

Patient information from the BMJ Group

Angina, unstable

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Angina, unstable

Unstable angina is a pain in your chest that can feel like a heart attack. It means your heart is not getting enough oxygen. There are good treatments for unstable angina, but it's important to go to hospital straight away, as it is a medical emergency.

We've brought together the best research about unstable angina and weighed up the evidence about how to treat it. You can use our information to talk to your doctor to decide which treatments are best for you. To read about stable angina and its treatments, see [Angina, stable](#).

What is unstable angina?

Angina is the pain you feel in your chest when your heart is not getting enough oxygen. Unstable angina may be a worsening of the chest pain you were already getting with a condition called stable angina. Or it may be a brand new chest pain.

[Stable angina](#) usually happens only when you are active. It typically stops when you rest for a few minutes and take your angina medicine. But unstable angina can happen even when you are resting, and it may not go away when you take your angina medicine. The pain is usually worse than in stable angina, and it is likely to go on for at least 20 minutes. ^[1]

Doctors often think of unstable angina as the middle step between stable angina and a heart attack. The lack of oxygen is worse than in stable angina. But it isn't as bad as in a heart attack. A heart attack can cause permanent damage to your heart.

If you get unstable angina, it is an emergency. You need treatment straight away. It's important to dial 999 and get emergency medical help.

In the longer term, taking medicine and changing how you live can help you have fewer and milder attacks. It can also lower your risk of having a heart attack.

Key points for people with unstable angina

- Unstable angina usually happens when the **arteries** in the heart get narrow from a build-up of fat. Doctors call this **coronary artery disease**.

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- People often describe unstable angina as a discomfort, an ache or pain, or a burning feeling or heavy pressure. It usually lasts at least 20 minutes.
- You are most likely to get these symptoms in your chest. But you can also get pain and discomfort in your back, arm, jaw, or throat.
- This can start without any warning, even if you are resting.
- Your doctor should check out any new chest discomfort or pain, even if it goes away.
- If it is unstable angina, you need to go to hospital straight away for treatment. This is to lower your risk of having a **heart attack** .
- You will also need to take other medicines, some probably for life, to lower your risk of having more attacks of unstable angina.
- Making some changes in your daily life will also lower your risk. If you smoke, now is the time to stop.

Your heart and how it works

To understand what happens when you have unstable angina, it helps to know something about your heart and how it works. ^[2]

Your heart is in the middle of your chest. It is a muscle about the size of your fist. It works automatically, so you don't have to think about making it beat.

Your heart works like a pump. Every time it beats, it pushes blood around your body.

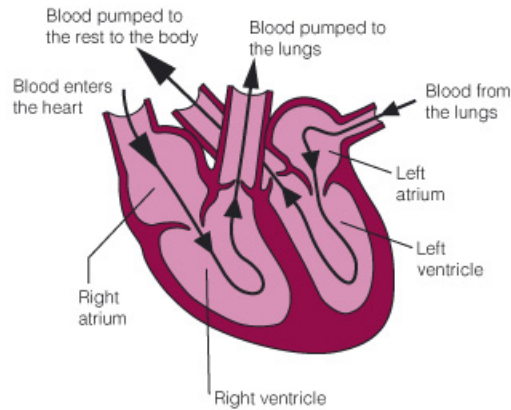
Blood carries oxygen and food (nutrients) to your cells. The cells in your body will die if they don't get a constant supply of both. For more, see [How your heart moves blood around your body](#) .

If your heart stops working, every other part of your body will die within minutes.

The parts of your heart

Your heart has thick, muscular walls. It's divided into two sides, right and left. Each side has an upper part and a lower part. Doctors call these chambers.

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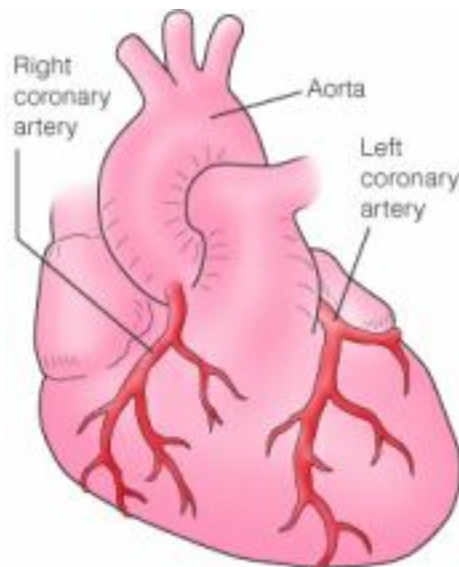
Your heart works like a pump.

The two chambers on the right side of your heart pump blood to your lungs, where the blood picks up oxygen. Blood then returns to the two chambers on the left side. They pump the blood to the rest of your body, taking oxygen and food to your cells. (When we talk about the left or right side of your heart, we mean your left and your right.)

The two upper chambers of your heart are called the **right atrium** and the **left atrium**. The two lower chambers are larger. They are called the **right ventricle** and the **left ventricle**.

For more, see [What happens when your heart beats](#) .

How your heart gets its own supply of blood



Coronary arteries bring your heart the blood it needs.

To do its job, your heart needs its own supply of blood. The blood carries oxygen to your heart's cells, so your heart can do its work.

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Your heart gets this blood from your **coronary arteries**. They supply the heart's muscular wall with blood that is rich in oxygen.

Your **left coronary artery** has two main branches.

- One is called the **left anterior descending artery** (or LAD artery for short). It supplies most of the blood to your left ventricle, the part of your heart that pumps blood out to your body. This job makes this artery very important to your health.
- The other one is called the **left circumflex artery**.

Your **right coronary artery** is smaller. Its branches carry blood to the back of your heart. These arteries split into a network of smaller vessels that take blood deeper into your heart muscle. For more, see [How blood moves through your heart](#) .

What happens in unstable angina

Most people get unstable angina because of a condition called **coronary artery disease**. This is when clumps of fat (called plaques) build up on the smooth lining of a coronary artery. Over time, they make the artery narrower, stiffer, and rougher.

This is called **atherosclerosis** . It's very common. It can happen in arteries anywhere in your body. If you have atherosclerosis in your coronary arteries, you have coronary artery disease. You may hear doctors call this ischaemic heart disease or coronary heart disease.

Here is what happens in unstable angina.

- A plaque in one of your coronary arteries breaks open and tears.
- A blood clot forms over the tear to try to patch it up, just like a scab forms on your skin if you cut yourself. ^[1] Doctors call this clot a thrombus.
- The clot partly blocks the artery. Then there isn't enough blood getting through to your heart.
- Not enough blood means not enough oxygen. This is what causes the bad pain and discomfort of unstable angina.
- The clot can get bigger. If the clot totally blocks off the artery and there isn't any oxygen getting to your heart, it's called a **heart attack** . This can permanently damage your heart. For more, see [Heart attacks](#) .

Sometimes, because the symptoms are the same, it can be hard for doctors to tell if someone has unstable angina or a type of heart attack. They can find out by doing tests. For more, see [How do doctors diagnose unstable angina?](#)

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You may hear doctors use the words **acute coronary syndrome** (ACS for short). This is a general term. It covers both unstable angina and some less severe types of heart attack. For more, see [Acute coronary syndrome](#) .

We have looked at unstable angina caused by coronary artery disease. But some people have angina caused by another condition that stops their heart getting enough oxygen. For more, see [Other causes of angina](#) . If your angina is caused by something else, talk to your doctor about how it should be treated.

There are different types of angina too. Here, we look at unstable angina. For more on the others, see [Other types of angina](#) .

Unstable angina: why me?

We don't know exactly why fatty clumps (called plaques) build up in some people's arteries and cause angina. And we don't know why some people's angina is stable while other people's angina is unstable. But we do know that some things make it more likely you will get coronary artery disease and angina. Doctors call these things risk factors. Having a risk factor doesn't mean you'll get angina for sure. It just means you are more likely to get it than someone who doesn't have that risk factor.

The risk factors for angina are the same as the risk factors for heart disease. We've listed the main ones below. ^[6] ^[7]

- Being male
- Being middle-aged or older
- Having family members who've had **heart attacks** or coronary disease
- Smoking
- Being overweight or **obese**
- Having **high cholesterol**
- Having **high blood pressure**
- Having **diabetes** .

The more risk factors you have, the more likely you are to get unstable angina. But you and your doctor can work to make your risk factors less dangerous. This can reduce your chance of getting an attack of unstable angina again or of having a heart attack.

You can't do anything about some risk factors, like conditions that run in your family or getting older. But you can do something about others, like smoking. If you smoke, now is the time to stop. And eating better and exercising will both help.

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Being under stress may affect some risk factors. For example, if you're stressed, you might eat or smoke more than usual. We don't know if stress by itself makes you more likely to get angina. ^[2]

For more information on ways to stay as healthy as possible, see [Unstable angina: what you can do to help yourself](#) .

You can also get good treatments for some of the things that put you at risk for getting angina. These conditions include:

- [Diabetes](#)
- [High blood pressure](#)
- [High cholesterol](#)
- [Obesity](#)
- [Smoking](#) .

What are the symptoms of unstable angina?

The main symptom of unstable angina is a bad pain in your chest. But it can come on in different ways.

Here are some ways this chest pain might come on. ^[8] ^[9]

- It may be a very bad pain that you've never had before.
- It may feel like a worse version of a type of chest discomfort or pain that you have had before called [stable angina](#) . With unstable angina, this discomfort or pain might hurt more, last longer (20 minutes or more), happen more often, or not go away when you take your angina medicine.
- It may be chest pain that happens when you are resting or not being very active.

About 8 in 10 people with unstable angina say that prolonged pain is the main symptom. ^[9] Some say it is a very bad new pain or a worsening of what was stable angina.

Unstable angina is different from stable angina in two main ways.

- It can happen any time, not just when you're exerting yourself, like when you're walking up a hill or running to catch a bus. You can get unstable angina when you are resting.
- It is less likely to go away when you rest or take your angina medicine.

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The pain of unstable angina can feel as if there's a weight on your chest or like a squeezing, crushing, or gripping sensation.

- The feeling is usually in the middle of the chest, spreading out to both sides.
- But you may get it in your neck and jaw, or less often in your back. Or it may go down one or both of your arms and make them feel heavy.
- You may get stomach pain.
- You may feel as if you have indigestion.
- The pain might also start somewhere else and only later spread to your chest.
- You may be more and more breathless and sweaty. Or you may feel sick or exhausted.
- You may also feel uneasy and anxious.

If you have discomfort that lasts only a few seconds or a dull ache lasting for hours, it's probably not unstable angina. Pain in your chest isn't always angina. You can also get chest pain from conditions that don't affect your heart. But only your doctor can say for certain, so be sure to get it checked out. For more, see [Other causes of chest pain](#) .

How do doctors diagnose unstable angina?

It can be hard to tell if chest pain is unstable angina. But this condition is a medical emergency. So if you have symptoms that might mean unstable angina, you, or someone with you, should dial 999 straight away.

When you reach the Accident and Emergency Department of your hospital, the doctor will ask you some questions about the pain and discomfort in your chest and your health. He or she will also examine you and do some tests.

It isn't always easy to diagnose unstable angina. That's because there are so many other causes of chest pain. Here are some things your doctor might do to help tell if you have angina.

Questions your doctor may ask

Your doctor may ask you these questions.

- How would you describe the discomfort or pain you feel?
- What brings on this feeling?
- How long does it last and what makes it go away?

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- Is there a regular pattern to it, and can you tell when it will happen?
- How long have you had it, and is it getting any worse?
- Do you smoke?
- Does **heart disease** run in your family?
- Do you have **high blood pressure** ?
- Do you have **high cholesterol** ?
- Do you have **diabetes** ?
- What kind of work do you do?
- What kinds of foods do you eat?

If there is any doubt about what is causing your discomfort or pain, your doctor will ask you more questions. For more, see [Other causes of chest pain](#) .

Physical examination

Your doctor will give you a physical examination to learn more about what could be causing your symptoms. Here are some things he or she may do.

- Measure your **blood pressure** and feel your pulse. Your pulse tells your doctor how fast your heart is beating and if the beat is regular.
- Listen to your heart, especially for any extra noises called murmurs. These may be a sign of a problem with your heart valves. Sometimes valve problems can cause angina.
- Listen to the blood flowing through the **arteries** in your neck to see if there are any extra noises. These noises may mean that your arteries are narrowed.
- Look for bumps under your skin that are a sign of high cholesterol. For example, you may have firm white bumps around your eyes. High cholesterol can put you at risk for narrowing of your arteries.
- Listen to your lungs for any extra noises while you breathe. These could be caused by lung disease or by **heart failure** . You can get heart failure if your heart is damaged, so it doesn't pump well.
- Measure your height and weight to work out if you are overweight. If you are overweight, this puts an extra strain on your heart.

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- Check for less common causes of angina. For example, your doctor will look for signs of **anaemia** and an overactive **thyroid gland** . Both can cause angina. For more, see [Other causes of angina](#) .
- Check for causes of chest pain that don't have anything to do with your heart. For more, see [Other causes of chest pain](#) .

If you do have angina, your doctor will also try to find out what type you have. We have looked at treatments for the type called unstable angina. But there are two other types. They're called **stable angina** and **variant (Prinzmetal's) angina**. For more, see [Other types of angina](#) .

Tests

You'll need several tests if your doctor thinks you have unstable angina. ^[24] ^[25] You are likely to have an electrocardiogram (ECG for short) and a troponin test soon after you reach hospital. You may also have some of the other tests as well, either then or later on. It depends on what your doctor thinks is wrong with you. We've listed the most common tests you might need.

- **An electrocardiogram (ECG)**. The first test your doctor will suggest is an electrocardiogram, or ECG for short. ^[24] ^[25] The ECG shows the electrical activity in your heart as a line on a graph. This test helps your doctor tell if your heart is beating properly and if you have certain heart problems. See [Electrocardiogram](#) to learn more.
- **Blood tests**. Your doctor will also suggest some blood tests. These include a test for a **protein** called troponin. This will help your doctor decide whether you have unstable angina or have had a **heart attack** . See [Troponin test](#) to learn more. Other tests can help tell if you have **anaemia** , **diabetes** , or **high cholesterol** . If your doctor thinks you might have an overactive thyroid gland, you'll need a blood test for that too.
- **An echocardiogram**. This test uses sound waves to make a picture of your heart. It's sometimes called an 'echo' for short. The picture shows how blood flows through your heart and if your heart is pumping properly, among other things. See [Echocardiogram](#) to learn more.
- **Coronary angiography**. This test uses a dye to make your **coronary arteries** show up on an **X-ray** . It can show blockages. See [Coronary angiography](#) to learn more.
- **A trial of treatment**. Your doctor may give you a treatment for angina to see if it takes away your discomfort or pain. The treatment is called glyceryl trinitrate (GTN for short).

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- **An X-ray.** If your doctor thinks you might have lung disease or **heart failure** rather than unstable angina, you will need an X-ray of your chest.
- **A stress test.** When your symptoms have settled down and your doctor is sure that you are not in danger, he or she may advise you to have a stress test, or to come back to hospital to have it at another time. Stress tests make your heart work harder. They can uncover problems that don't show up while you're resting. See [Stress test](#) to learn more.

Working out your risk

Some people with unstable angina are at greater risk than others of having a heart attack or other serious heart problems. By figuring out your risk, your doctor can decide which treatment is best for you. For more, see [Unstable angina: working out your risk](#) .

How common is unstable angina?

Angina is very common. And it's more common in men than in women.

Angina affects about 2 million people in the UK. ^[10] Around 8 in 100 men and 3 in 100 women aged 55 to 64 have (or have had) angina. For people aged 65 to 74, these numbers go up to 14 in 100 for men and 8 in 100 for women. ^[10] But we don't know exactly how many of these people have unstable angina and how many have stable angina. We also don't know how many people with stable angina go on to get unstable angina.

We do know that: ^[11]

- Fewer people have unstable angina than stable angina
- With unstable angina, you are more likely to need treatment in hospital.

What treatments work for unstable angina?

