

Patient information from the BMJ Group

Stroke, emergency care

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Stroke, emergency care

Strokes tend to happen without warning and should always be treated as an emergency. Getting the right treatment quickly can help you make a good recovery.

We've brought together the best research about strokes and weighed up the evidence about how to treat them. You can use our information to talk to your doctor and decide which treatments are best for you. If you've had a stroke and want to find out how you can help prevent another, see [Stroke prevention](#) .

What is a stroke?

A stroke is an emergency. A stroke happens when the blood supply to part of your brain is cut off. This can cause brain damage. The earlier you are treated, the better your chance of making a good recovery.

If your brain cells don't have a supply of blood, they won't get enough food and oxygen. If they go without food and oxygen for too long, brain cells can die. That's why some doctors call a stroke a brain attack. ^[1]

Strokes affect people in different ways. If you have a stroke, you may not be able to move one side of your body, or you may have difficulty speaking or swallowing. You may black out (lose consciousness) for a while. Or you may feel dizzy and have blurred vision for a few minutes. You should get medical help straight away, even if you think your symptoms aren't serious.

In most people who have a stroke, the blood supply to their brain is blocked by a **blood clot** . But a stroke can also happen when a blood vessel in the brain bursts.

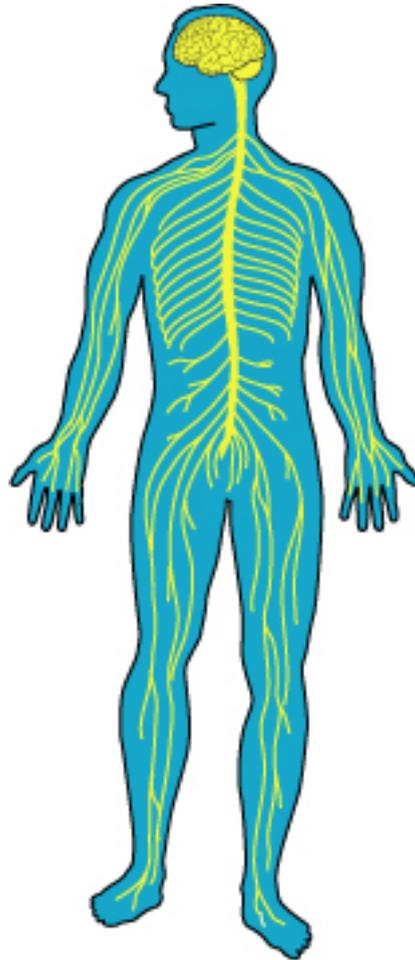
If you or someone close to you has just had a stroke, you will probably be shocked and worried about the future. Many people worry that a stroke will leave them disabled and they will have to depend on others to care for them. This may be true for some people, but it's certainly not true for everyone. With the right treatment and follow-up care, it's possible to make a good recovery from a stroke. If you follow your treatment carefully, you can live for many years afterwards.

Strokes tend to happen without warning. They can happen at any age, although they are more common in older people.

Key points for people who have had a stroke

- A stroke is an emergency. If you think you are having a stroke, or someone you know is having a stroke, you should call 999 straight away. You need to get to hospital as soon as possible. The sooner you get treatment, the better your chances of recovering are.
- The symptoms of a stroke can include sudden numbness or weakness (especially on one side of the body), sudden confusion or trouble speaking, sudden problems seeing, sudden dizziness, loss of balance or trouble walking, or a sudden, severe headache for no reason.
- If you're treated in a specialised stroke unit, you'll probably make a better recovery than if you're treated in an ordinary hospital ward.
- The symptoms you have in the first few days after a stroke may not last forever. If your symptoms are going to improve, they usually do so in the first two months after you have a stroke.
- Your symptoms are less likely to change after six months, but many people learn to adapt to life after a stroke.
- Many people feel depressed after having a stroke. Some people may need treatment for depression, but it usually goes away within six months to a year.
- Physiotherapists, occupational therapists, speech therapists, psychologists, and dietitians can help people adapt to life after a stroke.

Your brain



Nerves from the spinal cord reach every part of your body.

Many of the symptoms of a stroke make more sense once you understand how blood is supplied to your brain, and what happens when things go wrong. Knowing these things will also make it easier to understand how treatment can help control the damage a stroke does to your body and what you can do to prevent another stroke.

Your brain enables you to think, and to control the movements of your body. For example, your brain allows you to move your arm to pick up your coffee. It also controls lots of the things that you do without thinking. For example, it makes sure you keep breathing and your heart keeps beating. Different parts of your brain are in control of breathing, moving, and talking.

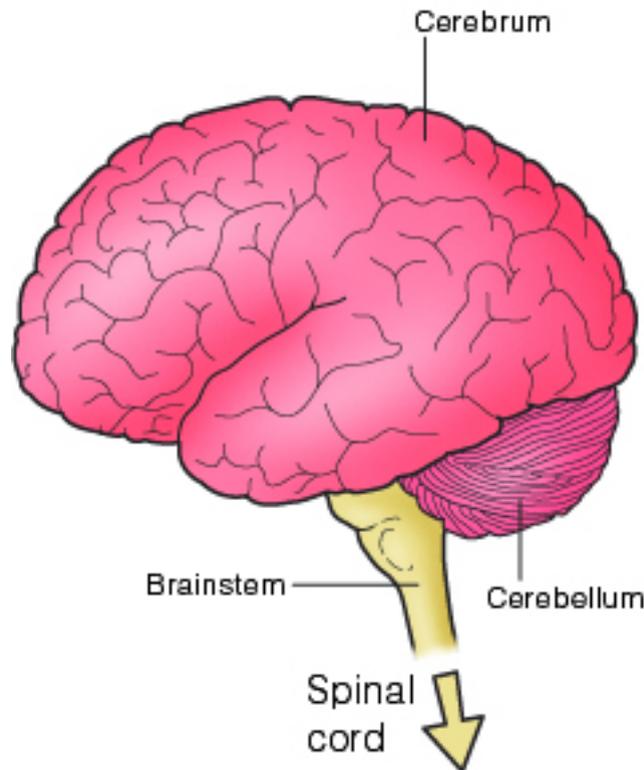
Your brain is connected to the rest of your body by your spinal cord. This is a tube of fibres that runs down your back from your brain. Your spinal cord is about the width of a finger, and it sits inside the bones that make up your spine. These bones protect your spinal cord from injury.

Nerves from your spinal cord reach every part of your body. When you touch something with your fingers, a signal travels along the nerves to the spinal cord and up to your brain.

The parts of your brain

There are three main parts of the brain:

- The cerebrum (the largest part of the brain)
- The brainstem
- The cerebellum.



The brainstem connects your brain to your spinal cord.

The **cerebrum** is what most people think of when you mention the brain. It is the largest part of your brain and is split into two halves by a deep groove. The two sides of the cerebrum, called the right and left **cerebral hemispheres**, communicate with each other.

