. Some stents are coated with a medication that helps keep the arteries open.

- **Coronary artery bypass grafting (CABG).** This is open-heart surgery. A surgeon takes a healthy blood vessel from another part of the body to create a new path for blood in the heart. The blood then goes around the blocked or narrowed coronary artery. It may be done as an emergency surgery at the time of a heart attack. Sometimes it's done a few days later, after the heart has recovered a bit.

## Cardiac rehabilitation

Cardiac rehabilitation is a personalized exercise and education program that teaches ways to improve heart health after heart surgery. It focuses on exercise, a heart-healthy diet, stress management and a gradual return to usual activities. Most hospitals offer cardiac rehabilitation starting in the hospital. The program typically continues for a few weeks or months after you return home.

People who attend cardiac rehab after a heart attack generally live longer and are less likely to have another heart attack or complications from the heart attack. If cardiac rehab is not recommended during your hospital stay, ask your provider about it.

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# Self care

To improve heart health, take the following steps:

- **Exercise.** Regular exercise helps improve heart health. As a general goal, aim for at least 30 minutes of moderate or vigorous physical activity five or more days a week. If you've had a heart attack or heart surgery, you may have activity restrictions. Ask your health care provider what's best for you.
- **Eat a heart-healthy diet.** Avoid or limit foods with a lot of saturated fat, trans fats, salt and sugar. Choose whole grains, fruits, vegetables, and lean proteins, such as fish and beans.
- **Maintain a healthy weight.** Too much weight strains the heart. Being overweight increases the risk of high cholesterol, high blood pressure and diabetes.
- **Don't smoke.** Quitting smoking is the most important thing you can do to improve heart health. Also, avoid being around secondhand smoke. If you need to quit, ask your provider for help.
- **Limit alcohol.** If you choose to drink alcohol, do so in moderation. For healthy adults, that means up to one drink a day for women and up to two drinks a day for men.
- **Get regular health checkups.** Some of the major risk factors for a heart attack — high blood cholesterol, high blood pressure and diabetes — don't cause early symptoms.
- **Manage blood pressure, cholesterol and blood sugar.** Ask your provider how often you need to have your blood pressure, blood sugar and cholesterol levels checked.
- **Control stress.** Find ways to help reduce emotional stress. Getting more exercise, practicing mindfulness and connecting with others in support groups are some ways to ease stress.

# Coping and support

Having a heart attack is scary. Talking about your feelings with your care provider, a family member or a friend might help. Or consider talking to a mental health care provider or joining a support group. Support groups let you connect with others who have been through similar events.

If you feel sad, scared or depressed, tell your care provider. Cardiac rehabilitation programs can help prevent or treat depression after a heart attack.

## Sex after a heart attack

Some people worry about having sex after a heart attack. Most people can safely return to sexual activity after recovery. But talk to your care provider first. When you can resume sex may depend on your physical comfort, emotional readiness and previous sexual activity.

Some heart medications can affect sexual function. If you're having problems with sexual dysfunction, talk to your care provider.

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# Preparing for your appointment

A heart attack usually is diagnosed in an emergency setting. However, if you're concerned about your risk of a heart attack, talk to your care provider. A cardiovascular risk assessment can be done to determine your level of risk.

You may be referred to a doctor trained in heart diseases (cardiologist).

Here's some information to help you prepare for your appointment.

## What you can do

When you make the appointment, ask if there's anything you need to do in advance, such as restrict your diet. You might need to avoid food or drink for a while before a cholesterol test, for example.

Make a list of:



- **Your symptoms**, including any that seem unrelated to heart disease, and when they began
- **Family history of heart problems**, including heart disease, stroke, high blood pressure, diabetes or early heart attacks
- **Important personal information**, including recent major stresses or recent life changes
- **All medications**, vitamins and other supplements you take, including doses
- **Questions to ask** your provider

Take a friend or relative along, if possible, to help you remember the information you're given.

Some questions to ask your provider about heart attack prevention include:

- What tests do I need to determine my current heart health?
- What foods should I eat or avoid?
- What's an appropriate level of physical activity?
- How often should I be screened for heart disease?
- I have other health conditions. How can I best manage these conditions together?
- Are there brochures or other printed material that I can have? What websites do you recommend?

Don't hesitate to ask other questions.

### **What to expect from your doctor**

Your health care provider is likely to ask you questions, including:

- How severe are your symptoms?
- Are they constant or do they come and go?
- What, if anything, seems to improve your symptoms?





- If you have chest pain, does it improve with rest?
- What, if anything, worsens your symptoms?
- If you have chest pain, does strenuous activity make it worse?
- Have you been diagnosed with high blood pressure, diabetes or high cholesterol?

### What you can do in the meantime

It's never too early to make healthy lifestyle changes, such as quitting smoking, eating healthy foods and becoming more active. These are important steps in preventing heart attacks and improving overall health.

Request an appointment

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By Mayo Clinic Staff

Oct 09, 2023



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- Heart attack diagnosis & treatment
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[Close-to-home care critical for heart attack survivor](#)



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[Mayo Clinic Q and A: Lifestyle changes to reduce heart attack and stroke risk](#)



[Mayo Clinic Q and A: Self-care steps can keep your heart healthy during the holidays](#)



[Heart attack symptoms in women are often different than men](#)

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[Calcium supplements: A risk factor for heart attack?](#)

[Flu Shot Prevents Heart Attack](#)

[Heart attack](#)

[Heart attack prevention: Should I avoid secondhand smoke?](#)

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