Unstable angina is serious. You need to get emergency treatment in hospital. But if you get treatment quickly, you have a very good chance of preventing a **heart attack** .

The first treatments you are likely to have will: ^[30]

- Relieve the pain in your chest
- Stop the clot in your **coronary artery** getting any bigger.

You may also be offered drugs to lower your risk of getting new blood clots. ^[30]

Your tests may show that you have a medium or high risk of getting worse, and that the arteries to your heart are badly blocked. In that case, your doctor may advise you to have

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a procedure to widen them. You may have this as soon as possible or later on.^[30] It depends on how well you are and what treatments you can get at your hospital. For more on how doctors determine your risk, see [Unstable angina: working out your risk](#) .

When you leave hospital, you will probably need to keep taking medicine every day for the rest of your life. This should lower your risk of getting another attack of unstable angina and of having a heart attack.

Key points about treating unstable angina

- Some treatments work best if you get them quickly. If you think you may be having an attack of unstable angina, call 999 straight away.
- In hospital, injections of drugs called **nitrates** will help the pain in your chest. You may also be given a drug called a **beta-blocker**, so your heart doesn't work so hard.
- Two other drugs, **aspirin** and **clopidogrel**, stop your blood clotting too much. They lower your risk of having a **heart attack** or a **stroke** , and of dying. You might be given both these medicines or just one.
- You may also be given other drugs to lower your risk of blood clots. Three types are **heparin**, **fondaparinux**, and **glycoprotein IIb/IIIa inhibitors**. These drugs can lower your risk of having a heart attack and of dying.
- Your doctor may also recommend taking a **statin** to lower the amount of bad cholesterol in your blood. This can reduce your risk of having a heart attack or a stroke.
- If tests show that a coronary artery is very narrow, you may have a procedure called **angioplasty** to widen it.
- After you leave hospital, you will probably need to keep taking some drugs every day.
- You and your doctor can also discuss other things you can do to stay as healthy as possible. These include stopping smoking, losing weight, and taking more exercise. To learn more, see [Unstable angina: what you can do to help yourself](#) .

There are several treatments for unstable angina. But which ones work best? We've looked at the research and given each treatment a rating according to how well it works.

For help in deciding which treatment is best for you, see [How to make the best decisions about treatment](#).

Treatment Group 1

Treatments for unstable angina

Treatments that work

- [Aspirin](#) : This is a drug that makes your blood less likely to clot. [More...](#)
- [Clopidogrel](#) : This is another drug that lowers your risk of blood clots. The brand name is Plavix. [More...](#)

Treatments that are likely to work

- [Heparin](#) : This is another type of drug that makes your blood less likely to clot. A type of heparin called unfractionated heparin (brand name Monoparin) works for only a short time. A newer type called low-molecular-weight heparin (LMWH for short) lasts longer. Some examples are dalteparin (Fragmin), enoxaparin (Clexane), and tinzaparin (Innohep). [More...](#)
- [Direct thrombin inhibitors](#) : These drugs also make your blood less likely to clot. But they do it in a different way from aspirin and clopidogrel. An example is bivalirudin (Angiox). [More...](#)
- [Fondaparinux](#) : This is another treatment that makes your blood less likely to clot. It's a type of drug called a factor Xa inhibitor and its brand name is Arixtra. [More...](#)
- [Statins](#) : These drugs lower the level of bad cholesterol in your blood, which helps prevent fatty plaques building up in your blood vessels. The commonly prescribed statins (and their brand names) are atorvastatin (Lipitor), fluvastatin (Lescol), pravastatin (Lipostat), rosuvastatin (Crestor), and simvastatin (Zocor). [More...](#)

Treatments that work, but whose harms may outweigh benefits

- [Glycoprotein IIb/IIIa inhibitors](#) : These drugs help stop blood clots forming. There are three of them: abciximab (brand name ReoPro), eptifibatide (Integrilin), and tirofiban (Aggrastat). [More...](#)
- [Warfarin](#) : This is a type of drug that makes your blood less likely to clot. The brand name is Marevan. [More...](#) .

Treatments that need further study

- [Beta-blockers](#) : These are drugs that make your heart beat more slowly, so it doesn't have to work so hard. Common beta-blockers (and their brand names) include atenolol (Tenormin), metoprolol (Lopresor), and propranolol (Inderal). [More...](#)

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- [Calcium channel blockers](#) : These are drugs that make your heart beat more gently. Common ones (and their brand names) include diltiazem (Adizem, Dilzem, Tildiem), felodipine (Plendil), nifedipine (Adalat, Coracten SR), and verapamil (Cordilox, Univer). [More...](#)
- [Early coronary angioplasty](#) : This is a procedure that widens the blocked artery in your heart. 'Early' means you have it soon after you're diagnosed with unstable angina. [More...](#)
- [Nitrates](#) : These are drugs that widen your heart's blood vessels. Common nitrates (and their brand names) include isosorbide dinitrate (Isoket Retard), isosorbide mononitrate (Elantan, Ismo, Imdur), and glyceryl trinitrate (GTN tablets, Nitrolingual pump spray, Nitromin, Nitronal, Nitrocine). [More...](#)

Other treatments

We haven't looked at the research on this treatment in as much detail as we've looked at the research on most of the treatments we cover. (To read more, see Our Method.) But we've included some information because you may have heard of this treatment or be interested in it.

- [Ticagrelor](#) : This is a drug that can reduce or prevent blood clots from forming in arteries. It is taken as a tablet twice a day along with low-dose aspirin. Its brand name is Brilique. [More ...](#)

What will happen to me?

If you've had an attack of unstable angina, you may worry that you could have a **heart attack** and you may feel anxious about the future. But most people recover well.

You will still need to take medicines, probably for the rest of your life. These medicines can relieve your chest pain and lower your risk of having a heart attack, a **stroke**, or other serious problems. ^[12] ^[13]

Having angina probably means that you have **coronary artery disease**. With this disease, the arteries that carry blood to your heart are narrowed, so less blood can get through. If an artery gets badly blocked, you can have a heart attack. Having angina means you are more likely to die early from a heart attack. ^[14]

What are my chances?

Doctors keep statistics on people who have problems like unstable angina. So, we know things like how many people die soon after an attack of unstable angina, how many people have a heart attack, and how many continue to have problems with their health.

A small percentage of people do die of a heart attack after getting unstable angina. However, more than 9 in 10 people who get treatment for unstable angina are still alive

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six months later. The idea of having a heart attack can be frightening, but bear in mind that statistics cannot tell you what will happen to you as an individual. You might be interested in reading these numbers, or you might prefer not to look at them. If you do read them, bear in mind they can't predict your future. They come from the experiences of large groups of people. They don't refer to you as an individual. For more, see [Survival rates for unstable angina](#) .

Doctors are always learning more about unstable angina, and treatments keep getting better. These days, doctors in the Accident and Emergency Department can quickly determine which people are at highest risk of getting worse. They can then give these people the intensive treatment they need. For more, see [Unstable angina: working out your risk](#) .

Making some changes in the way you live, such as stopping smoking and eating sensibly, may also help you live longer and stay in good health. For more, see [Unstable angina: what you can do to help yourself](#) .

How will unstable angina affect my life?

You may worry about doing your usual activities or enjoying life as normal. The good news is that, with the right treatment, many people with unstable angina can carry on with the things they enjoy.

Work

Having angina may affect some kinds of work. For example, you may no longer be able to do a job that involves running heavy machinery or driving certain kinds of vehicles. Contact the Driver and Vehicle Licensing Authority (DVLA) for more information (<http://www.dvla.gov.uk>).

Driving

You should still be able to drive, as long as your angina is under control. You don't need to tell the DVLA about your angina. But you do need to tell your car insurance company.

Sex

You may worry that having sex will bring on your angina. But most people can still enjoy sex.

If you're taking medicines called [nitrates](#) or a drug called nicorandil, you shouldn't take certain drugs for erection problems. Some of these drugs (with brand names) are:

- sildenafil (Viagra)
- tadalafil (Cialis)
- vardenafil (Levitra).

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Nitrates and nicorandil can lower your [blood pressure](#), and these other drugs may lower it even more. That can be dangerous.

If you worry about having sex, talk to your doctor. You may feel embarrassed, but remember that sex is a normal part of life. Your doctor is used to dealing with sexual problems. He or she may be able to help you and your partner.

If your doctor has any doubts, he or she may suggest a stress test to see how much exercise is safe for you. For more, see [Stress test](#).

Flying

If you have unstable angina or get frequent chest pains, then you probably should not fly. If you're not sure if flying is safe, talk to your doctor. Generally, if you can climb 12 stairs and walk 50 metres on flat ground without getting very breathless and without getting angina, you can probably fly as a passenger. ^[15]

Depression

Having angina can affect how much you get out of life. You may worry so much about your condition that you feel you have to take it easy and can't live life normally.

You might think of angina as a mini heart attack, which can make you feel like you have to stop doing things you enjoy. And this can give you more [anxiety](#) and even [depression](#).

If you're worried or feeling down, talk to your doctor about a self-help angina plan. This plan is based on a workbook and a relaxation tape. If you have been recently diagnosed with angina, the plan can help you feel better and have less anxiety and depression. You work with a nurse who helps you change the way you live and advises you about medicines. ^[16]

Future treatments

Your doctor may suggest you consider an operation called a [coronary artery bypass graft](#). It helps to improve the flow of blood to your heart.

Questions to ask your doctor

If you've been told you have unstable angina, you may want to talk to your doctor to find out more.

Here are some questions that you might want to ask:

- Why did I get unstable angina?
- Did I have a [heart attack](#)?
- Will I have a heart attack?

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- Are there tests that can show my chances of having a heart attack?
- Will I get better?
- What's the best treatment for me?
- Will I need to have treatment for the rest of my life?
- What are the side effects of treatment? How can I cope with them?
- Will I need surgery or another type of procedure?
- Do I have to stop any activities, such as sports?
- Can I still have sex?
- Should I change what I eat? If so, how?
- Is it safe for me to drive?

If you smoke, you may want to ask your doctor:

- How will stopping smoking help?
- Where can I find help to stop?
- What treatments are there to help me stop?
- Is there a local support group I can join to help me stop?

Survival rates for unstable angina

In one study looking at what happened to people after an attack of unstable angina: ^[29]

- About 5 in 100 people had died of a heart attack after 30 days
- About 9 in 100 people had died of a heart attack after six months.

But remember, these numbers apply to people in general. They don't say what will happen to you specifically. Ask your doctor what you can expect.

Treatments:

Aspirin

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[How does it work?](#)

[Can it be harmful?](#)

[How good is the research on aspirin?](#)

This information is for people who have unstable angina. It tells you about aspirin, a treatment used for unstable angina. It is based on the best and most up-to-date research.

Does it work?

Yes. If you have unstable angina, taking a medium dose of aspirin each day will lower your chances of having a heart attack or a stroke, and of dying.^[31] A medium dose is between 75 milligrams (mg) and 325 mg each day.

What is it?

Most of us think of aspirin as a painkiller. But it is also an **antiplatelet drug**. Platelets are sticky particles that help your blood clot when you are injured. But sometimes platelets also form clots in the vessels that supply blood to your heart (your coronary arteries). This can reduce the amount of oxygen getting to your heart and cause unstable angina or a heart attack. Aspirin stops platelets sticking together, making your blood less likely to clot.

You can buy aspirin at chemists and supermarkets without a prescription. You can also get certain types of aspirin on prescription from your doctor. If you pay prescription charges you may find it cheaper to buy it over the counter. But you should always check with your doctor what dose of aspirin you should take.

You can get aspirin as:

- Tablets that you swallow whole
- Tablets that you chew
- Tablets that you dissolve in water
- Tablets with a special coating to protect the lining of your stomach
- Suppositories (larger, bullet-shaped drugs that go in your rectum).

You will probably need to go on taking aspirin every day for the rest of your life, unless you get side effects.

Always tell your doctor or dentist that you are taking aspirin. Aspirin can make you bleed more than usual during dental and medical procedures.

Angina, unstable

If you are taking aspirin to protect your heart, don't take painkillers or cold and flu remedies that also have aspirin in them. This is because you could get too much aspirin in your system.

If you are **allergic** to aspirin or can't take it for some other reason, your doctor may give you another drug to stop your blood clotting. That drug may be [clopidogrel](#) . Many people also take clopidogrel along with aspirin.

The Food and Drug Administration (FDA), the body that checks the safety of drugs in the United States, says that taking ibuprofen with low doses of aspirin can make the aspirin less effective. ^[32] This means that if you take ibuprofen regularly together with aspirin, the aspirin may not reduce the risk of another stroke or heart attack so well.

Ibuprofen is a type of painkiller called an **NSAID** . NSAIDs are often used to treat conditions where there is pain and inflammation, such as arthritis. The FDA says that other NSAIDs may also stop aspirin working properly.

At the moment, doctors in the UK have not been given any guidance about using these two drugs together. US guidance suggests taking your aspirin at least half an hour before taking ibuprofen. See your doctor if you have any questions.

How can it help?

Aspirin can reduce your chance of having a heart attack or a stroke, or of dying. Here is what one study showed in people who had an attack of unstable angina. ^[31]

- Twelve months after the attack, 8 in 100 people who took 75 mg to 325 mg of aspirin daily had had a heart attack or a stroke, or had died from their **coronary artery disease** .
- But these things happened in 13 in 100 people who took a dummy treatment (a **placebo**) for comparison.

It doesn't help to take more than 325 mg of aspirin each day. In fact, it may be harmful. ^[31]

How does it work?

Aspirin stops your blood clotting by making **platelets** less sticky. Platelets are tiny particles in your bloodstream. They help your blood clot when you are injured. The less sticky your platelets are, the less likely they are to form clots in the blood vessels that supply your heart with blood (your coronary arteries).

If you have a clot in one of these blood vessels, your heart is not getting enough oxygen, and you may get unstable angina or have a heart attack. A blood clot may also form in an artery in your brain and cause a stroke.

Aspirin helps stop these clots forming.

Can it be harmful?

All drugs have side effects, including aspirin. But the benefits of taking aspirin are probably worth the risks if you have unstable angina.

The two most common side effects are bleeding and an upset stomach. Taking more than 325 mg of aspirin each day may increase your risk of these side effects. Also, higher doses won't protect your heart any more than lower doses.^[31] So, you should not take extra aspirin to protect your heart, or as a painkiller, or for colds or flu.

Bleeding

Blood clots stop you bleeding too much if you're cut. So, all drugs that affect clotting can make you bleed more than you would normally. Fortunately, the dose of aspirin needed to protect your heart is low. So your risk of bleeding too much also is low. Here is what one study showed.^[31]

- Slightly more than 1 in 100 people who took 75 mg to 325 mg of aspirin each day got serious bleeding.
- Slightly less than 1 in 100 people who took a dummy treatment got serious bleeding.

Still, if you're taking aspirin to protect your heart, you may notice that cuts take longer to stop bleeding or that you bruise more easily.

Upset stomach

Aspirin can irritate the lining of your stomach. Most people feel this as indigestion soon after taking an aspirin. Others feel a little sick. More rarely, the irritation causes **ulcers** or bleeding from the stomach lining. To avoid these problems, take aspirin with your main meal.

If you have an upset stomach or pain after you take aspirin, ask your doctor to recommend a type that protects your stomach lining.

If you've had a stomach ulcer, bleeding, or irritation in the past, your doctor may advise you to take a medicine called a **proton pump inhibitor** along with the aspirin. This is to stop the problem happening again. With this medicine, your stomach doesn't make as much acid. Proton pump inhibitors include esomeprazole (Nexium), omeprazole (Losec), and pantoprazole (Protium).

How good is the research on aspirin?

There is very good research showing that aspirin works for treating unstable angina.

We found a large summary of the research (called a **systematic review**) that looked at aspirin.^[31] It included a total of 12 good studies (called **randomised controlled trials**). The studies involved more than 5,000 people who had unstable angina. They compared aspirin and similar medicines with a dummy treatment (a **placebo**).