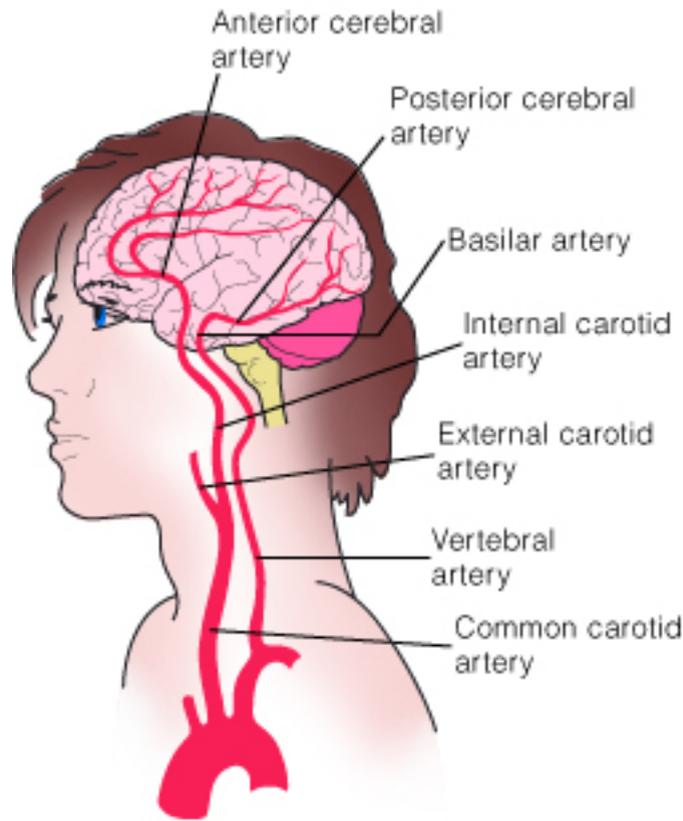
The **brainstem** sits at the bottom of the brain. It connects the brain to the spinal cord.

The **cerebellum** sits between the cerebrum and the brainstem.

Each part of your brain has its own function, although the different parts also work together.

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Blood flow to the brain



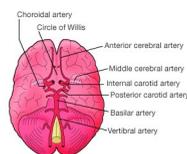
Arteries carry blood to your brain.

To work, your brain needs a constant supply of the food and oxygen that is carried by your blood. Blood reaches your brain through blood vessels called arteries.

If the flow of blood to your brain is interrupted, you have a stroke.

Doctors sometimes name strokes after the artery that has had its blood flow interrupted. You don't have to know the names of arteries, but we explain a few of them here.

Blood flows to your brain along two separate paths: the front path goes to the cerebral hemispheres and the back path goes to the cerebellum and brainstem.



Blood carries food and oxygen to the different parts of your brain.

The front path is called the **anterior circulation**. (Anterior means at the front.) The back path is called the **posterior circulation**. (Posterior means at the back.)

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The blood flow to the front of the brain comes from the left and right **internal carotid arteries** .

The blood flow to the back of the brain comes from the left and right **vertebral arteries** .

The **Circle of Willis** is where these two blood flows meet. It is a circle of arteries, deep within your brain.

What happens during a stroke

A stroke happens when the blood supply to part of the brain is cut off and the cells in that area are starved of oxygen and food.

Your brain cells can survive for a few minutes without food and oxygen. If the blood supply is interrupted for much longer, the brain cells die. This is why a stroke is an emergency. You should get medical help quickly if you think you are having a stroke, or if someone you know is having a stroke.

Stroke: why me?

There are many things that affect the chance of having a stroke. Things that make it more likely that someone will have a stroke are called risk factors. Here are some of the main risk factors: ^[2]

Things you can't change

- Getting older
- Being male
- Being African-Caribbean
- Having a relative who has had a stroke
- Having had a stroke before.

Things you can change

- Having high blood pressure
- Having heart disease
- Smoking
- Having high cholesterol
- Being obese

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- Not doing much exercise
- Not eating healthily
- Drinking too much alcohol
- Abusing drugs (such as cocaine)
- Having poorly-controlled diabetes.

Remember that even if you have some of these risk factors, it doesn't mean you will have a stroke. No one can say for certain what will happen to you as an individual.

To learn more, see [Risk factors for stroke](#) .

What can I do about my risk factors?

You can't control all of your risk factors but here are a few things you can do.

- Take any tablets your doctor prescribes for blood pressure and cholesterol.
- Stop smoking.
- Eat lots of fruit and vegetables and less fat.
- Do some physical activity for half an hour on most days of the week.
- Don't drink too much alcohol.

To learn more about protecting yourself from a stroke, see [How to reduce your risk of a stroke](#) .

Types of stroke

There are two main types of stroke.

- An **ischaemic stroke** happens when a blood vessel that takes blood to the brain gets blocked by a blood clot. This stops blood getting to part of the brain. About 4 in 5 strokes are ischaemic. To learn more, see [Ischaemic strokes](#) .
- A **haemorrhagic stroke** happens when a blood vessel in or near the brain bursts. Blood seeps into the spaces between brain cells. About 1 in 5 strokes are caused by bleeding into the brain. To learn more, see [Haemorrhagic strokes](#) .

Doctors normally find out the type of stroke you've had by doing a **CT (computed tomography) scan** or an **MRI scan** . You should have one of these scans within 12 hours if doctors think you've had a stroke.^[16] These scans produce an image of your brain. It's

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important to have a scan because bleeding into your brain may need different treatment to a blocked artery. To learn more, see [How do doctors diagnose a stroke?](#)

There is no treatment that can bring dead brain cells back to life. But around the dead cells, other brain cells will still be alive. These cells are in danger of dying too, unless the blood supply is quickly started up again.

This is why you need to get treatment urgently if you have a stroke. The aim of emergency treatment is to limit the area of the brain that is damaged. Doctors try to save the brain cells that are still alive but could die if they don't get their oxygen and food supply back soon.

Another type of stroke is a **transient ischaemic attack (TIA)** (sometimes called a mini-stroke). It's like an ischaemic stroke, but the blood clot only blocks the vessel for a short time. The symptoms usually go away. But having a TIA means you have a high chance of having an ischaemic stroke in the near future. To learn more, see [Transient ischaemic attacks](#) .

What are the symptoms of a stroke?

Strokes affect people in different ways. If you have a stroke you may not be able to move one side of your body, or you may have difficulty speaking or swallowing.

A stroke happens when the blood supply to part of your brain is cut off. You will have symptoms almost immediately, which is why a stroke happens without warning.

Without a supply of blood, your brain cells won't get enough food and oxygen. Because your brain has so many different functions, having a stroke can cause lots of different symptoms. The symptoms you get depend on which part of your brain is affected.

What happens during a stroke?

You may find that you suddenly:

- Feel weak on one side of your body. If you can't move one side of your body at all then doctors say you have a right-sided or left-sided paralysis.
- Can't feel anything on one side of your body. One side may feel numb.
- Have trouble speaking or understanding what is being said.
- Can't see out of one or both eyes. You may have gaps in what you can see or you may see double.
- Feel dizzy and unsteady, and have trouble walking.
- Have problems swallowing.

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- Have a terrible headache, either on its own or together with some of the symptoms mentioned above. Many people describe these headaches as the worst headaches they've ever had.