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All of the studies showed that aspirin reduced **heart attacks** and **strokes** , and saved lives.

Clopidogrel

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[How does it work?](#)

[Can it be harmful?](#)

[How good is the research on clopidogrel?](#)

This information is for people who have unstable angina. It tells you about clopidogrel, a treatment used for unstable angina. It is based on the best and most up-to-date research.

Does it work?

Yes. If you have unstable angina, taking clopidogrel in addition to [aspirin](#) will lower your chance of having a **heart attack** or a **stroke** , or of dying.

Doctors also give this drug to people with unstable angina who can't take aspirin.

What is it?

Clopidogrel (brand name Plavix) is an **antiplatelet drug**. **Platelets** are sticky particles that help your blood clot when you're injured. But platelets can also form clots in the blood vessels that supply blood to your heart (your **coronary arteries**). This can reduce the amount of oxygen getting to your heart and cause unstable angina or a heart attack. Like aspirin, clopidogrel stops platelets sticking together, making your blood less likely to clot.

The National Institute for Health and Care Excellence (NICE) advises the NHS on treatments. NICE recommends that people with unstable angina who have a medium to high risk of having a heart attack or of dying as a result of their condition should take clopidogrel as well as aspirin for up to 12 months after their attack of unstable angina.

^[33] For more on how doctors determine your risk, see [Unstable angina: working out your risk](#) .

How can it help?

If you take 300 milligrams (mg) of clopidogrel along with aspirin within 24 hours of getting unstable angina, and then take a lower dose (75 mg each day) for three months to 12 months, your risk of having a heart attack or a stroke, or of dying, will be a little less than if you take only aspirin every day.

One study found that after a year: ^[34]

- About 9 in 100 people who took clopidogrel plus aspirin had died as a result of their **coronary artery disease** or had a heart attack or a stroke

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- But these things had happened to 11 in 100 people who took a dummy treatment (a [placebo](#)) plus aspirin.

If you take both drugs to protect your heart, doctors think the best dose of aspirin is 75 mg to 100 mg each day. ^[34]

Another study found that a higher dose of clopidogrel might help more people, without causing too many side effects. ^[35] But we need more research to be sure about this.

How does it work?

Clopidogrel stops your blood clotting by making platelets less sticky. Platelets are tiny particles in your bloodstream. They help blood clot when you are injured. The less sticky your platelets are, the less likely they are to form clots in the blood vessels that supply your heart with blood (your coronary arteries).

If you have a clot in one of these blood vessels, your heart is not getting enough oxygen, and you may get unstable angina or have a heart attack. A blood clot may also form in an artery in your brain and cause a stroke.

Clopidogrel helps stop these clots forming.

Can it be harmful?

The most common side effect of clopidogrel is bleeding.

Blood clots stop you bleeding too much if you're cut. So, all drugs that affect clotting, including aspirin and clopidogrel, can make you bleed more than you would normally. If you take either or both of these drugs to protect your heart, you may notice that cuts take longer to stop bleeding or that you bruise more easily.

If you take clopidogrel as well as aspirin, your risk of serious bleeding is a little higher than if you take just aspirin. This is what one study showed. ^[34]

- Nearly 4 in 100 people who took both clopidogrel and aspirin got serious bleeding.
- Nearly 3 in 100 people who took just aspirin got serious bleeding.

Clopidogrel may not work as well with heartburn drugs called proton pump inhibitors (PPIs). These drugs reduce the amount of acid produced in the stomach and are used to protect against acid reflux ([GORD](#)) and stomach ulcers. PPIs include esomeprazole (Nexium), omeprazole (Losec), and pantoprazole (Protium). Research shows these drugs may stop the body from breaking down clopidogrel properly, so it may not work as well. Doctors have been advised to avoid using PPIs along with clopidogrel. ^[36]

How good is the research on clopidogrel?

There is good research showing that clopidogrel works for treating unstable angina.

Angina, unstable

We found a very large, good study (called a [randomised controlled trial](#)) that involved more than 12,500 people with unstable angina.^[37] It compared taking clopidogrel plus [aspirin](#) with taking a dummy treatment (a [placebo](#)) plus aspirin. Taking both clopidogrel and aspirin reduced [heart attacks](#) and [strokes](#) , and saved lives.^[38]

A later review of this study showed that taking higher doses of aspirin with clopidogrel didn't protect the heart any more than taking lower doses of aspirin.^[39] Also, taking higher doses increased the risk of bleeding. So doctors think that the best dose of aspirin to take with clopidogrel is 75 milligrams to 100 milligrams (mg) each day.

Direct thrombin inhibitors

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[How do they work?](#)

[Can they be harmful?](#)

[How good is the research on direct thrombin inhibitors?](#)

This information is for people who have unstable angina. It tells you about direct thrombin inhibitors, a treatment used for unstable angina. It is based on the best and most up-to-date research.

Do they work?

Probably. Treatment with a direct thrombin inhibitor will probably reduce your chance of having a [heart attack](#) or dying in the first 30 days after an attack of unstable angina.

These medicines aren't used much for unstable angina. But if you have an [allergy](#) to [heparin](#) , your doctor might prescribe one of these medicines instead.

What are they?

Thrombin inhibitors are drugs that help stop your blood clotting. They can't break up clots. But they can stop them getting bigger.

Thrombin inhibitors go straight into your bloodstream through a drip (also called an [intravenous infusion](#) or IV). You will probably have the drip for about seven days after your attack of unstable angina.

A thrombin inhibitor you can get in the UK is bivalirudin (brand name Angiox).

How can they help?

One summary of the research found that 30 days after an attack of unstable angina:^[40]

- More than 7 in 100 people who'd had seven days of a drip with a thrombin inhibitor had died or had a heart attack

Angina, unstable

- Slightly more than 8 in 100 people who'd had treatment with heparin had died or had a heart attack.

How do they work?

You get unstable angina when your heart isn't getting enough oxygen. Usually this happens because one or more of the **arteries** that carry blood to the heart (**coronary arteries**) are narrowed or partly blocked by a blood clot.

Direct thrombin inhibitors don't break up these clots. But they do stop them getting bigger and they stop new clots forming.

Can they be harmful?

Yes. These medicines can cause bleeding. But the risk is quite small. Slightly more than 1 in 100 people who are given these drugs get serious bleeding. ^[40]

The risk of bleeding with direct thrombin inhibitors is a bit lower than the risk with heparin.

The risk of having a **stroke** with this treatment is even smaller. Only about 6 in 1,000 people have a stroke in the month after treatment. ^[40]

This risk of a stroke after treatment with direct thrombin inhibitors is the same as with heparin.

How good is the research on direct thrombin inhibitors?

The research showing these drugs work for unstable angina is quite good. We found a large summary of the research (called a **systematic review**). ^[41] It included 11 good studies (known as **randomised controlled trials**). They involved a total of more than 35,000 people with unstable angina and similar heart problems.

These studies compared thrombin inhibitors with a drug called **heparin** . Both drugs help to stop unstable angina turning into a **heart attack** .

However, the research suggests that thrombin inhibitors may be slightly better at preventing heart attacks and stopping people dying. A month after an attack of unstable angina:

- About 7 in 100 people using a thrombin inhibitor had had a heart attack or died
- About 8 in 100 people using heparin had had a heart attack or died.

Heparin

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Angina, unstable

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[How good is the research on heparin?](#)

This information is for people who have unstable angina. It tells you about heparin, a treatment used for unstable angina. It is based on the best and most up-to-date research.

Does it work?

Probably. If you have injections of heparin for the first week after an attack of unstable angina, you are less likely to have a **heart attack** or die during that time. But having heparin for longer than this doesn't seem to work any better. Having treatment for longer may also increase the risk of side effects.

What is it?

Heparin is a drug that helps stop your blood clotting. You may have heard it called a blood thinner. But this isn't really what it is. It doesn't break up clots. It does stop them getting bigger.

You can get two types of heparin.

- **Unfractionated heparin.** The brand name is Monoparin. This type works for only a short time. It goes straight into your bloodstream through a drip (also called an **intravenous infusion** or IV). While you have this treatment, you will need blood tests to make sure that your blood is clotting properly.
- **Low-molecular-weight heparin.** This is called LMWH for short. It lasts longer, so it doesn't have to be given as often. You get this type of heparin as an injection under your skin. With this type, you don't need tests to make sure your blood is clotting properly. That means you can keep giving yourself injections when you go home. ^[42]

Some examples of low-molecular-weight heparin (with brand names) are:

- dalteparin (Fragmin)
- enoxaparin (Clexane)
- tinzaparin (Innohep).

How can it help?

Here is what the research shows about using heparin to treat people with unstable angina.

- Some studies found that nearly 8 in 100 people who had unfractionated heparin for seven days, on top of their [aspirin](#), had a heart attack or died during that time. ^[43] That compared with more than 10 in 100 who had just aspirin.

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- Other studies found that less than 2 in 100 people who had LMWH for seven days, on top of their aspirin, had a heart attack or died during that time.^[43] That compared with more than 5 in 100 of those who had just aspirin or aspirin plus a dummy treatment (a placebo).

Some research has compared the two types of heparin.^[44]

- Having unfractionated heparin and having LMWH for seven days worked the same for saving lives and preventing more attacks of angina.
- But LMWH worked a little better at preventing heart attacks.

How does it work?

If you get unstable angina, your heart isn't getting enough oxygen. This happens because one or more of the arteries that supply blood to your heart (your coronary arteries) are partly blocked by blood clots.

Heparin does not break up these clots. But it does stop them getting bigger and it stops new clots forming.

Can it be harmful?

Drugs that stop clotting, such as heparin, can cause bleeding. But the risk is quite small, especially when treatment lasts for only seven days.^{[43] [44] [45]}

- The risk of serious bleeding with unfractionated heparin or with LMWH is the same.^[44]
- Having heparin injections for longer than seven days increases the risk of bleeding.^[43]

How good is the research on heparin?

There is good research showing that heparin probably works for treating unstable angina. We found four large summaries of research (called systematic reviews).^{[46] [47] [48] [49]} They included several good studies (called randomised controlled trials) that involved a total of about 13,000 people.

Three of the studies showed that having heparin injections, in addition to aspirin and other usual treatments, for the first seven days after an attack of unstable angina reduced heart attacks and saved lives. But having more heparin treatment for up to three months didn't help more.

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One newer summary found that heparin injections cut the chances of having a heart attack, but didn't make any difference to how long people lived. People who had heparin also had an increased chance of bleeding, but not of serious bleeding. ^[49]

When the two different types of heparin were compared, low-molecular-weight heparin (LMWH for short) worked better than unfractionated heparin at reducing heart attacks. But the two types were equally good at saving lives and preventing more attacks of angina. ^[48]

Statins

In this section

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[What are they?](#)

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[How do they work?](#)

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[How good is the research on statins?](#)

This information is for people who have unstable angina. It tells you about statins, a treatment used for unstable angina. It is based on the best and most up-to-date research.

Do they work?

Probably. Taking a statin will reduce the amount of bad cholesterol in your blood, which should lower your risk of having a heart attack if you have coronary artery disease. Most people get unstable angina because of this disease.

What are they?

Statins are a group of drugs that can reduce your level of bad cholesterol, which is known as low-density lipoprotein (LDL) cholesterol. If you have too much LDL cholesterol in your blood, it builds up to form fatty deposits (plaques) along the inside of blood vessels. Over time, these plaques can make the arteries bringing blood to your heart (your coronary arteries) narrower, stiffer, and rougher. This is called **coronary artery disease**. Most people with unstable angina have this disease. Plaques can also form in an artery in your brain, which can lead to a stroke.

By reducing LDL cholesterol, statins help stop plaques growing.

There are many different statins available. The main ones (with brand names) are:

- atorvastatin (Lipitor)
- fluvastatin (Lescol)
- pravastatin (Lipostat)
- rosuvastatin (Crestor)

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- simvastatin (Zocor, Simzal).

Most of these drugs need to be prescribed by a doctor. You can buy a low dose (10 mg) of simvastatin over the counter at pharmacies. Its brand name is Zocor Heart-Pro. However, if you have angina, this dose will be too low for you. You'll need to be treated by your doctor.

How can they help?

Not many studies have looked at using statins after an attack of unstable angina, but lots of research shows this treatment can help prevent heart attacks for people with coronary artery disease.^[50] ^[51] ^[52] These treatments can also lower your risk of having a stroke .

How do they work?

Statins interfere with the liver's ability to make cholesterol. They also help your liver absorb more bad cholesterol from your blood.

Statins stop the work of an enzyme that tells the liver to make more cholesterol. (An enzyme is a substance that assists a chemical reaction in the body.) Blocking this enzyme reduces the amount of bad (LDL) cholesterol that your liver makes.

Because your liver is making less cholesterol, the level of bad cholesterol in your blood starts to fall. When this happens, your liver thinks your body has a cholesterol shortage, so it absorbs more bad cholesterol from your blood. This means there is less bad cholesterol to clog up blood vessels.

If there is less bad (LDL) cholesterol in your blood, there's a lower chance that fatty plaques will build up in your blood vessels, and a lower risk of having a heart attack. (A heart attack happens when a blood vessel is completely blocked by a fatty deposit and blood can't get through to your heart.)

Statins also lower levels of triglycerides, the other main fat (lipid) circulating in your blood. High levels of triglycerides can be harmful.

Can they be harmful?

Yes, but side effects are rare. Your risk of having a heart attack due to raised blood cholesterol that is not treated or properly controlled is probably much greater than your risk of getting one of these side effects.

Headaches, upset stomachs, feeling tired, and not being able to sleep

Some people who take statins report these problems.^[53] But they may not be more common in patients who are taking statins than in patients who are not.

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Liver damage

Sometimes people taking statins get liver problems. The amount of an enzyme in the liver (called transaminase) goes up, which is a sign that the liver may not be working as well as it could. If the level rises too high (three times the normal level) then your doctor may take you off statins.

The main job of the liver is to remove harmful chemicals from the body. If it can't do this job very well, then the harmful chemicals build up in the body and can lead to liver failure. It's not clear whether these raised enzyme levels are more common in people taking statins than in people not taking them. Studies compared people given a statin and people given an inactive treatment (a placebo). Similar numbers of people from both groups got this problem.^[54] This suggests that the liver problem may not be related to statins.

To check whether your liver is working properly your doctor may do a **liver function test** before you start treatment. This is a blood test. Your doctor will repeat the test in the first one month to three months of treatment and again every three months to six months after that for the first year of treatment.^[55]

Muscle pain and muscle damage

These side effects aren't common. Some people who take statins get pain in their muscles, and a few actually get muscle damage, although this is rare. If you have new muscle pain after starting statins, you should tell your doctor.

It's always hard to say who will get a side effect, and even how common it is. One research review looked at 30,000 people who took statins for more than five years. Of these, 50 people who were treated with statins and 40 who were given a placebo had high levels of the enzyme creatine kinase (a sign of muscle damage) in their blood.^[54]

Another review of nearly 20,000 people found that muscle pain was very rare.^[53] Less than 1 in 1,000 people had muscle pain. And the problem was just as likely to happen in people who took a dummy treatment as in those taking a statin.

One study from the US has shown that Asian people who take rosuvastatin have twice as much drug in their blood as white people. This suggests that Asian people may not clear the drug from their body as quickly as other people, and they may not need such a big dose to get the same effect. In the UK, doctors are advised to start Asian people on a lower dose (5 milligrams [mg] a day).^[56]

Muscle breakdown

Rarely, people taking statins get a serious kind of muscle damage, called **rhabdomyolysis**. If this happens, muscle tissue starts to break down. It breaks down into chemicals that enter your bloodstream. These chemicals are harmful to your kidneys, and can even cause your kidneys to stop working. If your kidneys stop working, your life may be in danger.

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In the UK, there have been six suspected cases of muscle breakdown in people taking a high dose of rosuvastatin.^[57] There's no evidence that rosuvastatin is more likely to cause the problem than other statins, but doctors have been warned to be careful about giving people high doses of rosuvastatin. A high dose is 40 milligrams a day or more. This dose is only recommended for people at a high risk of a heart attack or a stroke. For more details see [Advice about rosuvastatin \(Crestor\)](#) .

There's also a higher risk of muscle breakdown if you take simvastatin together with another drug called amiodarone.^[55] Amiodarone is used to treat irregular heartbeats.

Kidney damage

Some people who have taken statins have had kidney damage or kidney failure (when the kidneys stop working). But it's not clear whether the kidney problems are due to taking the statin or whether the people would have got kidney problems anyway. Many people who take statins are at increased risk of kidney damage because of other conditions they have, such as **diabetes** and **high blood pressure** . The FDA is keeping a close watch to see what happens to people who take statins.

If you get a fever, dark urine, vomit, or feel sick, you should see your doctor as soon as possible.^[58]

Atorvastatin and bleeding in your brain

One study has shown that, although atorvastatin protects against some types of stroke, it may increase your risk of others.^[59] Atorvastatin may be less suitable for people who are at risk of a stroke caused by bleeding in the brain (a **haemorrhagic stroke**). Make sure you tell your doctor if you've had a stroke before. Your doctor will be able to explain the risks and benefits of this treatment, and may recommend a different drug if atorvastatin isn't suitable.

Other side effects

These side effects have been reported among people taking statins, although they are not common:

- Sleep disturbances, such as insomnia and nightmares
- Short-term memory loss
- Sexual problems (such as being unable to get an erection)
- Depression
- Interstitial lung disease. This is when tissue in the lungs becomes inflamed, making it hard to breathe. If you have breathing problems while taking statins, see your doctor.

Angina, unstable

The Medicines and Healthcare Products Regulatory Agency (MHRA), which monitors the safety of drugs in the UK, says patients should be warned about these possible side effects when taking any of the statins used in the UK. ^[60]

Other side effects sometimes mentioned include headaches, stomach upsets, and feeling tired. However, these symptoms are very common. We don't know for sure that they're caused by statins. ^[53]

The MHRA has recently found that statins may increase the risk of people developing diabetes. However, the risk is small and is mainly in people who are already at increased risk of developing diabetes. ^[61]

Long-term side effects

We don't yet know whether statins are harmful when taken for long periods of time. The studies done so far have lasted about six years. Because many people will have to take these drugs for the rest of their lives, doctors are following patients carefully to check the safety of the drugs and side effects after many years of using them.

How good is the research on statins?

Many studies show that statins can help prevent heart attacks in people with coronary artery disease. ^[50] ^[51] ^[52] Most people get unstable angina because of this disease. Studies also show they can lower the risk of stroke .

However, not many studies have looked specifically at taking statins soon after an attack of unstable angina. We found one study with more than 3,000 people who were in hospital because of a mild heart attack or unstable angina. ^[62] Some started taking a statin and others took a dummy treatment (a placebo). After 16 weeks, those who were taking the statin were less likely to have made another emergency trip to hospital for a similar heart problem.

Early coronary angioplasty

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[How does it work?](#)

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[How good is the research on early coronary angioplasty?](#)

This information is for people who have unstable angina. It tells you about early coronary angioplasty, a treatment used for unstable angina. It is based on the best and most up-to-date research.

Angina, unstable

Does it work?

Studies show that having this procedure as soon as possible after an attack of unstable angina can reduce your risk of having a heart attack or of dying. But it's not clear if having this treatment straight away works better than taking medicines for most people.

It may be that some people do better with this procedure, such as those at high risk of having a heart attack, while others do better with drug treatments.

What is it?

Early coronary angioplasty is a procedure that widens your coronary arteries. That means blood can flow more easily to your heart again, and your heart can get more oxygen. 'Early' means having this procedure soon after you've had an attack of unstable angina.

During the procedure, a doctor uses a tiny deflated balloon on the end of a thin tube. This tube is put into your body, probably near your groin. It is then passed through your blood vessels until it reaches the part of your artery that is blocked.

The doctor then inflates and deflates the balloon several times. This widens the artery and gets blood flowing through it again.

We've prepared some extra information for people thinking of having this operation. To read more, see [Coronary angioplasty](#).

Many people have this procedure soon after an attack of unstable angina. But you may not have it if your risk of a heart attack seems low.^[63] To find out how doctors determine risk, see [Unstable angina: working out your risk](#).

How can it help?

Coronary angioplasty can lower your chance of having a heart attack if you have unstable angina. However, we're not sure if having this as soon as possible works better than having drug treatment. Studies have had different findings.

One summary of the research found that people who had the procedure as soon as possible were more likely to be alive two years later, and less likely to have had a heart attack.^[64] After two years, 5 in 100 people who'd had an early operation had died, compared with 7 in 100 people who'd had the operation later or had only drug treatment. Of those who'd survived, 8 in 100 people who'd had an early operation had a heart attack, compared with 9 in 100 people who'd had other treatments.^[64]

However, other summaries of the research found that early angioplasty did not reduce the risk of death or heart attack, compared with drug treatment.^[65] ^[66]

Another summary looked separately at how the treatment worked for men and women. It found that men were less likely to die, have a heart attack, or return to hospital if they had angioplasty as soon as possible, instead of drug treatment. However, early angioplasty

Angina, unstable

was no better than drug treatment for women, unless they were at particularly high risk of having a heart attack or related problems. ^[67]

How does it work?

This procedure can get rid of the blockage that caused your unstable angina. It lets more blood reach your heart. It also widens the narrowed artery or arteries in your heart. In the long run, this means that more blood can flow to your heart. This may help to prevent more attacks of unstable angina or a heart attack.

Can it be harmful?

All procedures carry some risks.

Studies have found that the risk of bleeding during the procedure was about twice as high as the risk with the usual treatment with drugs. ^[68] ^[69]

- Around 2 to 6 in 100 people got serious bleeding with coronary angioplasty.
- But only about 1 to 3 in 100 people got serious bleeding with the usual treatment with drugs.

There are some other risks too.

- You may have pain in your chest during the procedure. You may also feel discomfort where the tube is put in. But painkillers will help.
- Sometimes doctors have to give up during the procedure because they can't get the tube into the coronary artery. But this is rare.

In a few people, the coronary artery that has been re-opened quickly closes off again.

^[70] But this is far less of a problem than it used to be. That is because, these days, doctors usually put in a tiny tube called a stent to keep the artery open.

But if your artery does close off again, your doctor may recommend emergency surgery on your heart. This is called a coronary artery bypass graft (CABG for short). The surgery makes new routes for your blood to go around the blocked arteries by taking blood vessels from another part of your body (probably your leg) and attaching them to the narrowed arteries. This allows your blood to go past the blocked sections of your arteries and deliver oxygen and nutrients to your heart muscles. To learn more, see Coronary artery bypass.

How good is the research on early coronary angioplasty?

There's a lot of good research on this procedure, which widens the blood vessels in the heart. However, studies have had different findings on whether having this treatment

Angina, unstable

soon after an attack of unstable angina works better than waiting or having only drug treatment. So we still need more research.

We found a big summary of the research (called a [systematic review](#)). It looked at seven studies including more than 8,000 people. It showed that, two years afterwards, people who'd had an early coronary angioplasty were more likely to be alive and less likely to have had a [heart attack](#) , compared with people who had the operation later or had only drug treatment. ^[64]

However, a later summary with 10 studies (10,648 people) did not find that early coronary angioplasty helped more than drug treatment. This summary included studies looking at older types of treatment that are no longer used, so it's findings may not be as reliable. ^[65]

However, another summary with seven studies (5,370 people) also found that early coronary angioplasty didn't lower people's risk of heart attacks or of dying early, compared with drug treatment. ^[66]

A fourth summary with eight studies (10,150 people) suggested that early angioplasty may work better for men than for women, although women at high risk of a heart attack or related problems may also benefit. However, there was a lot of variation among the studies, which makes it difficult to reliably combine their findings. So we need more research to know for certain. ^[67]

Glycoprotein IIb/IIIa inhibitors

In this section

[Do they work?](#)

[What are they?](#)

[How can they help?](#)

[How do they work?](#)

[Can they be harmful?](#)

[How good is the research on glycoprotein IIb/IIIa inhibitors?](#)

This information is for people who have unstable angina. It tells you about glycoprotein IIb/IIIa inhibitors, a treatment used for unstable angina. It is based on the best and most up-to-date research.

Do they work?

Probably. Treatment with a glycoprotein IIb/IIIa inhibitor as soon as possible after you are diagnosed with unstable angina will probably reduce your risk of having a [heart attack](#) or of dying during the next month. But you can get serious bleeding with this treatment.

These drugs are not the right treatment for everyone who has unstable angina. Whether they are right for you will depend on your risk of having a heart attack and what other treatments or procedures you are having.

Angina, unstable

What are they?

Glycoprotein IIb/IIIa inhibitors are drugs that help stop your blood clotting. There are three of them. They are listed below (with their brand names).

- abciximab (ReoPro)
- eptifibatide (Integrilin)
- tirofiban (Aggrastat)

All of them go straight into your bloodstream through a drip (also called an **intravenous infusion** or IV). You need to have the treatment only once, probably as soon as possible after your unstable angina is diagnosed.

The National Institute for Health and Care Excellence (NICE) advises the NHS on treatments. NICE recommends that treatment with a glycoprotein IIb/IIIa inhibitor be considered in people with unstable angina if the following are true: ^[33]

- They have a medium or higher risk of having a heart attack or of dying as a result of their condition within six months
- They are scheduled to have a test called a [coronary angioplasty](#) within 96 hours of being admitted to hospital.

How can they help?

One summary of the research (a **systematic review**) showed that one month after an attack of unstable angina: ^[71]

- Nearly 11 in 100 people who had a drip of a glycoprotein IIb/IIIa inhibitor had died or had a heart attack
- Nearly 12 in 100 people who had a dummy treatment (a **placebo**) had died or had a heart attack.

One study looked to see if the benefits were different for people at different ages. The study showed that, overall, elderly people (over 80) got even more benefit from taking these drugs in terms of reducing their risk of a heart attack, although they also had an increased risk of bleeding. ^[72]

Another study looked at combining a glycoprotein IIb/IIIa inhibitor with a drug called [clopidogrel](#) for people having a procedure to widen a blocked artery ([coronary angioplasty](#)). Those who had both drugs were less likely to die, have a heart attack, or need another procedure within 30 days of their angioplasty, compared with those who had clopidogrel plus a placebo. ^[73]

Angina, unstable

How do they work?

Glycoprotein IIb/IIIa inhibitors stop your blood clotting by making **platelets** less sticky. Platelets are tiny particles in your bloodstream. They help blood to clot when you are injured. The less sticky your platelets are, the less likely they are to form clots in the blood vessels that supply your heart with blood (your **coronary arteries**).

If you have a clot in one of these blood vessels, your heart isn't getting enough oxygen and you may get unstable angina or have a heart attack.

Glycoprotein IIb/IIIa inhibitors won't help break up a clot. But they can stop it getting bigger. They can also stop new clots forming. [Aspirin](#) does this too, but in a different way. ^[74]

Can they be harmful?

Yes. All glycoprotein IIb/IIIa inhibitors can cause bleeding. Mild bleeding, such as bruising or oozing around the tube in your arm for the drip, is easy to deal with. More serious bleeding or internal bleeding in your gut or brain is more dangerous. ^[71]

How good is the research on glycoprotein IIb/IIIa inhibitors?

There's good research showing glycoprotein IIb/IIIa inhibitors can help after an attack of unstable angina, but they can increase the risk of serious bleeding.

We found a large summary of research (called a **systematic review**) that looked at having a drip (an **intravenous infusion** or IV) of one of these drugs soon after an attack of unstable angina or a mild **heart attack**. ^[71] It included six good studies (called **randomised controlled trials**) with more than 30,000 people with unstable angina or a mild heart attack.

One month after treatment, 11 in 100 people who'd had a drip of a glycoprotein IIb/IIIa inhibitor had died or had a heart attack, compared with 12 in 100 people who'd had a dummy treatment (a **placebo**). However, people treated with a glycoprotein IIb/IIIa inhibitor were more likely to have had serious bleeding.

However, these studies were done before people with unstable angina were routinely given [clopidogrel](#) and similar drugs (called thienopyridines). So we don't know if the result would be similar today. We did find one good-quality study (a randomised controlled trial) that looked at combining a glycoprotein IIb/IIIa inhibitor with clopidogrel to treat people having a procedure to widen a blocked artery ([coronary angioplasty](#)). People who had both drugs were less likely to die, have a heart attack, or need another procedure within a month of their angioplasty, compared with those having clopidogrel plus a placebo. ^[73]

Warfarin

In this section

Angina, unstable

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[What is it?](#)

[How can it help?](#)

[How does it work?](#)

[Can it be harmful?](#)

[How good is the research on warfarin?](#)

This information is for people who have unstable angina. It tells you about warfarin, a treatment used for unstable angina. It is based on the best and most up-to-date research.

Does it work?

If you have unstable angina, taking warfarin may reduce the risk of having a **heart attack** or a **stroke**. But other treatments have a lower risk of causing bleeding as a side effect, so doctors don't usually use warfarin for unstable angina.

What is it?

Warfarin (brand name Marevan) is a drug that helps stop your blood clotting. It can't break up clots, but it can stop them getting bigger.

How can it help?

Taking warfarin as well as aspirin when you first have unstable angina works about as well as taking aspirin plus another drug called [clopidogrel](#). Both combinations of drugs reduce the risk of having a heart attack or a stroke.^[75]

But there's more risk of having serious bleeding with warfarin and aspirin. So doctors are advised to use clopidogrel and aspirin instead.^[76]

How does it work?

If you get unstable angina, your heart isn't getting enough oxygen. This happens because one or more of the arteries that supply blood to your heart (your **coronary arteries**) are partly blocked by blood clots.

Warfarin stops clots getting bigger and stops new clots forming.

Can it be harmful?

Yes. Drugs that stop clots forming, such as warfarin and [heparin](#), can cause bleeding.

Here is what one study showed.^[77]

- About 27 in 1,000 people who took warfarin as well as the usual treatments for unstable angina got serious bleeding.
- But only about half that many, 13 in 1,000 people, who took only the usual treatments got serious bleeding.

How good is the research on warfarin?

Warfarin can prevent heart attacks and deaths in people with unstable angina, if it's given at the correct doses. A summary of the research (a [systematic review](#)) looking at 13 studies and including nearly 70,000 people, showed that warfarin plus [aspirin](#) worked better than aspirin alone, and about the same as aspirin plus [clopidogrel](#).^[75]

But warfarin can be harmful. The researchers worked out that, if 100 people were given warfarin instead of clopidogrel, three more people would have serious bleeding.

Not all the research shows that warfarin can prevent [heart attacks](#). Five earlier studies looking at 4,500 people didn't find any benefit from taking warfarin plus aspirin, compared with aspirin alone.^{[78] [79] [80] [81]}

Beta-blockers

In this section

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[How do they work?](#)

[Can they be harmful?](#)

[How good is the research on beta-blockers?](#)

This information is for people who have unstable angina. It tells you about beta-blockers, a treatment used for unstable angina. It is based on the best and most up-to-date research.

Do they work?

We don't know. If you take a beta-blocker, you may have less chest pain in the first few days after your attack of unstable angina. And the pain may be milder. But we are not sure if these medicines lower your risk of having a [heart attack](#) or of dying.

Still, doctors tend to use beta-blockers for unstable angina. This is partly because of the way these medicines work on your heart, and partly because doctors know that these medicines help people who have had a heart attack or have the [stable kind of angina](#).^[82]

What are they?

Beta-blockers are a group of drugs that are used to treat heart problems. Doctors prescribe them for unstable angina to lower the chance of damage to the heart muscle. They slow your heart down. And they reduce the amount of work your heart needs to do. This means your heart doesn't need as much oxygen. Your doctor will advise you about how long to keep taking beta-blockers.

Here are some common beta-blockers (and their brand names).