If you or someone you know have any of these symptoms, treat it as an emergency and get medical help straight away. The earlier you are treated for a stroke, the better your chances of making a good recovery.

Doctors may talk to you about where in your brain you've had a stroke. A stroke in the front of your brain (the **cerebrum**) will give different symptoms to a stroke in the base of your brain (in the **cerebellum** or the **brainstem**). Here is a description of what each part of your brain does, and the symptoms that can happen when these parts of your brain are starved of blood.

Cerebrum

The two sides of the cerebrum are called the **right cerebral hemisphere** and the **left cerebral hemisphere**. They do slightly different jobs.

The right cerebral hemisphere controls movement on the left side of your body. And it organises complicated movements, such as getting dressed. If you have a stroke in this part of your brain:

- Your left arm or leg may be paralysed
- You may have problems getting washed and dressed or understanding instructions.

The left cerebral hemisphere controls movement on the right side of your body and controls speaking. If you have a stroke in this part of your brain:

- Your right arm or leg may be paralysed
- You may have problems with reading, writing or speaking
- You may have problems understanding what is being said.

Cerebellum

Your cerebellum helps coordinate your body's movements. If you have a stroke in this part of your brain:

- You may have problems with coordination
- You may have problems with your balance
- You'll probably feel dizzy and sick.

Brainstem

This part of your brain keeps your heart beating and your lungs working. It also controls the muscles that move your tongue and voicebox. These are the muscles that allow you to swallow food and to talk. And the brainstem also controls your eye muscles.

If you have a stroke in this part of your brain:

- You may have difficulty speaking and swallowing
- You may see double and feel sick
- You may not be able to breathe automatically or your heart may stop beating.

A stroke in the brainstem can be fatal.

Transient ischaemic attacks (mini-strokes)

If your symptoms go away within a few minutes and you recover completely, it is called a **transient ischaemic attack** (TIA) or mini-stroke. A TIA happens when an artery supplying blood to your brain gets blocked and the blood supply is cut off temporarily. This usually happens if the artery is blocked by a blood clot or has been narrowed by hardening of the arteries (atherosclerosis).

In a transient ischaemic attack, the blockage corrects itself (usually after a few minutes or after a few hours at the most). And once the blood flow is restored, the brain cells begin to work normally again. Usually all your symptoms disappear.

But this type of attack should always be taken seriously because it can mean you have a high chance of having a full-scale stroke, which could leave you with permanent brain damage. About 10 in 100 people who have a TIA will have a full-scale stroke within a week. Having treatment quickly (within 24 hours of having symptoms) can reduce this risk to 2 in 100. ^[18]

If you think you have had a transient ischaemic attack, or are having one, you should seek medical help straight away.

What happens after a stroke?

The first few days

It's difficult to say what will happen to you if you've had a stroke. Every stroke is different. It's especially difficult for doctors to predict what will happen to your symptoms in the first few weeks after a stroke. Once these symptoms have settled down your doctor will probably have a better idea of what kind of progress you will make. But even then there's a lot of guesswork involved. You may find that you are still getting better months and even years after your stroke. So there's always hope that things will improve, even if they only improve slightly.

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Doctors aren't exactly sure what happens in your brain just after a stroke.^[19] The part of your brain where the stroke has happened may be swollen. Part of your recovery may have to do with this swelling going down. As the swelling goes down, brain cells that are still alive start working again.^[19]

When your symptoms get worse

In the first few days after you have a stroke, you may get worse before you start to get better. Symptoms get worse in up to 4 in 10 people who have a stroke and go to hospital.^[20]

Why this happens is still not fully understood, although some things make it more likely.

- If you have a severe stroke and there's swelling in your brain, your symptoms are more likely to get worse before they get better.^[21]
- If you have **high blood pressure**, **diabetes**, signs of brain damage or you're older, your symptoms are also likely to get worse before you get better.^[21]

If your symptoms do get worse, you will probably do less well in the long term than if you recover quickly or remain the same.

When you become unconscious

You may lose consciousness during or after a stroke.

Researchers aren't sure how many people become unconscious during or after a stroke. Studies have shown between 1 in 6 and 1 in 3 people may become unconscious.^[22] ^[23] No one knows why some people become unconscious, but it may be because they have had bad strokes before or have more swelling in their brain.

What will happen in the long term?

How you are affected after a stroke will depend on:

- How bad your stroke was
- Where in your brain it happened
- What treatment you've had
- How much of your brain has been damaged.

It's difficult to say how your symptoms will change in the first few weeks and months. But there's a lot to be hopeful about. Research shows that being treated by specialists in a stroke team, such as a **physiotherapist** or a speech therapist, can help you recover, even if you have this treatment months or years after your stroke.

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Although brain cells that have died never work again, the cells that are left can form new links with each other. There's also evidence that when nerves in the brain have been damaged, other brain cells may take over their job.

As a result of these things, you may find that gradually you can do some of the things you used to do before you had the stroke. ^[24] Doctors call this **neuroplasticity**. Doctors aren't sure how it helps you get better and whether treatments such as physiotherapy help.

Doing special exercises may help speed this process up. ^[24] So even if your stroke happened months ago, it's worth asking about special treatments that could help you get back to normal.

Paralysis or muscle weakness

One of the main problems that you can be left with after a stroke is weakness or paralysis on one side of your body. Doctors call this **hemiplegia**, and it happens when the brain cells controlling the movement of muscles on that side of the body have died.

- Paralysis can disrupt your life, making even the most basic activities a problem. You may have difficulty eating, dressing, washing and going to the toilet.
- Nearly half the people who have a stroke get weakness in the muscles of their face, making eating and sometimes speaking difficult.
- Nearly half of people who've had a stroke have weakness in the muscles of their legs, which may make walking difficult or even impossible.
- About half of all people who've had a stroke lose some movement in their hand or arm, which can affect their ability to feed themselves, write or drive a car. ^[22]

Physiotherapy can help you get the use of your muscles back if they have been left weak after a stroke. For example, special exercises may be used to improve your balance and walking, and can help you be more independent. Ideally, physiotherapy should start soon after a stroke, but even if you have it a year later you should be able to recover some movement. ^[25] ^[26]

Occupational therapy can help you develop new ways to carry out daily activities such as dressing, washing, and driving.

Muscle stiffness

Your muscles may become stiff after you have had a stroke. Doctors call this spasticity, and it's a natural reaction of your body after a stroke if the nerve cells controlling the movement of the muscles have died. If it isn't treated it can eventually cause your arm and leg to be held in strange positions. For example, your arm may stay close to your body and your hand may curl up into a fist.

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This combination of weakness from the stroke and the stiffness that develops afterwards can make your movements awkward and clumsy. It often gets better on its own, but if it doesn't, physiotherapy or splinting (where the muscles are put in plaster casts or bandaged) may help you gain some control over your movement. Injections of botulinum toxin (Botox) or two other drugs called baclofen (brand name Lioresal) and tizanidine (Zanaflex) are also used to help relieve stiffness.

Language problems

You may have problems speaking, understanding what people are saying, reading, or writing. Doctors call these kinds of problems **aphasia**, and they are most common in people who have had a stroke involving the left cerebral hemisphere. This is the part of the brain that is most strongly involved in language.