- atenolol (Tenormin)

Angina, unstable

- bisoprolol (Cardicor, Emcor)
- metoprolol (Lopresor)
- nadolol (Corgard)
- pindolol (Visken)
- propranolol (Inderal)

Some beta-blockers can be injected straight into your bloodstream. Others come as tablets. Doctors may give you the injected kind in the first few hours after an attack of unstable angina. This is because injections work faster than tablets.

How can they help?

We don't know if these drugs can reduce your risk of having a heart attack or of dying. But we do know that if you have a beta-blocker to treat your unstable angina, you will probably have less chest pain in the first few days after your attack. ^[83] ^[84]

Even if you are already taking other drugs, such as a [nitrate drug](#) or a [calcium channel blocker](#), you may get less chest pain if you take a beta-blocker as well. ^[84]

One study found that the beta-blocker metoprolol may work better than a calcium channel blocker called nifedipine at reducing your chance of getting more chest pain or having a heart attack in the two days after an attack of unstable angina. ^[83]

How do they work?

Beta-blockers stop the action of chemicals called **adrenaline** and **noradrenaline**. Your body makes these chemicals when you are scared, angry, or in pain. They increase your [blood pressure](#). And they make your heart race and beat more forcefully. The pain and anxiety you feel when you have unstable angina cause your body to make adrenaline and noradrenaline.

Beta-blockers reduce the effects of these chemicals on your heart. So they slow your heart down and stop it working too hard. A slower, more relaxed heart uses less oxygen. And that's important if the vessels that carry blood to your heart (your [coronary arteries](#)) are narrower than normal because of a blood clot. Your heart gets oxygen from your blood. When your heart needs less oxygen, the pain from your unstable angina eases off.

Because they stop your heart working too hard, beta-blockers do some other good things.

- They lower your blood pressure and stop it rising suddenly when you feel anxious, under stress, or in pain. This can help prevent a heart attack.

Angina, unstable

- They help control your heartbeat so you have less chance of getting a fast, abnormal heartbeat (called [arrhythmia](#)).

Can they be harmful?

Beta-blockers do have side effects. For most people they tend to be mild. Some studies show that only about 6 in 100 people stop taking beta-blockers because of side effects.

[\[85\]](#) [\[86\]](#) [\[87\]](#)

Some of the side effects of taking beta-blockers are listed below. [\[87\]](#)

- Low blood pressure: If you stand up quickly, you may feel dizzy. You may also feel more tired than usual. If your blood pressure drops very far, you may faint. Your doctor will help you avoid these problems by choosing the right dose for you.
- Losing your sex drive or having difficulty keeping an erection: People taking older types of beta-blockers sometimes get these problems. You can probably avoid them if your doctor prescribes a beta-blocker that acts on your heart more than on other parts of your body. It will also help if you're taking the lowest dose that you can.
- Lung problems getting worse: If you have [asthma](#) or [chronic bronchitis](#), you may not be able to take beta-blockers. Discuss your chest problems with your doctor. Some beta-blockers can work better than others if you have lung problems.
- Low blood sugar: Taking beta-blockers might cover up symptoms you get when your blood sugar is low. You can get low blood sugar from medicines for [diabetes](#). But for most people with diabetes, this should not be a problem. Be sure to tell your doctor if you have diabetes. Then he or she can decide about whether to give you a beta-blocker. [\[88\]](#)

How good is the research on beta-blockers?

There isn't a lot of research on using beta-blockers for unstable angina. So we can't be sure how much they help. Still, doctors tend to use beta-blockers. This is partly because of the way these drugs work on the heart, and partly because doctors know that these drugs help people who have had a [heart attack](#) or have the [stable kind of angina](#). [\[89\]](#)

One study looked at people with unstable angina who were already taking a [nitrate drug](#) or a calcium channel blocker. [\[90\]](#) The beta-blocker propranolol didn't reduce the risk of a heart attack or the need for heart surgery, or save lives. But it did reduce the risk of having more attacks of unstable angina in the next four days, and it made the attacks shorter.

Angina, unstable

Another study compared a beta-blocker called metoprolol with a [calcium channel blocker](#) called nifedipine. ^[91] The beta-blocker worked better at reducing people's risk of having more chest pain or a heart attack in the two days after an attack of unstable angina.

Calcium channel blockers

In this section

[Do they work?](#)

[What are they?](#)

[How can they help?](#)

[How do they work?](#)

[Can they be harmful?](#)

[How good is the research on calcium channel blockers?](#)

This information is for people who have unstable angina. It tells you about calcium channel blockers, a treatment used for unstable angina. It is based on the best and most up-to-date research.

Do they work?

We don't know. These drugs may not reduce your risk of having a [heart attack](#) or dying if you have unstable angina. But doctors often give them to relieve chest pain.

What are they?

Calcium channel blockers are drugs that are used to treat other heart problems, such as irregular heartbeats. They disrupt the electrical activity in your heart and blood vessels. Heart muscle cells, like nerve cells, are driven by electrical activity. By interfering with this, calcium channel blockers can:

- Make your heart beat more slowly
- Make your heart pump less hard.

They can also:

- Relax some [arteries](#) and make them wider
- Lower your [blood pressure](#) .

There are two kinds of calcium channel blockers: those that work mainly on arteries to lower your blood pressure and those that work mainly on your heart.

Some common calcium channel blockers (and their brand names) are listed below.

- diltiazem (Adizem, Dilzem, Tildiem)
- felodipine (Plendil)
- nifedipine (Adalat, Coracten SR)

Angina, unstable

- verapamil (Cordilox, Univer)

People usually take these drugs as tablets.

How can they help?

We don't know whether these drugs can help if you have unstable angina. So far, studies show that they probably won't reduce your chances of having a heart attack or dying.^[92]

One study also found they don't work as well as drugs called [beta-blockers](#) at reducing chest pain in the 48 hours after an attack of unstable angina, or at reducing the risk of a heart attack.^[93]

How do they work?

When calcium gets into heart cells, it makes them want to pump. By stopping this process, calcium channel blockers can make your heart pump more gently.

Doctors thought calcium channel blockers might work for people with unstable angina because these drugs have the same kinds of actions as other drugs that seem to help. For example, they can slow your heart down and make it less excitable. And, like beta-blockers, they can lower your blood pressure.

All of these actions stop your heart working too hard, so they should protect it. But these drugs don't seem work as well as beta-blockers for people with unstable angina.^[93]

Doctors still use calcium channel blockers sometimes as well as beta-blockers or [nitrates](#).^[94] Your doctor might also give you a calcium channel blocker if you can't take a beta-blocker.

Can they be harmful?

Studies show that some calcium channel blockers, such as nifedipine, are harmful and may increase the risk of dying in people who have narrowed arteries in their heart (coronary artery disease).^[95] ^[96] Many people with unstable angina have this disease. So doctors are very careful about using these drugs.

These drugs can also cause other side effects that are less serious. For example, you may get headaches, feel dizzy, or feel sick.

How good is the research on calcium channel blockers?

We found a large summary (called a [systematic review](#)) of six good studies (known as [randomised controlled trials](#)).^[97] The studies included a total of 1,109 people with unstable angina. They took a calcium channel blocker for varying lengths of time, ranging from two days to up to five months after their angina attack.

Angina, unstable

Overall, the risk of having a **heart attack** or dying was the same whether people took: ^[97]

- A calcium channel blocker or a dummy treatment (a **placebo**)
- A calcium channel blocker or a drug called a [beta-blocker](#) .

We found another good study (a randomised controlled trial) of 338 people with unstable angina. ^[98] This study showed that a calcium channel blocker called nifedipine didn't work as well as a beta-blocker called metoprolol at reducing the risk of more chest pain and heart attacks in the first two days after an attack of unstable angina. ^[98]

Nitrates

In this section

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[How do they work?](#)

[Can they be harmful?](#)

[How good is the research on nitrates?](#)

This information is for people who have unstable angina. It tells you about nitrates, a treatment used for unstable angina. It is based on the best and most up-to-date research.

Do they work?

We don't know. If you take a drug called a nitrate, you should have less chest pain in the first few days after your attack of unstable angina. And the pain may be milder. But there isn't enough research to tell if these medicines can reduce your risk of having a **heart attack** or of dying.

Still, doctors tend to use nitrates for unstable angina. This is partly because of the way these drugs work on the heart, and partly because doctors know that these medicines help people who have had a heart attack or have [stable angina](#) . ^[99]

What are they?

Nitrates are drugs that widen blood vessels. This lets more blood flow through them. Doctors call these drugs **vasodilators**. They work on your **arteries** and your **veins** .

If you had a type of chest pain called stable angina before you had your attack of unstable angina, you may already be taking a nitrate drug called glyceryl trinitrate (GTN for short). This same drug is commonly used as a treatment after unstable angina.

If you are in a lot of pain, as is likely with unstable angina, the quickest and best way to get nitrates is through a drip in a vein (also called an **intravenous infusion** , or IV for short). You will probably have this drip for at least 24 hours.

Angina, unstable

The two nitrate drugs used for this are glyceryl trinitrate (GTN) and isosorbide dinitrate.

How can they help?

Being on a drip of a nitrate for 48 hours to treat unstable angina will reduce your risk of:

- Having short attacks of chest pain (stable angina) ^[100] ^[101]
- Having a new longer attack of chest pain (unstable angina) ^[100] ^[101]
- Having to take nitrate tablets for your chest pain. ^[100]

How do they work?

Nitrates widen your blood vessels by relaxing the muscles in their walls. They relieve chest pain because they widen the **coronary artery** that is blocked. And this lets more blood pass through it. More blood means more oxygen for your heart, and that means less pain.

Nitrates don't have any effect on the clot that's causing your unstable angina. But they do stop your coronary arteries tightening around the blockage and making it worse.

Can they be harmful?

Like all drugs, nitrates have side effects. But they are usually mild. Doctors think that nitrates are pretty harmless because researchers have not found any serious side effects during studies.

These are some of the side effects they can cause.

- Headaches: Nitrates widen the blood vessels in your brain. This can cause a throbbing headache that starts soon after treatment.
- Dizziness and fainting: If you get up too quickly after being on a nitrate drip, you may feel dizzy or even faint. Normally, your leg veins tighten as you stand up to stop blood pooling in your legs. Nitrates can stop this happening. So your **blood pressure** drops and you feel faint.
- Reddening or flushing of your skin: Nitrates widen the small blood vessels in your skin. This can make it turn red and feel warm, like when you blush.

Most nitrates act for a short time. That means the side effects wear off quickly. But if you have side effects while you're on a nitrate drip, they may last until the drip is stopped.

How good is the research on nitrates?

There isn't a lot of good research on nitrates for treating unstable angina.

Angina, unstable

We found two good studies (called [randomised controlled trials](#)) that looked at giving glyceryl trinitrate (GTN) as a drip (an [intravenous infusion](#) or IV) to people with unstable angina. ^[102] ^[103]

The first study involved 162 people. ^[102] It lasted for 48 hours.

- About 18 in 100 people who had a GTN drip had more than two attacks of chest pain or one new attack lasting more than 20 minutes.
- But this happened to 36 in 100 of those who had a dummy treatment (a [placebo](#)).

Also, in the same study: ^[102]

- About 16 in 100 people who had a GTN drip needed to take more than two nitrate tablets to relieve chest pain
- But 31 in 100 of those who had a dummy treatment needed to.

The second study involved 200 people with unstable angina. ^[103] All of them had already had a [procedure to widen their coronary arteries](#) . This study showed:

- About 43 in 100 people who had a GTN drip for up to two-and-a-half days had more attacks of chest pain during that time
- But 75 in 100 of those who had a dummy treatment had more attacks.

Giving people GTN plus [heparin](#) , which is a drug that reduces blood clotting, didn't work any better for preventing chest pain than giving people GTN on its own. ^[103] And giving them heparin on its own didn't work any better than giving them just a dummy treatment.

Fondaparinux

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[How good is the research on fondaparinux?](#)

This information is for people who have unstable angina. It tells you about fondaparinux, a treatment used for unstable angina. It is based on the best and most up-to-date research.

Does it work?

Probably. If you have injections of fondaparinux following an attack of unstable angina, you are less likely to have a [heart attack](#) or die in the days after.

Angina, unstable

Fondaparinux may be less likely to cause serious bleeding than a treatment called [heparin](#) .

What is it?

Fondaparinux (brand name Arixtra) is a drug that helps stop your blood clotting. You may hear it called a blood thinner. But this isn't really what it is. It doesn't break up clots. It does stop them getting bigger.

Fondaparinux is a type of drug called factor Xa inhibitor. You will probably have injections of fondaparinux after an attack of unstable angina unless you are scheduled to have a test called a [coronary angiography](#) within 24 hours. If so, you'll probably have injections of unfractionated [heparin](#) instead. ^[33]

How can it help?

We found one large study that compared fondaparinux with enoxaparin, a type of heparin often used to prevent clots in unstable angina. It found no difference between the treatments in people's risk of having a heart attack or of dying after nine days. ^[104] There was also no difference when the researchers followed up with patients after 30 days and six months.

How does it work?

If you get unstable angina, your heart isn't getting enough oxygen. This happens because one or more of the arteries that supply blood to your heart (your [coronary arteries](#)) are partly blocked by blood clots.

Fondaparinux does not break up these clots. But it does stop them getting bigger and it stops new clots forming.

Can it be harmful?

Drugs that stop clotting, such as fondaparinux, can cause bleeding. But the risk is quite small, especially when treatment lasts for only a short time.

The risk of bleeding may be lower with fondaparinux than with heparin. ^[104]

How good is the research on fondaparinux?

There is good research showing that fondaparinux probably works for treating unstable angina. We found one very large, good-quality study (a [randomised controlled trial](#)) comparing fondaparinux with enoxaparin, a type of [heparin](#) often used to prevent clots in unstable angina. The study included more than 20,000 people who were randomly assigned to have injections of one of the drugs after an attack of unstable angina or a mild type of [heart attack](#) . ^[104]

The researchers found no difference between the treatments in people's risk of having a heart attack or of dying after nine days, 30 days, or six months. ^[104] People were less

likely to have serious bleeding if they were given fondaparinux than if they were given enoxaparin.

Ticagrelor

In this section

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[Can it be harmful?](#)

This information is for people who have unstable angina. It tells you about ticagrelor, a treatment used for unstable angina in addition to aspirin.

Does it work?

We haven't looked at the research on ticagrelor in as much detail as we've looked at the research on most of the treatments we cover. (To read more, see Our Method.) But we've included some information because you may have heard of this treatment or be interested in it.

What is it?

Ticagrelor (brand name Brilique) is an antiplatelet drug. Some people with unstable angina take it along with aspirin to help prevent blood clots in the vessels that supply blood to the heart (their **coronary arteries**). Clots in these blood vessels can reduce the amount of oxygen getting to the heart and cause unstable angina or a **heart attack**.

How can it help?

Ticagrelor taken with low-dose aspirin may reduce the risk of heart attack and **stroke**, and help you live longer. ^[105]

How does it work?

Ticagrelor taken with aspirin helps prevent blood clots by making **platelets** less sticky. Platelets are tiny particles in your bloodstream. They help your blood clot when you are injured. The less sticky your platelets are, the less likely they are to form clots in the blood vessels that supply your heart with blood (your coronary arteries).

If you have a clot in one of these blood vessels, your heart is not getting enough oxygen, and you may get unstable angina or have a heart attack. A blood clot may also form in an artery in your brain and cause a stroke.

This combination of treatments helps stop these clots forming.

Can it be harmful?

You may get side effects when you take ticagrelor. The more common ones include: ^[74]

Angina, unstable

- Shortness of breath
- Bleeding
- Bruising.

Less common side effects include: ^[74]

- Nausea
- Vomiting
- Diarrhoea
- Abdominal pain
- Stomach upset
- Inflammation of the lining of the stomach (gastritis)
- Dizziness
- Headache
- Rash
- Itching.

Further informations:

How your heart moves blood around your body

Two main types of blood vessels work together to carry blood through your body: arteries and veins.

Arteries are thick-walled vessels that carry blood away from your heart. Most arteries carry blood to cells in your body after the blood has picked up oxygen from your lungs.