Problems with swallowing and speaking

About half of all patients who are treated in hospital for a stroke have difficulty swallowing.^[22] In one study, only 1 person out of 357 had swallowing difficulties that lasted more than six months after their stroke.^[27] Speech therapists and dietitians may be able to teach you how to cope with swallowing problems, but it's not clear whether this speeds up your recovery.

Up to 4 in 10 people who have a stroke have problems speaking.^[13] If you have problems speaking, then you may also have problems swallowing since the parts of the brain that control speaking and swallowing are close together.

Sometimes problems speaking and swallowing clear up on their own in the first few months after a stroke. About 1 in 5 people who have language problems still have them six months later. Problems that don't get better on their own will almost always improve, at least to some extent, with speech therapy.^[13] Speech therapy works by making healthy nerves take over the work of nerves damaged by the stroke.^[24]

Problems with sight

About 1 in 5 people have problems seeing after a stroke.^[23]

There are three types of problems:

- Blindness in one eye (caused by a blood clot interrupting the blood flow).
- A blind spot in your vision. This occurs when the part of your brain that receives information from your eyes is affected. This means you may not be able to see all of something you're looking at. The blind spot is usually on either the left or right side of your field of vision and affects the sight in both eyes. This can cause problems in your daily activities, and you may not be able to drive a car.
- Seeing double (caused by a stroke in the brainstem).

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Again, physiotherapy may help, and the sooner it starts the better. But it will still help if you have it later. ^[25] ^[26]

Incontinence

Incontinence is the term doctors use when a person can't always control their bladder or bowels.

- About half of all people who have a stroke have problems controlling their bladder at some time. ^[13]
- This problem is more common in older people, in those with **diabetes** and in those who have had a severe stroke. ^[13]
- But most people get back control of their bladder and bowels after a few weeks. ^[28]
- If you aren't able to control your bladder after a few days, it's often a sign that your recovery may not be good. ^[29]
- Incontinence can be distressing for you and your family. There are things that can help you if you are incontinent, so talk to your doctor if it's a problem.

Problems with memory and mental tasks

As many as 1 in 6 people will have problems remembering things after a stroke. You may have problems concentrating, learning new information, making decisions, and solving everyday problems.

For example, you may not be able to remember why you went out to the shops or you may not be able to do simple sums. Some of these problems may get better on their own, or you may learn to cope with them. For example, you may have to use lists or carry a diary with you to remind you what you're doing that day.

Depression and emotional ups and downs

It's common to feel depressed after a stroke. It's thought that as many as 1 in 5 people get severe depression one month after their stroke. ^[22]

You may be particularly likely to get depressed if you have had a bout of depression before or if your stroke was bad and it's difficult adjusting to a new lifestyle. But you have a good chance of getting over these feelings with treatment (usually with **antidepressant** drugs).

Most people recover from depression within a year of their stroke.

To learn more, see our section on [depression](#) .

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Not surprisingly, it's also common to feel very emotional in the year after a stroke. About 1 in 5 people find it hard to control their emotions and may burst into tears or laugh uncontrollably for no reason.^[22] Very often these outbursts are triggered by other people, for example, if someone asks how you are coping. You may want to ask your doctor about treatment if this happens to you.

Loss of sex drive

It's quite safe to have sex after a stroke. But, understandably, many people feel less like having sex after a stroke, and many stop having sex altogether.^[30] ^[31] Part of the problem may be the loss of feeling in one half of the body, although a stroke may simply turn some people off thinking about sex. Sexual therapy, which involves talking through any difficulties with a specialist **counsellor**, may help you find ways of enjoying sex again.

Other health problems

If you've had a stroke, you are at risk of getting other health problems. These are not caused by the stroke itself, but may happen because the stroke has left you vulnerable in some way. Many of these complications can be prevented if you get good care in hospital and afterwards, but it is still a good idea to be aware of the health problems that could come up.

To learn more, see [Possible health problems after a stroke](#).

How it affects carers and family

A stroke affects many people, not just the person who's had the stroke. Husbands and wives of people who have had a stroke are especially affected, but other relatives may also feel the strain.

Caring for someone who has had a stroke can be physically and emotionally draining.^[27] Carers may have to help with dressing, feeding and washing, and they will have to change their own lifestyles to be able to do all these things. Many carers choose to stop working. Yet, very often, what they do is not appreciated by the person they are caring for. This is because people who have had a stroke are often not aware of what the carer is doing, or because they are depressed as a result of the stroke.

Carers say the biggest problems are feeling isolated and not getting enough sleep.^[32] To avoid becoming ill themselves, it's important for carers to recognise that they may not be able to do everything themselves. They may need extra help at home or to arrange respite care (this is when someone else takes over the care for a time so they can have a break).

Support groups for carers can help make them feel less isolated. Support groups may also be able to put carers in touch with organisations that can help them out at home. Ask your doctor for help if you are having difficulties as a carer. Don't let your own health suffer.

How do doctors diagnose a stroke?

Physical examination

If your doctor thinks you may have had a stroke, he or she will give you a thorough physical check.

If you have had a severe stroke, you may black out (lose consciousness). But if you are awake, the doctor will check how alert you are by asking you simple questions. He or she will probably ask you your name and what the date is. You might also be asked if you know where you are.

Your doctor will then shine a light in your eyes to make sure your pupils respond properly. He or she will also ask you to look left and right, then up and down. You may also be asked to smile or shrug, and the doctor may test whether you can hear quiet noises or feel a gentle touch on your skin.

The doctor will then check your muscles by asking you to squeeze someone's finger, push with your hands or legs, or kick your legs out. Very often people who have had a stroke will be weak on one side of their body, so it's important to test the strength of your legs and arms.

Your doctor will also check your reflexes by tapping your knee or another joint with a small hammer. Someone who has had a stroke may have reflexes that are much faster and stronger than usual.

If you can get out of bed, your doctor may want to see if you can walk properly. He or she will also make sure that your speech is normal, because some strokes make it hard for people to talk. Other tests include asking you to write something simple on a piece of paper, or to remember the names of a few simple objects (like a hat, a car, and a dog) and then say them back to the doctor after a few minutes.

Brain scans

Doctors use brain scans to find out what type of stroke you've had, where it is, and what treatment you should have.^[41] It's usually best to have a brain scan as soon as possible after doctors think you may have had a stroke. You should definitely have a brain scan within 12 hours. But you may have one much more quickly. Scans can show where the stroke has happened and if the stroke has caused any other problems.^[16]

You may have:

- A CT (computerised tomography) scan: You lie down on a bed that moves slowly through the scanner. The scanner takes lots of x-rays of your brain to see if there is anything unusual there. It provides very detailed pictures and may be the only test you need
- An MRI (magnetic resonance imaging) scan: This looks very like a CT scanner. You lie on a bed which moves you through the tunnel of the scanner. The scanner uses

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a strong magnetic field to get detailed pictures of your brain. You may have an MRI scan if the results from the CT scan aren't clear.