Veins have thinner walls. Most veins carry blood back from your cells to your heart. From here, the blood is pumped to your lungs to pick up more oxygen.

What happens when your heart beats

Every time your heart beats, three things happen.

- Your heart relaxes so blood can flow into it.
- The two upper chambers of your heart contract, squeezing blood into the two lower chambers.
- The two lower chambers contract and pump blood out. The right chamber pumps blood to your lungs. The left one pumps blood to the rest of your body.

Your heart beats about 60 times to 80 times a minute. But it can beat as many as 150 times a minute if you're exercising hard and your body needs more oxygen and food.

How blood moves through your heart

Once your blood has delivered oxygen and food to your cells, it returns to the upper chamber on the right side of your heart.

From there it moves into the lower chamber on the right. Next, it travels to your lungs through the **pulmonary artery**. That artery is a short, wide blood vessel that stretches between your heart and your lungs. There, it picks up oxygen.

Once blood has picked up oxygen, it returns to the left side of your heart through your **pulmonary veins**. These veins are four large blood vessels that bring blood back from your lungs to your heart.

Blood enters the upper chamber on the left side. Then it moves into the lower chamber on the left. It's then pumped through the main artery of your body (called the aorta) to all parts of your body.

Acute coronary syndrome

Acute coronary syndrome (ACS) is a general term. Doctors use it to refer to three serious heart problems that can happen when your heart can't get enough oxygen:

- Unstable angina
- A type of **heart attack** called ST segment elevation myocardial infarction (STEMI)
- A type of heart attack called non-ST segment elevation myocardial infarction (non-STEMI).

Angina, unstable

The names STEMI and non-STEMI are based on the changes that doctors see on a test called an [electrocardiogram](#) (ECG). They use this test to diagnose these conditions.

The main symptom of all three conditions is chest pain or discomfort. The big difference between them is that heart attacks can damage your heart, whereas unstable angina does not. That's why it's important to stop unstable angina turning into a heart attack. ^[3]

Other causes of angina

Angina is the discomfort or pain you feel, most likely in your chest, when your heart isn't getting enough oxygen. It's typically caused by narrowing of the [arteries](#) that carry blood to your heart. Doctors call this **coronary artery disease**.

But angina can be caused by other conditions that also stop your heart getting enough oxygen. Here are some of those other conditions.

- You have problems with the valves in your heart.
- You have [high blood pressure](#) that hasn't been treated.
- You have a condition that doesn't have anything to do with heart problems but that makes your heart work harder. For example, if you have [anaemia](#), your blood doesn't carry enough oxygen. And if your [thyroid gland](#) is too active, your heart beats faster than normal. In both cases, your heart has to work harder, so it needs more oxygen. But it may not get as much as it needs to keep up.

Other types of angina

Besides unstable angina, there are two other types of angina.

Stable angina

Stable angina is the most common type of angina. It is pain or discomfort, most likely in your chest, when your heart isn't getting enough oxygen. You get this type of angina when you are active, and it goes away when you rest.

It usually happens because the arteries that carry blood to the heart (the [coronary arteries](#)) have become narrow. The narrowing is caused by fatty clumps that have built up inside the artery.

If you get stable angina, taking medicine and changing the way you live can help you have fewer and milder attacks. But getting stable angina is also a warning that you could go on to get unstable angina or have a [heart attack](#). ^[4]

Angina, unstable

For more, see [Stable angina](#) .

Variant (Prinzmetal's) angina

Variant angina isn't very common. You may hear doctors call this type Prinzmetal's angina. It's most likely to happen while you are resting or during the night. You may get bad pain or discomfort. But it goes away if you take angina medicine.

Variant angina is caused by a spasm in one of your coronary arteries. The spasm makes the artery get narrower. This means it can't carry as much blood to your heart.

You can get this type of angina even if you don't have narrowing of your arteries from fatty clumps. These attacks can be brought on by cold weather, stress, smoking, and certain medicines. ^[5]

Other causes of chest pain

It can be hard for your doctor to work out if the discomfort or pain you're feeling in your chest really is angina. To help tell what's causing your symptoms, your doctor will ask you some questions, will examine you, and may suggest some tests.

Here's a list of other causes of chest discomfort or pain that can be confused with angina: ^[4]

- Food coming back up from your stomach towards your throat (doctors call this [acid reflux](#))
- An [ulcer](#) in your stomach
- [Inflammation](#) of your [gall bladder](#)
- Inflammation or an injury in your chest, ribs, or shoulder
- Inflammation of the lining of your lungs (called [pleurisy](#)) or another disease of your lungs
- [Anxiety](#)
- A [panic attack](#) .

Unstable angina: working out your risk

Without treatment, some people with unstable angina are more likely than others to get worse chest pain, to have a [heart attack](#) , or to die. But these risks can be reduced with drug treatment, a procedure to widen the [coronary arteries](#) , or both. ^[6] ^[17]

That's why it's very important for doctors to work out your risk for getting worse. Your risk can change in the hours after your attack. So your doctor will watch you closely during this time.

One way doctors commonly measure risk for people with unstable angina is to use something called the **TIMI risk scale**. ^[6] ^[17] On this scale, the more points you have, the higher your risk. You get 1 point for each of the seven things below that apply to you.

- You are 65 or older.
- You have three or more risk factors for [coronary artery disease](#) . For more on risk factors, see [What is unstable angina?](#)
- One of your coronary arteries is narrowed by half (50 percent) or more.
- You have a change of more than 0.5 millimetres on a part of your electrocardiogram (ECG) called the ST segment. The bigger the change, the more likely it is that you have heart muscle damage. For more, see [Electrocardiogram](#) .
- You had two or more angina attacks in the 24 hours before you went to hospital.
- You have an increase in your blood levels of a substance called troponin or of other substances that show your heart muscle is damaged. For more, see [Troponin test](#) .
- You used aspirin in the seven days before you went to hospital. Taking aspirin should lower your risk of getting blood clots that could block your coronary arteries. But if you still get unstable angina, even though you took aspirin, the drug may not be working because your arteries are too narrow.

If you score 3 or higher on the TIMI risk scale, your doctor will probably advise you to do the following things. ^[17]

- Have a test called [coronary angiography](#) , to see if your coronary arteries are very narrow.
- If necessary, have a [procedure to widen the arteries](#) or an operation to get blood flowing around the blockage, ideally within 24 hours of getting to hospital.

Unstable angina: what you can do to help yourself

If you get unstable angina, you will need emergency treatment to stop you having a heart attack. Once you get over the bout of unstable angina and your condition is stable, your doctor will talk to you about things you can do to make your health better and to stop your angina and heart disease getting worse.

Here's a list of some things your doctor might suggest.

- Stop smoking. If you smoke, now is the time to stop. The more you smoke, the greater your risk of dying from heart disease. For more about stopping, see [Smoking](#).
- Lose weight. If you are obese or overweight, try to lose weight. It may help to see a dietitian. For more, see [Obesity](#).
- Eat a healthy diet. You should eat at least five servings of fruit and vegetables every day, eat at least one serving of oily fish every week, and cut back on how much fat and sugar you eat.
- Take regular exercise. Talk to your doctor about what kind of exercise and how much is safe for you.
- Limit how much alcohol you drink. Men shouldn't drink any more than three to four units a day. Women shouldn't drink any more than two to three units a day. One unit is half a pint of ordinary strength lager or a single shot (25 millilitres) of a spirit, such as whisky or gin. A small glass of wine (125 millilitres) is about one and a half units. But bear in mind that different wines and beers have different strengths of alcohol.
- Ask about a self-help angina plan. This is a plan based on a workbook and a relaxation tape. If you just found out that you have angina, this plan can help you to feel better and have less anxiety and depression. A nurse helps you change the way you live and advises you about medicines. Ask your doctor about this kind of plan. ^[16]

Having a coronary artery bypass

A coronary artery bypass graft is an operation to improve the blood flow to your heart. It's sometimes called CABG for short (pronounced cabbage).

In a bypass operation, a surgeon takes parts of healthy blood vessels from another part of your body (such as your leg) and uses them to take over from the narrowed arteries in your heart.

Angina, unstable

Bypass surgery usually takes between three and six hours. You'll be given a general anaesthetic, so you'll be asleep during the operation. Afterwards, you'll recover in intensive care. You should recover quickly. You'll usually be walking after two days and home within 10 days.

If you have angina, having a coronary artery bypass can: [\[18\]](#) [\[19\]](#) [\[20\]](#) [\[21\]](#) [\[22\]](#) [\[23\]](#)

- Reduce your chest pain and stop you feeling so breathless. About 9 in 10 people have no angina after their operation. Half the people who have bypass surgery still have no symptoms of angina five years later
- Reduce the amount of tablets you need to take for angina. You may even be able to stop taking them altogether. You may need to keep taking tablets for high blood pressure and high cholesterol. Taking aspirin will reduce the risk of your new, healthy blood vessels clogging up
- Generally make you feel better. You may be more able to go out and see friends or have hobbies.

But a coronary artery bypass is a serious operation, and it may take you months to recover fully.

We've prepared some extra information for people considering having a coronary artery bypass. To find out more, read [Coronary artery bypass](#).

Electrocardiogram

An ECG is one of the most important tests doctors can use to find out if your chest discomfort or pain is coming from a lack of oxygen to your heart.

When you have this test, small sensors (called electrodes) are put on your chest. They pick up the electrical activity in your heart.

Wires from the sensors go to a machine. The machine shows the electrical activity as a line on a graph.

ECGs don't hurt and don't affect your heart.

From this test, your doctor can tell:

- If you've had a heart attack before
- How fast your heart is beating
- If your heart is beating in a regular pattern

Angina, unstable

- If your heart chambers are a normal size
- How thick the walls of your heart are.

In unstable angina, your doctor looks for any changes in your ECG, especially if they happen when you are having symptoms. If you have had an ECG before, your doctor will compare your old one with your new one. That's to see if there are any changes.

Your doctor will be especially interested in the part of your ECG called the ST segment. From this, he or she can work out if there is any damage to your heart muscle and, if so, how much.

Troponin test

Troponin is a protein found in your heart muscle and in your other muscles.^[26] If your heart muscle is damaged, troponin gets into your blood. So how much troponin you have in your blood helps doctors to work out whether you have unstable angina or have had a heart attack .

Unstable angina can sometimes turn into a heart attack. That means you will need to have more than one troponin test. You will probably have one when you first get to hospital and another one some hours later.^[26]

From the results of your troponin test, doctors will be able to work out whether you need to be treated for a heart attack. If the test is negative, doctors need to find out how high your risk is of having a heart attack or other serious heart problems later on. This will affect what treatment you have. For more, see [Unstable angina: working out your risk](#) .

Echocardiogram

An echocardiogram uses sound waves to tell doctors how well your heart is working. It's a type of ultrasound test .

For this test, an instrument that sends and picks up sound signals is put on your chest. The sounds (echoes) it picks up appear on a screen as a picture.

This test is safe and it doesn't hurt.

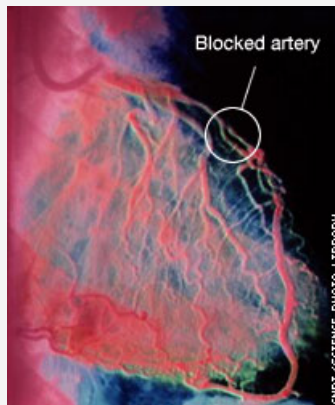
From this test, your doctor can tell:

- How well your heart chambers fill with blood and pump it to the rest of your body
- If your heart muscle has any damage

Angina, unstable

- If your heart is a normal size
- If your heart valves are working properly.

Coronary angiography



A coronary angiography can show blocked arteries.

Coronary angiography is a type of X-ray that shows your coronary arteries .

This test is done in an X-ray laboratory. You may hear doctors call it the **catheter lab** or the **cath lab**. Before the test, you may be given medicine to make you sleepy.

When you have angiography, doctors put a thin tube (called a catheter) through an artery in your arm or thigh and into your heart. Then they inject dye through the tube into your coronary arteries. When they take the X-ray, the dye shows up.

From this test, your doctor can tell how badly your coronary arteries are narrowed. If it shows that your arteries are very narrow, your doctor may suggest you have a procedure to widen them.

Stress test

Stress tests make your heart work harder. This allows them to uncover problems that don't show up while you're resting. In unstable angina, the stress test will probably be done when your symptoms are better. This may be at the end of your visit to the Accident and Emergency department. Or it may be at a later visit to a hospital clinic.

A stress test can help your doctor tell if you have narrowing of the arteries that carry blood to your heart (your coronary arteries). Doctors call this condition **coronary artery disease**. And the test may show how bad the narrowing is. This can help your doctor decide if you should be offered more tests and maybe surgery.

Angina, unstable

There are two kinds of stress tests, described below. Your doctor will tell you which kind is best for you.

Exercise stress test

An exercise stress test shows how much exercise you can do before your heart is put under too much strain. For this test, you walk on a treadmill. Your doctor may speed up the treadmill or make it steeper. At the same time, you have an [electrocardiogram](#) (ECG) and your [blood pressure](#) is measured.

Your doctor will look at your ECG for changes that happen when your heart isn't getting enough oxygen. You may have bad coronary artery disease if any of the following things happen during this test:

- You get chest pain
- You get short of breath
- Your ECG is abnormal
- Your blood pressure goes down.

In general, the more exercise you can do during the stress test, the more likely your doctor is to say that you have a good outlook.

But the results of your stress test may be normal even if you have coronary artery disease, or they may suggest you have bad disease when you don't.^[27] If your doctor suspects a problem, he or she will probably suggest a test called **coronary angiography**. For more, see [Coronary angiography](#) .

Exercise stress testing is very safe. It is always done by well-trained doctors or other professionals. There's a slight risk that this test could bring on a [heart attack](#) or a dangerous irregular heartbeat. But this is very rare. Because of this risk, there are guidelines for doctors saying who shouldn't have a stress test.^[28]

Non-exercise stress test

If you can't exercise or you have an abnormal ECG while you are resting, your doctor might suggest you have a non-exercise stress test instead. This test doesn't involve any exercise.

For this test, your doctor may give you a drug to make your heart work harder. And he or she may also use a test called an [echocardiogram](#) or a scan called a nuclear scan to see how your heart is working. (During a nuclear scan, radioactive chemicals are injected into your blood. The chemicals stick to [red blood cells](#) and travel through your bloodstream and heart. Doctors can then use a special scanner see images of your heart and blood vessels.)