Checking the blood flow to your brain

If doctors think your stroke has been caused by a narrowing or blockage in the main blood vessel supplying your brain, you'll probably be given an **ultrasound** scan of your neck. The main blood vessel is called the carotid artery, and the test is called a **carotid Doppler**. A build up of fat in the carotid artery can reduce the amount of blood that gets to the brain, or stop it completely. Either of these can cause a stroke.

A carotid Doppler measures how fast blood flows through your carotid artery.^[42] It's a very quick test and it doesn't hurt. An ultrasound probe is moved over your neck in the place where the carotid artery is. Sound waves travel from the probe to the artery and then bounce back, producing a pattern. Doctors can tell how fast blood is moving through the artery. If the artery is narrowed, blood will flow faster. This test will help your doctor decide whether you need surgery to clear the artery.

To learn more about this operation, see [carotid endarterectomy](#) in our section on stroke prevention.

Heart scan

Doctors can use ultrasound to check how well your heart is working.^[42] This test is called an **echocardiogram** (or 'echo' for short). An ultrasound probe is moved over your chest where your heart is. It takes about 10 minutes to 15 minutes and it's safe.

Doctors can see how well the valves in your heart are working and how thick the walls of your heart are. They'll also be able to check whether there is a clot in your heart that might have caused a stroke.

If doctors need to get a closer look at your heart, you may be asked to swallow a small probe attached to a wire. The back of your throat will be sprayed to make it numb so it shouldn't hurt when you swallow the probe.^[42]

How common are strokes?

Strokes are the third most common cause of death in the UK (after heart disease and cancer). Every year about 150,000 people in the UK have a stroke.^{[12] [13]} Overall, about 1 in 5 people die from stroke within the first 30 days.

No one can say what someone's personal risk of dying after a stroke will be. On average, about one-third of the people who have a stroke will die within a year.^[12]

Some types of stroke are more serious than others. Having a stroke because there is bleeding into your brain (a **haemorrhagic stroke**) is usually more serious than having a stroke because you have a blocked blood vessel (an **ischaemic stroke**). About 3 in

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10 people who have bleeding in their brains die within 30 days, compared with about 1 in 10 people who have a stroke because of a blocked artery.^[7]

In the 1960s and 1970s the number of people having a stroke started to fall, mainly because people were following advice to stop smoking, to eat better, and to exercise regularly.^{[14] [38]} But more recently the number of people having a stroke has stayed the same. This may have something to do with the fact that people are living longer, since the older you get the more likely you are to have a stroke.

What treatments work for a stroke?

There are two kinds of treatment for a stroke:

- Emergency or early treatment (which you get in the first few hours or days after a stroke)
- Long-term treatment (which you are given to try to reduce the chance of having another stroke).

In this section we cover emergency or early treatment. Your doctor may call it acute treatment. To learn more about long-term treatment, see [Stroke prevention](#) .

Key points about treating a stroke

- If you think you're having a stroke, or have had one, get to hospital straight away. A stroke is an emergency. Many people think there's no point in getting medical help for a stroke. In fact, the most important thing you can do to limit the damage from a stroke is to get medical attention straight away.
- The symptoms of a stroke can include sudden numbness or weakness (especially on one side of your body), sudden confusion or trouble speaking, sudden problems seeing, sudden dizziness, loss of balance, trouble walking, or a bad headache.
- If you're cared for in a specialised stroke unit, you're more likely to make a good recovery.
- In hospital, you may be given fluid as a drip into a vein, usually in your arm. Some people need a tube that's put into their mouth to help them breathe.
- Taking aspirin within two days of having an ischaemic stroke (the type that happens when a blood vessel is blocked) reduces your chance of dying from the stroke. It can reduce the amount of disability you have after surviving the stroke. It also improves your chance of making a complete recovery.
- Clot-dissolving (thrombolytic) drugs can reduce your chances of being disabled after a stroke caused by a blood clot. The sooner you get this treatment, the better it works. Unfortunately, these drugs can harm some people by causing bleeding in

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the brain. Also, it can be difficult for doctors to tell who will be helped and who will be harmed.

Treatments for a stroke

A stroke needs different treatment depending on whether it was caused by a blood clot or by bleeding in the brain. We've looked separately at treatments for these different kinds of stroke.

- [Emergency treatment for an ischaemic stroke \(caused by a blood clot\)](#)
- [Emergency treatment for a haemorrhagic stroke \(caused by bleeding\)](#)

Treatment Group 1

Emergency treatment for ischaemic strokes

Treatments that work

- [Treatment in a stroke unit](#) : This is treatment given in a specialised hospital ward or unit, where people who have had a stroke are cared for by a team of specialists. [More...](#)
- [Aspirin](#) : Taking aspirin makes your blood less sticky, so there is less chance that a blood clot will form and block a blood vessel. [More...](#)

Treatments that work, but whose harms may outweigh benefits

- [Clot-dissolving \(thrombolytic\) drugs](#) : These are given as an injection to help dissolve clots. The only one licensed in the UK for people who have had a stroke is alteplase (brand name Actilyse). [More...](#)
- [Anticoagulants](#) : These are drugs that make it less likely that a blood clot will form and block the flow of blood to your brain. Examples (and their brand names) include heparin (Monoparin), certoparin (Alphaparin), dalteparin (Fragmin), enoxaparin (Clexane), and tinzaparin (Innohep). [More...](#)

Treatments that are unlikely to work

- [Neuroprotective drugs](#) : These aim to stop brain cells getting damaged. Many different drugs and groups of drugs are neuroprotective. Examples (and their brand names) include nimodipine (Nimotop), nifedipine (Adalat), and piracetam (Nootropil). [More...](#)

Treatments that are likely to be ineffective or harmful

- [Lowering blood pressure](#) : There are many different groups of drugs used to lower blood pressure. Some examples (and their brand names) are captopril (Capoten), atenolol (Tenormin), nicardipine (Cardene), prazosin (Hypovase), and losartan (Cozaar). [More...](#)

Treatment Group 2

Emergency treatment for haemorrhagic strokes

Treatments that are likely to work

- [Surgery](#) : An operation may sometimes be done to drain the blood that collects in your brain if you have a haemorrhage. [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 it or be interested in it.

- [Drugs to stop bleeding in the brain](#) : These drugs may stop bleeding and may prevent brain cells getting damaged. Only one drug has been looked at in studies. It is called recombinant activated factor VII (brand name NovoSeven). [More...](#)

What will happen to me?

If you've had a stroke, you and your family will probably be anxious about the future. You may wonder whether you'll have another stroke, whether you'll be able to live your life as you did before, or if you'll need help because you have a disability. You may also want to know whether having a stroke will affect how long you can expect to live.

It's very difficult to say what will happen to you after a stroke. A lot depends on the type of stroke you've had and how bad it was, as well as your age, whether this is your first stroke and what your risk factors are. To learn more, see [Risk factors for stroke](#) .

Some people who survive a stroke have few, if any, after-effects. Others need full-time care.

Strokes are the leading cause of serious long-term disability in the UK. But it's also true that the brain has a remarkable ability to recover from injury. Other parts of your brain may take over the job of cells that have been damaged by a stroke, so it's difficult to say whether the problems you have in the first few days after a stroke will still be there a few months later.

Stroke, emergency care

Research gives us some idea of what you can expect after a stroke, but even this can become out of date as doctors learn more about the best way to treat strokes and how to stop them happening again.

No research statistics can tell you what will happen to you. They can only tell you what happened to the group of people who were studied at one particular time.

This is what the research shows us: [\[4\]](#) [\[39\]](#) [\[7\]](#) [\[40\]](#) [\[13\]](#)

- The time it takes to recover from a stroke depends on how bad it is
- One-half to two-thirds of all people who have had a stroke are able to live at home three months later
- Between 15 in 100 and 30 in 100 people who survive a stroke are permanently disabled
- About 1 in 5 people who have a stroke need to be cared for in a nursing home
- Half the men and women who've a stroke under the age of 65 die within eight years
- About 1 in 6 people who've had a stroke have another one within a year
- The amount of disability you have is likely to increase with another stroke
- Of the people who are still alive 30 days after a stroke, about 1 in 3 will be completely independent within three weeks. At six months half the people who've had a stroke can live independently.

Questions to ask your doctor

If you've had a stroke, you may want to talk to your doctor to find out more.

Here are some questions you might want to ask:

- How serious was my stroke?
- When can I get a brain scan?
- What do you think caused it?
- Will I be treated in a unit that specializes in stroke care?
- What kind of stroke have I had?
- Will my symptoms go away?

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- Will I be disabled? What disabilities will I have?
 - What's the best treatment for me?
 - Will I need any drug treatment?
 - What are the side effects of treatment?
 - Will I have another stroke?
 - What should I do if I get similar symptoms again?
 - What can I do to help myself? Do I need to change my diet? Should I eat less fat? Do I need to exercise more? Can you help me stop smoking?
 - Should I take any vitamin supplements?
 - Are other members of my family at risk of having a stroke? If they are, what can they do to protect themselves?
-

Treatments:

Treatment in a stroke unit

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 treatment in a stroke unit?](#)

This information is for people who have an ischaemic stroke. It tells you about specialist stroke units, where some people who've had a stroke are treated. It is based on the best and most up-to-date research.

Do they work?

Yes. If you're treated in a specialised stroke unit instead of an ordinary hospital ward, you have a greater chance of:

- Being alive a year later
- Leaving hospital sooner
- Being able to live at home (rather than in a nursing home) as long as 10 years later (the length of time that patients were followed in some studies).

Stroke, emergency care

In the UK, doctors are advised to admit all patients suspected of having a stroke to specialised stroke units. ^[44]

What are they?

Specialised stroke units are services run by doctors, nurses and other health professionals who only look after people who have had a stroke. These teams are very experienced. Stroke units may be based in a ward in a general hospital or in a special unit. They usually offer physiotherapy, occupational therapy, and speech and language therapy, as well as the more usual medical care.

There are three main types of stroke units:

- Acute (or intensive) stroke units admit you as soon as you get to hospital, and usually discharge you early (within about seven days)
- Rehabilitation stroke units admit you about seven days after your stroke. They focus on rehabilitation (restoring your health and getting you back to what you were able to do before the stroke)
- Combined acute and rehabilitation units admit you soon after a stroke and also provide rehabilitation care for at least a few weeks.

Some stroke units will use a care pathway. This is way of organising the services people receive to make sure they get all the treatments they should. For example, if the unit where you are being treated used a care pathway, you might be given a daily written care plan which tells you the treatments or tests you are going to have that day. You might see a physiotherapist in the morning, and have an appointment with a speech therapist in the afternoon. Writing everything down in this way can help staff make sure you get the best care. You might hear care pathways called care maps, clinical pathways, or critical pathways.

How can they help?

Being treated in a stroke unit rather than on an ordinary hospital ward increases your chance of: ^{[45] [46] [47]}

- Being alive a year later
- Being able to look after yourself (being less disabled)
- Being able to live at home one year after your stroke
- Going home sooner. Patients treated in a stroke unit go home about two to six days sooner than patients treated on an ordinary hospital ward
- Being alive and living at home 10 years after your stroke.

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Being monitored constantly for at least 48 hours after you are admitted to hospital may increase your chances of surviving your stroke even more, although this isn't certain. ^[48] Constant monitoring means you are attached to machines which check things such as your oxygen levels, heart rate, and temperature. Normally these things are checked every few hours, rather than all the time.

All patients who've had a stroke seem to be helped by being treated in stroke units. It doesn't seem to matter what type of stroke you've had, how severe it was, or your age or sex.

If the stroke unit where you're treated uses a care pathway then you may be: ^[49]

- More likely to have the tests you need
- Less likely to get an infection in the tubes that carry your urine (called a **urinary tract infection**)
- Less likely to have to be admitted to hospital again after you are sent home.

But the care pathway may not change your chance of surviving and being able to care for yourself.

How do they work?

The care in stroke units is well co-ordinated and given by experts. Other things that stroke units do that may help your recovery include:

- Getting you up and moving around sooner, instead of letting you stay in bed (early mobilisation)
- Giving you intravenous saline solutions (salt solutions given as a drip) within 12 hours of your arrival in the hospital to stop you getting dehydrated and developing low blood pressure
- Checking on you to make sure that you don't have a fever and treating it if you do. A raised temperature has been shown to slow down recovery.

Can they be harmful?

There's no evidence that being treated in a stroke unit is harmful in any way.

How good is the research on treatment in a stroke unit?

There is strong evidence that specialised stroke units are helpful for people who have had a stroke. A big summary of the research (a **systematic review**) found that: ^[47]

Stroke, emergency care

- People who were treated in a stroke unit were more likely to be alive, independent, and living at home one year later
- And after five years and 10 years, people treated in stroke units were more likely to live at home and be less disabled. ^[47]

Another systematic review found that any type of specialist stroke care worked better than non-specialist care. ^[50]

Aspirin

In this section

[Does it work?](#)

[What is it?](#)

[How can it help?](#)

[How does it work?](#)

[Can it be harmful?](#)

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

This information is for people who have an ischaemic stroke. It tells you about aspirin, a treatment used for this type of stroke. It is based on the best and most up-to-date research.

Does it work?

Yes. Taking aspirin within two days of having a stroke reduces your risk of dying or being severely disabled.

But aspirin should only be used in people who have had an ischaemic stroke (where there's a blockage in the blood vessel supplying the brain).

What is it?

Doctors call aspirin an antiplatelet drug, although it is also widely used as a painkiller. Platelets are sticky cells that are carried in your blood. Their job is to make blood clot and stop the bleeding if you cut yourself.

If the platelets are activated and form a clot even though you haven't cut yourself, and this clot blocks a blood vessel in your brain, it's called an **ischaemic stroke**. Platelets can be activated by smoking, diabetes, **high blood pressure**, and high cholesterol. ^[17] Platelets can be activated for many years before you have a stroke.

Activated platelets also release chemicals into your blood that make blood vessels narrower. Doctors call this process **vasoconstriction**.

Aspirin stops platelets sticking together. This means that your blood is less likely to form clots. ^[17] Aspirin is also thought to act in other ways to produce its antiplatelet effect, but doctors don't know exactly how. ^[51]

Stroke, emergency care

You'll only be given aspirin if you've had an ischaemic stroke, where a blockage stops blood getting to your brain. If you've had a bleed into your brain (a haemorrhagic stroke), aspirin can make you bleed even more.