Angina, unstable

Glossary:

heart attack

Doctors call a heart attack an acute myocardial infarction (or acute MI). This is the name for the damage that occurs to the heart muscle if it isn't getting enough blood and oxygen because a branch of the coronary arteries is blocked. During a heart attack, you may have pain or heaviness over your chest, and pain, numbness or tingling in your jaw and left arm.

arteries

Arteries are the blood vessels that take blood that is rich in oxygen and food away from your heart. The arteries carry this blood to all the tissues in your body.

atherosclerosis

Atherosclerosis is also called 'hardening of the arteries'. It happens when fatty material sticks to the inner wall of your arteries. Over time, cholesterol, fats and other things in your blood stick to the same area and the artery wall becomes thick and narrow, making it progressively more difficult for blood to flow through the affected vessels.

high blood pressure

Your blood pressure is considered to be high when it is above the accepted normal range. The usual limit for normal blood pressure is 140/90. If either the first (systolic) number is above 140 or the lower (diastolic) number is above 90, a person is considered to have high blood pressure. Doctors sometimes call high blood pressure 'hypertension'.

anaemia

Anaemia is when you have too few red blood cells. Anaemia can make you get tired and breathless easily. It can also make you look pale. Anaemia can be caused by a number of different things, including problems with your diet, blood loss and some diseases.

thyroid gland

Your thyroid gland is a small organ that sits in your neck, just in front of your windpipe. It sends out a hormone called thyroxine. This acts on receptors within cells. By acting on the receptors it gives the cells a message to speed up their metabolism and work harder.

coronary arteries

Coronary arteries are the vessels that supply blood to the heart muscle. If yours are blocked, you may have a pain in your chest (known as angina) or a heart attack because parts of the heart are not getting enough blood and oxygen.

obesity

If your body stores more energy than you need, this can make you overweight. The excess energy is stored in your fat cells. If your weight goes above a certain level, doctors call this obesity. Obesity is considered a medical condition. The excess weight can be a strain on your bones and joints. And if you are obese, you're more likely to get other diseases. Doctors have developed a scale for telling how much excess weight you have. This measure, called the body mass index (BMI), depends on your height.

high cholesterol

If you've been told that you have high cholesterol it usually means that your total cholesterol level is 5mmol/l or higher. But doctors also look at the amount of good (HDL) and bad (LDL) cholesterol you have in your blood. Having high levels of bad cholesterol can make it more likely that you'll get certain diseases in your heart and arteries.

diabetes

Diabetes is a condition that causes too much sugar (glucose) to circulate in the blood. It happens when the body stops making a hormone called insulin (type 1 diabetes) or when insulin stops working (type 2 diabetes).

acid reflux

Acid reflux happens when acid from your stomach flows into the tube leading from your throat to your stomach (your oesophagus) or up into your throat. Acid reflux can cause heartburn.

ulcer

An ulcer is an open sore. Ulcers can happen in many parts of your body, such as in your stomach, and the skin of your legs, mouth, or genitals.

inflammation

Inflammation is when your skin or some other part of your body becomes red, swollen, hot, and sore. Inflammation happens because your body is trying to protect you from germs, from something that's in your body and could harm you (like a splinter) or from things that cause allergies (these things are called allergens). Inflammation is one of the ways in which your body heals an infection or an injury.

gall bladder

The gall bladder is a small organ below the liver on the right side of the abdomen. Its job is to store bile, a chemical made in the liver that helps to break down food in the intestines. The chemicals in the gall bladder can, under certain circumstances, become solid and form small stones. If a stone gets stuck in the tubes that empty the gall bladder, there can be a backup of fluid, causing the gall bladder to swell and possibly become infected. This condition is called gall bladder disease.

stroke

Angina, unstable

You have a stroke when the blood supply to a part of your brain is cut off. This damages your brain and can cause symptoms like weakness or numbness on one side of your body. You may also find it hard to speak if you've had a stroke.

blood pressure

Blood pressure is the amount of force that's exerted by your blood on to your blood vessels. You can think of it like the water pressure in your home: the more pressure you have, the faster and more forcefully the water flows out of the shower. Blood pressure is measured in millimetres of mercury (written as mm Hg). When your blood pressure is taken, the measurement is given as two numbers, for example 120/80 mm Hg. The first, higher, number is called the systolic pressure, and the second, lower, number is the diastolic pressure. The systolic number is the highest pressure that occurs while your heart is pushing blood into your arteries. The diastolic number is the lowest pressure that happens when your heart is relaxing and is not pushing your blood.

coronary artery disease

This is when clumps of fat (called plaques) build up on the smooth lining of the arteries supplying your heart with blood (the coronary arteries). Over time, these plaques make the arteries narrower, stiffer and rougher. This is called atherosclerosis. Less blood can get through the narrowed arteries, which means less oxygen gets to the heart. This can result in angina or a heart attack.

heart disease

You get heart disease when your heart isn't able to pump blood as well as it should. This can happen for a variety of reasons.

general anaesthetic

You may have a type of medicine called a general anaesthetic when you have surgery. It is given to make you unconscious so you don't feel pain when you have surgery.

heart failure

When the heart loses its ability to push enough blood through the blood vessels, it is called heart failure.

proteins

A lot of your body's tissues are made out of proteins. Proteins can be made in your cells. Proteins are also part of the food you eat, particularly meat and dairy products. Your body breaks down the protein you eat into amino acids. Your cells then use these amino acids to build new proteins, which make up muscles, joints, hair and other parts of your body.

X-ray

X-rays are pictures taken of the inside of your body. They are made by passing small amounts of radiation through your body and then onto film.

ultrasound

Ultrasound is a tool doctors use to create images of the inside of your body. An ultrasound machine sends out high-frequency sound waves, which are directed at an area of your body. The waves reflect off parts of your body to create a picture. Ultrasound is often used to see a developing baby inside a woman's womb.

red blood cells

Red blood cells are the part of your blood that makes it red. Their main job is to carry oxygen from your heart and lungs to the tissues of your body. Once these cells unload oxygen, they pick up carbon dioxide. They take carbon dioxide back to your lungs so it can be breathed out of your body.

platelets

Platelets are small disc-shaped particles found in your blood (along with red blood cells and white blood cells). Platelets form the clots that stop the bleeding when you've been cut. People who don't have enough platelets have problems with bleeding too much.

rectum

The rectum is the last 15 to 20 centimetres (six to eight inches) of the large intestine, ending with the anus (where you empty your bowels from).

allergy

If you have an allergy to something (such as pollen or a medicine), your body always overreacts to it. The reaction happens because your immune system (your body's system for fighting infection) is too sensitive to it.

NSAIDs

NSAID stands for nonsteroidal anti-inflammatory drug. NSAIDs help with pain, inflammation and fever. They are called 'nonsteroidal' because they don't contain any steroids. Aspirin and ibuprofen are both NSAIDs.

placebo

A placebo is a 'pretend' or dummy treatment that contains no active substances. A placebo is often given to half the people taking part in medical research trials, for comparison with the 'real' treatment. It is made to look and taste identical to the drug treatment being tested, so that people in the studies do not know if they are getting the placebo or the 'real' treatment. Researchers often talk about the 'placebo effect'. This is where patients feel better after having a placebo treatment because they expect to feel better. Tests may indicate that they actually are better. In the same way, people can also get side effects after having a placebo treatment. Drug treatments can also have a 'placebo effect'. This is why, to get a true picture of how well a drug works, it is important to compare it against a placebo treatment.

Angina, unstable

systematic reviews

A systematic review is a thorough look through published research on a particular topic. Only studies that have been carried out to a high standard are included. A systematic review may or may not include a meta-analysis, which is when the results from individual studies are put together.

randomised controlled trials

Randomised controlled trials are medical studies designed to test whether a treatment works. Patients are split into groups. One group is given the treatment being tested (for example, an antidepressant drug) while another group (called the comparison or control group) is given an alternative treatment. This could be a different type of drug or a dummy treatment (a placebo). Researchers then compare the effects of the different treatments.

intravenous infusion

When a medicine or a fluid, such as blood, is fed directly into a vein, it's called an intravenous infusion (or IV). To give you an intravenous infusion, a nurse, technician or a doctor places a narrow plastic tube into a vein (usually in your arm) using a needle. The needle is then removed and the fluid is infused (or dripped) through the tube into the vein.

kidney

Your kidneys are organs that filter your blood to make urine. You have two kidneys, on either side of your body. They are underneath your ribcage, near your back.

arrhythmias

Arrhythmias are when your heart starts to beat in an uncoordinated way. It may not beat at an even pace, or it may sometimes beat too weakly or too hard.

asthma

Asthma is a disease of the lungs. It makes you wheeze, cough and feel short of breath. Asthma attacks are caused by inflammation and narrowing of your airways, which makes it hard for air to pass in and out of your lungs.

chronic bronchitis

Your doctor may say that you have chronic bronchitis if you have a cough that brings up phlegm, if it lasts for three months or more, and you have had it twice in two years. Smoking is a common cause of chronic bronchitis.

veins

Veins are blood vessels that carry blood back to your heart after your blood has delivered oxygen and food to the tissues.

randomised controlled trials

Randomised controlled trials are medical studies designed to test whether a treatment works. Patients are split into groups. One group is given the treatment being tested (for example, an antidepressant drug) while another group (called the comparison or control group) is given an alternative treatment. This could be a different type of drug or a dummy treatment (a placebo). Researchers then compare the effects of the different treatments.

diarrhoea

Diarrhoea is when you have loose, watery stools and you need to go to the toilet far more often than usual. Doctors say you have diarrhoea if you need to go to the toilet more than three times a day.

Sources for the information on this leaflet:

1. Grech ED, Ramsdale DR. Acute coronary syndrome: unstable angina and infarction non-ST segment elevation myocardial. *BMJ*. 2003; 326: 1259-1261.
2. Martini FH. The heart. In: Ober WC, Garrison CW, Welch K, et al. *Fundamentals of anatomy and physiology* 5th edition. Prentice Hall, Upper Saddle River, NJ; 2001.
3. Grech ED, Ramsdale DR. Acute coronary syndrome: unstable angina and infarction non-ST segment elevation myocardial. *BMJ*. 2003; 326: 1259-1261.
4. Scottish Intercollegiate Guidelines Network. Management of stable angina. February 2007. Guideline 96. Available at <http://www.sign.ac.uk/guidelines/fulltext/96/index.html> (accessed on 19 March 2014).
5. Mishra PK. Variations in presentation and various options in management of variant angina. *European Journal of Cardio-thoracic Surgery*. 2006; 29: 748-759.
6. Antman EM, Cohen M, Bernink PJ, et al. The TIMI risk score for unstable angina/non-ST elevation MI: a method for prognostication and therapeutic decision making. *Journal of the American Medical Association*. 2000; 284: 835-842.

Angina, unstable

7. Sarkees ML, Bavry AA. Acute coronary syndrome (unstable angina and non-ST elevation MI). November 2010. Clinical Evidence. (Based on December 2009 search.) Available at <http://clinicalevidence.bmj.com/ceweb/conditions/cvd/0209/0209.jsp> (accessed on 19 March 2014).
8. Grech ED, Ramsdale DR. Acute coronary syndrome: unstable angina and infarction non-ST segment elevation myocardial. *BMJ*. 2003; 326: 1259-1261.
9. European Society of Cardiology. Management of acute coronary syndromes in patients presenting without persistent ST-segment elevation. *European Heart Journal*. 2002; 23: 1809-1840.
10. British Heart Foundation. Coronary heart disease statistics: 2012. Available at <http://www.bhf.org.uk/publications/view-publication.aspx?ps=1002097> (accessed on 19 March 2014).
11. National Institute for Health and Care Excellence. Unstable angina and NSTEMI: the early management of unstable angina and non-ST-segment-elevation myocardial infarction. March 2010. Clinical guideline 94. Available at <http://guidance.nice.org.uk/CG94> (accessed on 19 March 2014).
12. Grech ED, Ramsdale DR. Acute coronary syndrome: unstable angina and infarction non-ST segment elevation myocardial. *BMJ*. 2003; 326: 1259-1261.
13. European Society of Cardiology. Management of acute coronary syndromes in patients presenting without persistent ST-segment elevation. *European Heart Journal*. 2002; 23: 1809-1840.
14. Rosengren A, Wilhelmsen L, Hagman M, et al. Natural history of myocardial infarction and angina pectoris in a general population sample of middle-aged men: a 16-year follow-up of the Primary Prevention Study, Goteborg, Sweden. *Journal of Internal Medicine*. 1998; 244: 495-505.
15. Clinical Knowledge Summaries. Angina - management. Available at <http://cks.nice.org.uk/angina#azTab> (accessed on 19 March 2014).
16. Lewin RJP, Furze G, Robinson J, et al. A randomised controlled trial of a self-management plan for patients with newly diagnosed angina. *British Journal of General Practice*. 2002; 52: 194-201.
17. Grech ED, Ramsdale DR. Acute coronary syndrome: unstable angina and infarction non-ST segment elevation myocardial. *BMJ*. 2003; 326: 1259-1261.
18. Hueb W, Soares PR, Gersh BJ, et al. The medicine, angioplasty, or surgery study (MASS-II): a randomized, controlled clinical trial of three therapeutic strategies for multivessel coronary artery disease: one-year results. *Journal of the American College of Cardiologists*. 2004; 43: 1743-1751.
19. Coronary Artery Surgery Study Authors. Coronary artery surgery study (CASS): a randomized trial of coronary artery bypass surgery: quality of life in patients randomly assigned to treatment groups. *Circulation*. 1983; 68: 951-960.
20. European Coronary Surgery Study Group. Prospective randomised study of coronary artery bypass surgery in stable angina pectoris. Second interim report by the European Coronary Surgery Study Group. *Lancet*. 1980; 2: 491-495.
21. The VA Coronary Artery Bypass Surgery Cooperative Study Group. Eighteen-year follow-up in the veterans affairs cooperative study of coronary artery bypass surgery for stable angina. *Circulation*. 1992; 86: 121-130.
22. Sjöland H, Wiklund I, Caidahl K, et al. Improvement in quality of life and exercise capacity after coronary bypass surgery. *Archives of Internal Medicine*. 1996; 156: 265-271.
23. Caine N, Harrison SC, Sharples LD, et al. Prospective study of quality of life before and after coronary artery bypass grafting. *BMJ*. 1991; 302: 511-516.
24. Grech ED, Ramsdale DR. Acute coronary syndrome: unstable angina and infarction non-ST segment elevation myocardial. *BMJ*. 2003; 326: 1259-1261.

Angina, unstable

25. European Society of Cardiology. Management of acute coronary syndromes in patients presenting without persistent ST-segment elevation. *European Heart Journal*. 2002; 23: 1809-1840.
26. Grech ED, Ramsdale DR. Acute coronary syndrome: unstable angina and infarction non-ST segment elevation myocardial. *BMJ*. 2003; 326: 1259-1261.
27. Gill D, Mayou R, Dawes M, et al. Presentation, management and course of angina and suspected angina in primary care. *Journal of Psychosomatic Research*. 1999; 46: 349-358.
28. British Cardiac Society. Protocol for cardiac physiologist managed exercise stress testing, 2003. April 2003. Available at http://www.bcs.com/documents/tech_protocol_2003.pdf (accessed on 19 March 2014).
29. Das R, Kilcullen N, Morrell C, et al. The British Cardiac Society Working Group definition of myocardial infarction: implications for practice. *Heart*. 2006; 92: 21-26.
30. European Society of Cardiology. Management of acute coronary syndromes in patients presenting without persistent ST-segment elevation. *European Heart Journal*. 2002; 23: 1809-1840.
31. Antithrombotic Trialists' Collaboration. Collaborative meta-analysis of randomised trials of antiplatelet therapy for prevention of death, myocardial infarction, and stroke in high risk patients. *BMJ*. 2002; 324: 71-86.
32. U.S. Food and Drug Administration. New information for healthcare professionals: concomitant use of ibuprofen and aspirin. August 2013. Available at <http://www.fda.gov/Drugs/DrugSafety/PostmarketDrugSafetyInformationforPatientsandProviders/ucm125222.htm> (accessed on 19 March 2014).
33. National Institute for Health and Care Excellence. Unstable angina and NSTEMI: the early management of unstable angina and non-ST-segment-elevation myocardial infarction. March 2010. Clinical guideline 94. Available at <http://guidance.nice.org.uk/CG94> (accessed on 19 March 2014).
34. Yusuf S, Zhao F, Mehta S, et al. The Clopidogrel in Unstable angina to prevent Recurrent Events (CURE) trial. *New England Journal of Medicine*. 2001; 345: 494-502.
35. Abuzahra M, Pillai M, Caldera A. Comparison of higher clopidogrel loading and maintenance dose to standard dose on platelet function and outcomes after percutaneous coronary intervention using drug-eluting stents. *American Journal of Cardiology*. 2008; 102: 401-403.
36. European Medicines Agency. Public statement on possible interaction between clopidogrel and proton pump inhibitors. May 2009. Available at http://www.ema.europa.eu/ema/index.jsp?curl=pages/news_and_events/news/2009/11/news_detail_000194.jsp&mid=WC0b01ac058004d5c1 (accessed on 19 March 2014).
37. Yusuf S, Zhao F, Mehta S, et al. The Clopidogrel in Unstable angina to prevent Recurrent Events (CURE) trial. *New England Journal of Medicine*. 2001; 345: 494-502.
38. Budaj A, Yusuf S, Mehta SR, et al. Benefit of clopidogrel in patients with acute coronary syndromes without ST-segment elevation in various risk groups. *Circulation*. 2002; 106: 1622-1626.
39. Peters RJ, Mehta SR, Fox KA, et al. The Clopidogrel in Unstable angina to prevent Recurrent Events (CURE) trial investigators. *Circulation*. 2003; 108: 1682-1687.
40. Direct Thrombin Inhibitor Trialists' Collaborative Group. Direct thrombin inhibitors in acute coronary syndromes: principal results of a meta-analysis based on individual patients' data. *Lancet*. 2002; 359: 294-302.
41. Direct Thrombin Inhibitor Trialists' Collaborative Group. Direct thrombin inhibitors in acute coronary syndromes: principal results of a meta-analysis based on individual patients' data. *Lancet*. 2002; 359: 294-302.

Angina, unstable

42. Sarkees ML, Bavry AA. Acute coronary syndrome (unstable angina and non-ST elevation MI). November 2010. Clinical Evidence. (Based on December 2009 search.) Available at <http://clinicalevidence.bmj.com/ceweb/conditions/cvd/0209/0209.jsp> (accessed on 19 March 2014).
43. Eikelboom JW, Anand SS, Malmberg K, et al. Unfractionated heparin and low molecular weight heparin in acute coronary syndrome without ST elevation: a meta-analysis. *Lancet*. 2000; 355: 1936-1942.
44. Magee KD, Sevcik W, Moher D, et al. Low molecular weight heparins versus unfractionated heparin for acute coronary syndromes (Cochrane review). In: *The Cochrane Library*. Wiley, Chichester, UK.
45. Oler A, Whooley MA, Oler J, et al. Adding heparin to aspirin reduces the incidence of myocardial infarction and death in patients with unstable angina: a meta-analysis. *Journal of the American Medical Association*. 1996; 276: 811-815.
46. Eikelboom JW, Anand SS, Malmberg K, et al. Unfractionated heparin and low molecular weight heparin in acute coronary syndrome without ST elevation: a meta-analysis. *Lancet*. 2000; 355: 1936-1942.
47. Oler A, Whooley MA, Oler J, et al. Adding heparin to aspirin reduces the incidence of myocardial infarction and death in patients with unstable angina: a meta-analysis. *Journal of the American Medical Association*. 1996; 276: 811-815.
48. Magee KD, Sevcik W, Moher D, et al. Low molecular weight heparins versus unfractionated heparin for acute coronary syndromes (Cochrane review). In: *The Cochrane Library*. Wiley, Chichester, UK.
49. Magee KD, Campbell SG, Moher D, et al. Heparin versus placebo for acute coronary syndromes (Cochrane review). In: *The Cochrane Library*. Wiley, Chichester, UK.
50. Cucherat M, Lièvre M, Gueyffier F. Clinical benefits of cholesterol lowering treatments. Meta-analysis of randomized therapeutic trials. *Presse Med*. 2000; 29: 965-976 [in French].
51. Heart Protection Study Collaborative Group. MRC/BHF Heart Protection Study of cholesterol lowering with simvastatin in 20,536 high-risk individuals: a randomised placebo-controlled trial. *Lancet*. 2002; 360: 7-22.
52. Athyros VG, Papageorgiou AA, Mercouris BR, et al. Treatment with atorvastatin to the National Cholesterol Educational Program goal versus 'usual' care in secondary coronary heart disease prevention: the GREek Atorvastatin and Coronary-heart-disease Evaluation (GREACE) study. *Current Medical Research and Opinion*. 2002; 18: 220-228.
53. Pfeffer MA, Keech A, Sacks FM, et al. Safety and tolerability of pravastatin in long-term clinical trials; Prospective Pravastatin Pooling (PPP) Project. *Circulation*. 2002; 105: 2341-2346.
54. LaRosa JC, He J, Vupputuri S. Effect of statins on risk of coronary disease: a meta-analysis of randomized controlled trials. *Journal of the American Medical Association*. 1999; 282: 2340-2346.
55. British National Formulary. Lipid-regulating drugs. Section 2.12. British Medical Association and Royal Pharmaceutical Society of Great Britain. Also available at <http://bnf.org> (accessed on 19 March 2014).
56. U.S. Food and Drug Administration. Information for healthcare professionals: Crestor (rosuvastatin calcium). August 2013. Available at <http://www.fda.gov/Drugs/DrugSafety/PostmarketDrugSafetyInformationforPatientsandProviders/ucm124906.htm> (accessed on 21 March 2014).
57. Medicines and Healthcare Products Regulatory Agency. New prescribing advice for the 40mg dose of Crestor (rosuvastatin). June 2004. Available at <http://www.mhra.gov.uk/Safetyinformation/Safetywarningsalertsandrecalls/Safetywarningsandmessagesformedicines/CON019482> (accessed on 19 March 2014).
58. U.S. Food and Drug Administration. Crestor (rosuvastatin calcium) tablets. August 2013. Available at <http://www.fda.gov/safety/medwatch/safetyinformation/ucm200635.htm> (accessed on 19 March 2014).

Angina, unstable

59. Electronic Medicines Compendium. Lipitor 10mg, 20mg, 40mg, 80mg tablets. January 2014. Available at <http://www.medicines.org.uk/emc/medicine/2498/PIL/Lipitor+10mg%2c+20mg%2c+40mg%2c+80mg+Tablets/> (accessed on 19 March 2014).
60. Medicines and Healthcare Products Regulatory Agency. Statins: updates to product safety information. November 2009. Available at <http://www.mhra.gov.uk/Safetyinformation/Safetywarningsalertsandrecalls/UKsafetyPublicAssessmentReports/CON079302> (accessed on 19 March 2014).
61. Medicines and Healthcare Products Regulatory Agency. Statins: risk of hyperglycaemia and diabetes. January 2012. Available at <http://www.mhra.gov.uk/Safetyinformation/DrugSafetyUpdate/CON140667> (accessed on 19 March 2014).
62. Schwartz GG, Olsson AG, Ezekowitz MD, et al. Effects of atorvastatin on early recurrent ischemic events in acute coronary syndromes: the MIRACL study: a randomized controlled trial. *Journal of the American Medical Association*. 2001; 285: 1711-1718.
63. Task Force for Diagnosis and Treatment of Non-ST-Segment Elevation Acute Coronary Syndromes of European Society of Cardiology, Bassand JP, Hamm CW, et al. Guidelines for the diagnosis and treatment of non-ST-segment elevation acute coronary syndromes. *European Heart Journal*. 2007; 28: 1598-1660.
64. Bavry AA, Kumbhani DJ, Rassi AN, et al. Benefit of early invasive therapy in acute coronary syndromes: a meta-analysis of contemporary randomized clinical trials. *Journal of the American College of Cardiology*. 2006; 48: 1319-1325.
65. Qayyum R, Khalid MR, Adomaityte J, et al. Systematic review: comparing routine and selective invasive strategies for the acute coronary syndrome. *Annals of Internal Medicine*. 2008; 148: 186-196.
66. Navarese EP, Gurbel PA, Andreotti F, et al. Optimal timing of coronary invasive strategy in non-ST-segment elevation acute coronary syndromes: a systematic review and meta-analysis. *Annals of Internal Medicine*. 2013; 158: 261-270.
67. O'Donoghue M, Boden WE, Braunwald E, et al. Early invasive vs conservative treatment strategies in women and men with unstable angina and non-ST-segment elevation myocardial infarction: a meta-analysis. *Journal of the American Medical Association*. 2008; 300: 71-80.
68. Cannon CP, Weintraub WS, Demopoulos LA, et al. Comparison of early invasive and conservative strategies in patients with unstable coronary syndromes treated with the glycoprotein IIb/IIIa inhibitor tirofiban. *New England Journal of Medicine*. 2001; 344: 1879-1887.
69. FRISC II Investigators. Invasive compared with non-invasive treatment in unstable coronary-artery disease: FRISC II prospective randomised multicentre study. *Lancet*. 1999; 354: 708-715.
70. GUSTO II b Angioplasty Substudy Investigators. A clinical trial comparing primary coronary angioplasty with tissue plasminogen activator for acute myocardial infarction. *New England Journal of Medicine*. 1997; 336: 1621-1628.
71. Boersma E, Harrington RA, Moliterno DJ, et al. Platelet glycoprotein IIb/IIIa inhibitors in acute coronary syndromes: a meta-analysis of all major randomised clinical trials. *Lancet*. 2002; 359: 189-198.
72. Hernández AV, Westerhout CM, Steyerberg EW, et al. Effects of platelet glycoprotein IIb/IIIa receptor blockers in non-ST segment elevation acute coronary syndromes: benefit and harm in different age subgroups. *Heart*. 2007; 93: 450-455.
73. Kastrati A, Mehilli J, Neumann FJ, et al. Abciximab in patients with acute coronary syndromes undergoing percutaneous coronary intervention after clopidogrel pretreatment: the ISAR-REACT 2 randomized trial. *Journal of the American Medical Association*. 2006; 295: 1531-1538.
74. British National Formulary. Antiplatelet drugs. Section 2.9. British Medical Association and Royal Pharmaceutical Society of Great Britain. Also available at <http://bnf.org> (accessed on 19 March 2014).
75. Testa L, Zoccai GB, Porto I, et al. Adjusted indirect meta-analysis of aspirin plus warfarin at international normalized ratios 2 to 3 versus aspirin plus clopidogrel after acute coronary syndromes. *American Journal of Cardiology*. 2007; 99: 1637-1642.

Angina, unstable

76. Scottish Intercollegiate Guidelines Network. Acute coronary syndromes. February 2013. Guideline 93. Available at <http://www.sign.ac.uk/guidelines/fulltext/93/> (accessed on 19 March 2014).
77. OASIS Investigators. Effects of long-term, moderate-intensity oral anticoagulation in addition to aspirin in unstable angina. *Journal of the American College of Cardiology*. 2001; 37: 475-484.
78. Cohen M, Adams PC, Parry G, et al. Combination antithrombotic therapy in unstable rest angina and non-Q-wave infarction in nonprior aspirin users: primary end points analysis from the ATACS trial. *Circulation*. 1994; 89: 81-88.
79. Anand SS, Yusuf S, Pogue J, et al. Long-term oral anticoagulant therapy in patients with unstable angina or suspected non-Q-wave myocardial infarction: organization to assess strategies for ischaemic syndromes (OASIS) pilot study results. *Circulation*. 1998; 98: 1064-1070.
80. OASIS Investigators. Effects of long-term, moderate-intensity oral anticoagulation in addition to aspirin in unstable angina. *Journal of the American College of Cardiology*. 2001; 37: 475-484.
81. Hunyh T, Theroux P, Bogaty P, et al. Aspirin, warfarin, or the combination for secondary prevention of coronary events in patients with acute coronary syndromes and prior coronary artery bypass surgery. *Circulation*. 2001; 103: 3069-3074.
82. European Society of Cardiology. Management of acute coronary syndromes in patients presenting without persistent ST-segment elevation. *European Heart Journal*. 2002; 23: 1809-1840.
83. HINT Research Group. Early treatment of unstable angina in the coronary care unit: a randomized, double blind, placebo controlled comparison of recurrent ischaemia in patients treated with nifedipine or metoprolol or both. *British Heart Journal*. 1986; 56: 400-413.
84. Gottlieb SO, Weisfeldt ML, Ouyang P, et al. Effect of the addition of propranolol to therapy with nifedipine for unstable angina pectoris: a randomized, double-blind, placebo-controlled trial. *Circulation*. 1986; 73: 331-337.
85. Freemantle N, Cleland J, Young P, et al. Beta blockade after myocardial infarction: systematic review and meta regression analysis. *BMJ*. 1999; 318: 1730-1737.
86. Yusuf S, Peto R, Lewis J, et al. Beta blockade during and after myocardial infarction: an overview of the randomized trials. *Progress in Cardiovascular Diseases*. 1985; 27: 335-371.
87. CAPRICORN investigators. Effect of carvedilol on outcome after myocardial infarction in patients with left-ventricular dysfunction: the CAPRICORN randomised trial. *Lancet*. 2001; 357: 1385-1390.
88. Sarkees ML, Bavry AA. Acute coronary syndrome (unstable angina and non-ST elevation MI). November 2010. Clinical Evidence. (Based on December 2009 search.) Available at <http://clinicalevidence.bmj.com/ceweb/conditions/cvd/0209/0209.jsp> (accessed on 19 March 2014).
89. European Society of Cardiology. Management of acute coronary syndromes in patients presenting without persistent ST-segment elevation. *European Heart Journal*. 2002; 23: 1809-1840.
90. Gottlieb SO, Weisfeldt ML, Ouyang P, et al. Effect of the addition of propranolol to therapy with nifedipine for unstable angina pectoris: a randomized, double-blind, placebo-controlled trial. *Circulation*. 1986; 73: 331-337.
91. HINT Research Group. Early treatment of unstable angina in the coronary care unit: a randomized, double blind, placebo controlled comparison of recurrent ischaemia in patients treated with nifedipine or metoprolol or both. *British Heart Journal*. 1986; 56: 400-413.
92. Held PH, Yusuf S, Furberg CD. Calcium channel blockers in acute myocardial infarction and unstable angina: an overview. *BMJ*. 1989; 299: 1187-1192.
93. HINT Research Group. Early treatment of unstable angina in the coronary care unit: a randomized, double blind, placebo controlled comparison of recurrent ischaemia in patients treated with nifedipine or metoprolol or both. *British Heart Journal*. 1986; 56: 400-413.
94. European Society of Cardiology. Management of acute coronary syndromes in patients presenting without persistent ST-segment elevation. *European Heart Journal*. 2002; 23: 1809-1840.

Angina, unstable

95. Furberg CD, Psaty BM, Meyer JV. Nifedipine: dose-related increase in mortality in patients with coronary heart disease. *Circulation*. 1995; 92: 1326-1331.
96. World Health Organization and the International Society of Hypertension. Effects of calcium antagonists on the risks of coronary heart disease, cancer and bleeding. *Journal of Hypertension*. 1997; 15: 105-115.
97. Held PH, Yusuf S, Furberg CD. Calcium channel blockers in acute myocardial infarction and unstable angina: an overview. *BMJ*. 1989; 299: 1187-1192.
98. HINT Research Group. Early treatment of unstable angina in the coronary care unit: a randomized, double blind, placebo controlled comparison of recurrent ischaemia in patients treated with nifedipine or metoprolol or both. *British Heart Journal*. 1986; 56: 400-413.
99. European Society of Cardiology. Management of acute coronary syndromes in patients presenting without persistent ST-segment elevation. *European Heart Journal*. 2002; 23: 1809-1840.
100. Karlberg KE, Saldeen T, Wallin R, et al. Intravenous nitroglycerine reduces ischaemia in unstable angina pectoris: a double-blind placebo-controlled study. *Journal of Internal Medicine*. 1998; 243: 25-31.
101. Douchet S, Malekianpour M, Theroux P, et al. Randomized trial comparing intravenous nitroglycerin and heparin for treatment of unstable angina secondary or restenosis after coronary artery angioplasty. *Circulation*. 2000; 101: 955-961.
102. Karlberg KE, Saldeen T, Wallin R, et al. Intravenous nitroglycerine reduces ischaemia in unstable angina pectoris: a double-blind placebo-controlled study. *Journal of Internal Medicine*. 1998; 243: 25-31.
103. Douchet S, Malekianpour M, Theroux P, et al. Randomized trial comparing intravenous nitroglycerin and heparin for treatment of unstable angina secondary or restenosis after coronary artery angioplasty. *Circulation*. 2000; 101: 955-961.
104. Mehta SR, Granger CB, Eikelboom JW, et al. Efficacy and safety of fondaparinux versus enoxaparin in patients with acute coronary syndromes undergoing percutaneous coronary intervention: results from the OASIS-5 trial. *Journal of the American College of Cardiology*. 2007; 50: 1742-1751.
105. National Institute for Health and Care Excellence. Tricagrelor for the treatment of acute coronary syndromes. October 2011. Technology appraisal 236. Available at <http://www.nice.org.uk/ta236> (accessed on 19 March 2014).

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