You will need a CT scan or an MRI scan to find out what type of stroke you have had. To learn more, see [How do doctors diagnose a stroke?](#)

How can it help?

If you take aspirin within 48 hours of when your stroke symptoms start, you are: ^[52] ^[53] ^[54]

- Slightly more likely to be alive and living independently six months later
- Slightly more likely to make a complete recovery
- Slightly less likely to have another stroke or die later of your stroke.

One study showed that aspirin alone works as well as aspirin given with another drug called heparin. ^[55]

How does it work?

An ischaemic stroke happens when an artery supplying blood to your brain gets blocked by a clot. As a result, blood can't reach the brain cells and they begin to die. These brain cells can't be brought back to life.

If the blockage that caused the stroke is removed, blood will be able to flow through the artery again. Cells that otherwise might have died will be saved, and there will be less brain damage.

Aspirin helps blood flow through the arteries by stopping platelets sticking together.

Can it be harmful?

Common side effects of taking aspirin are an upset stomach, indigestion, and constipation. These effects are related to the amount of aspirin you take. ^[56] But they are not usually serious.

The most serious side effect of aspirin, however, is bleeding in the brain (a haemorrhage). The risk of having a haemorrhage is small. In the studies we looked at there were two extra brain haemorrhages for every 1,000 people treated with aspirin. ^[54] Experts agree that the risk is worth taking because the benefits of treatment far outweigh the possible harmful effects.

Taking aspirin doesn't increase your risk of bleeding as much as some other drugs for strokes, such as heparin. ^[55]

How good is the research on aspirin?

There is good evidence that aspirin improves recovery from stroke.

More than 40,000 people have taken part in studies that compared groups of patients given aspirin within two days of having an ischaemic stroke with patients given a dummy treatment (a [placebo](#)).^[54] Most of the information on aspirin comes from two big studies.
[\[52\]](#) [\[53\]](#)

Overall, aspirin reduced the risk of dying or being dependent on other people for care after a stroke by about 1 in 100. This may not seem like a lot. But with about 150,000 people in the UK having a stroke for the first time every year, this means that aspirin can help prevent around 1,500 of these people from dying or being dependant on others.

Results from these two big studies also show that aspirin reduces the risk of having another stroke.^[57]

Clot-dissolving (thrombolytic) drugs

In this section

[Do they work?](#)

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[How do they work?](#)

[Can they be harmful?](#)

[How good is the research on clot-dissolving drugs?](#)

This information is for people who have an ischaemic stroke. It tells you about clot-dissolving (thrombolytic) drugs, a treatment used for this type of stroke. It is based on the best and most up-to-date research.

Do they work?

Yes. If you get one of these drugs within three hours of the beginning of your stroke symptoms, you are less likely to need nursing care in the future. They may still work if you have them within six hours of your stroke.

But in some people these drugs can be dangerous. They can cause death from bleeding in the brain.

For this reason, doctors have to weigh up the increased likelihood of being alive and independent in the long run against the increased risk of death in the short term.

What are they?

Clot-dissolving drugs are a group of medicines that are often referred to as clot-busters, because they break up or dissolve clots that have formed in a blood vessel. This lets the normal flow of blood restart.

Some common clot-dissolving drugs (and their brand names) are:

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- alteplase (Actilyse)
- reteplase (Rapilysin)
- urokinase (Syner-Kinase).

Most clot-dissolving drugs do the same thing as a natural chemical in your body called **tissue plasminogen activator (t-PA)**. This chemical stops your blood clotting when it shouldn't. But alteplase is different. It's called a **recombinant tissue plasminogen activator (rt-PA)**.

Alteplase is genetically engineered (made in a laboratory) and is an exact copy of the t-PA found in your body. Scientists are able to match this substance exactly because they've found the gene responsible for making t-PA in the body. They have cloned this gene to make rt-PA outside the body. Human insulin is made the same way.

Clot-dissolving drugs are usually given as a drip (also called an IV or an **intravenous infusion**).

Only alteplase is licensed to be used in the UK to treat people who have had a stroke. There are strict guidelines for using it. ^[58] ^[59]

The National Institute for Health and Care Excellence (NICE), which advises the government about health care, says alteplase should be used as an emergency treatment for stroke, as long as certain guidelines have been followed. ^[59]

Alteplase should only be given by a specialist.

You will need to have a brain scan before getting this treatment to make sure you have not had bleeding in your brain (a haemorrhagic stroke).

Your doctor will also ask you or a relative when your symptoms started, as it's best to give this drug within four-and-a-half hours of the start of a stroke. But it can be difficult to be certain about when stroke symptoms began. For example, many people wake up with the symptoms, which could have started at any time during the night.

How can they help?

Clot-dissolving drugs like alteplase may increase your chance of making a good recovery from your stroke. ^[60] People who take alteplase are less likely to need care in a nursing home after their stroke.

One review of the research looked at people three to six months after their stroke. ^[60] It found that, for every 1,000 people treated with alteplase, 55 fewer people were dead or needed care in a nursing home. But this has to be weighed against a higher risk of dying from bleeding in the brain.

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The research shows that alteplase works best if you get it as quickly as possible. It works especially well if you get the drug within 90 minutes.^[61] Guidelines for doctors say it has to be given within three hours. One study that gathered together the findings from four good trials found that alteplase worked when it was given up to four-and-a-half hours after a stroke. After this time the risks seemed to be more than the benefits.^[62]

Some research also shows that alteplase might even help if you get it up to six hours after the start of your stroke symptoms.^[63]

How do they work?

During an ischaemic stroke, a blood vessel in your brain gets blocked by a blood clot. This clot stops the blood delivering oxygen and food to the cells in your brain. All cells need food and oxygen from the blood in order to live. When the blood can't reach cells, they begin to die.

Clot-dissolving drugs change a chemical in the body from its inactive state (when it's called **plasminogen**) to its active state (when it's called **plasmin**). Plasmin attacks the long, stringy substance that's the main part of a blood clot. This substance is called **fibrin**. As fibrin breaks down, the clot breaks up into tiny pieces, so blood is able to flow along the vessel again, and brain cells can be supplied with blood. If the drug is given in time, brain cells can be saved from death, and the damage that is caused by a stroke may not be as bad as it might have been.

Can they be harmful?

Yes. There is a risk of death. Clot-dissolving drugs can cause bleeding in your brain (a haemorrhage) because the blood vessels there may be slightly leaky after your stroke and more likely to burst.

One review of the research looked at people who were treated with alteplase.^[60] It found that, for every 1,000 people who were treated with alteplase, an extra 25 people died of bleeding in the brain.

Another review of the research looked at how many people died after their treatment.^[64] It didn't look separately at people who had bleeding in the brain. Researchers checked on people an average of five months after their stroke. People who'd been given clot-dissolving drugs were slightly more likely to have died. But the difference wasn't big enough to be sure it hadn't happened by chance.

People most likely to be harmed are those who have had a very bad stroke caused by a clot and those who are aged 70 and older.^[65]

How good is the research on clot-dissolving drugs?

The evidence that clot-dissolving drugs (thrombolytic drugs) can help people who have had a stroke is quite good. But there's also evidence that these drugs can be harmful.

Stroke, emergency care

There have been lots of studies looking at this treatment and they have involved many thousands of patients. Here's what they found:

- Being treated with a clot-dissolving drug after a stroke can reduce your chance of dying from the stroke or being dependent on someone else to look after you. ^[60]
- The drug alteplase seems to work the best. ^{[66] [67]}
- Streptokinase seems to be more harmful than the other clot-dissolving drugs. You're more likely to be dead three months after being treated with streptokinase than if you hadn't been treated with it. ^[68]
- Combining streptokinase with aspirin is more harmful than using streptokinase alone. ^[68]
- The earlier clot-busting drugs are given, the more likely they are to work. They work especially well if they are given within 90 minutes of the stroke. Clot-busting drugs might help even if they are given up to six hours after the stroke starts. ^[63]

But there are still many things we don't know about these drugs, such as who is most likely to benefit from clot-dissolving drugs and what the best dose is.

There are many studies of clot-dissolving drugs going on around the world. You can find out more about these at the Internet Stroke Center (<http://www.strokecenter.org/trials>).

Anticoagulants

In this section

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[What are they?](#)

[How can they help?](#)

[Why should they work?](#)

[Can they be harmful?](#)

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

This information is for people who have an ischaemic stroke. It tells you about anticoagulant drugs, a treatment used for this type of stroke. It is based on the best and most up-to-date research.

Do they work?

Anticoagulants cut your chances of getting a blood clot in your legs or in your lungs. But they can also be dangerous because they increase your chances of bleeding in your brain or in another part of your body.

Anticoagulants are not likely to help you recover from a stroke. And they're unlikely to reduce the amount of disability that the stroke causes.

What are they?

Anticoagulants are drugs that help stop clots forming in your blood. When they are given as soon as possible after a stroke, it is called **immediate systemic anticoagulation**. Systemic means that the drug will affect your whole body, not just the area where it may be needed (in a stroke, this is the brain).

You may have heard these drugs called blood thinners, but this isn't really what they are. They can't dissolve clots, but they can stop them getting bigger. They work by stopping the production of chemicals called clotting factors. These chemicals are needed by the blood in order to clot.

The standard anticoagulant is heparin, which is given as an injection. Heparin is available in the UK under the brand name Monoparin.

The effects of heparin wear off very quickly, however, and the drug has to be given very often. So scientists developed a group of drugs called low-molecular-weight heparins (sometimes abbreviated LMWH). These types of heparins last longer than normal heparin, so they don't have to be given as often.

Some of these low-molecular-weight heparins (followed by their brand names) are:

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

Another drug, called danaparoid (Orgaran), also acts as an anticoagulant. It works by stopping the formation of fibrin, a substance that the blood needs in order to make clots.

How can they help?

There is some evidence that anticoagulants can reduce the risk of two of the complications of having a stroke: ^[69] ^[70] ^[71] ^[72] ^[73] ^[74]

- **Deep vein thrombosis** (or DVT): This is a condition in which a blood clot forms in a vein deep inside your body, usually in one of your legs. This can lead to a pulmonary embolism (see below). Some research shows that anticoagulants can reduce your risk of getting a DVT by about two-thirds.
- **Pulmonary embolism**: This happens when a blood clot gets stuck in one of the main arteries that supply your lungs with blood. It is very dangerous and can kill you. One review of the research found that anticoagulants reduce the risk of this happening by about a third. To learn more, see [Possible health problems after a stroke](#).

But because anticoagulants can cause bleeding in the brain and other parts of the body, the benefits have to be weighed against the risks.

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And there's no evidence that anticoagulants can reduce the risk that you will die or be disabled as a result of your stroke. ^[69] ^[70] ^[71]

Why should they work?

During an ischaemic stroke a blood vessel in the brain gets blocked by a blood clot. This clot keeps the blood from delivering oxygen and food to the cells. All cells need the oxygen and food carried by the blood in order to live. When blood can't reach cells, they begin to die.

Anticoagulant drugs stop clots forming, so they may help patients recover from a stroke.

Can they be harmful?

The biggest problem with anticoagulants is that they can cause bleeding in the brain (a haemorrhage). Research has found that for every 131,100 people who are treated with anticoagulants, there's an extra one person who gets bleeding in the brain. ^[69] ^[70] The exact risk seems to depend on your dose. The higher the dose, the higher the chance of a haemorrhage.

How good is the research on anticoagulants?

There is good evidence that drugs that stop blood clots forming (anticoagulants) aren't helpful in treating people with a stroke, but they are useful for stopping clots forming elsewhere in the body. We found one big summary of research (called a **systematic review**) that compared anticoagulants with the usual care. The review included 2421 studies. ^[69] ^[70] Another review compared the effects of anticoagulants with those of [aspirin](#). ^[71]

- Anticoagulants don't help people recover from a stroke.
- They don't work any better than aspirin.
- They may increase the risk of bleeding in the brain.

There is good evidence that in people who have had a stroke, anticoagulants can lower the risk of **deep vein thrombosis** (DVT) or a **pulmonary embolism**. ^[69] ^[70] ^[71] ^[75] ^[73] ^[74] But because anticoagulants can cause bleeding in the brain and other parts of the body, the benefits have to be weighed against the risks.

Two good reviews of all the evidence found that low molecular weight heparins are better than standard heparins at lowering the risk of deep vein thrombosis in people who have had a stroke. ^[73] ^[74] ^[76] But the evidence isn't good enough for us to say how the two types of heparin compare in terms of safety and long-term effects.

Neuroprotective drugs

Stroke, emergency care

In this section

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[What are they?](#)

[How can they help?](#)

[How do they work?](#)

[Can they be harmful?](#)

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

This information is for people who have an ischaemic stroke. It tells you about neuroprotective drugs, a treatment sometimes used for this type of stroke. It is based on the best and most up-to-date research.

Do they work?

No. It's unlikely that neuroprotective drugs will help you recover from a stroke.

What are they?

Neuroprotective drugs are thought to stop nerve cells dying. Many of these drugs are used to treat other conditions and are still being tested to see if they work for people who've had a stroke. Because trials are still being done, some of these drugs may be referred to by a number instead of a name. You may only be able to get some of these drugs by taking part in studies (called clinical trials) in a few hospitals.

There are several different groups of these drugs. Here's a brief description.

Calcium channel blockers

You may have already heard of **calcium channel blockers**. They're used to treat high blood pressure. (Sometimes they're called calcium channel antagonists.) These drugs can be given as either tablets or a drip (also called an IV or an **intravenous infusion**). Examples of these drugs (and their brand names) are:

- nimodipine (Nimotop)
- nifedipine (Adalat)
- nicardipine (Cardene)
- diltiazem (Tildiem).

Gamma-aminobutyric acid (GABA) agonists

GABA agonists are being tested to see if they stop brain cells being destroyed. They include piracetam (Nootropil), diazepam (Valium), and clomethiazole, but in the UK are only being used in clinical trials.

Glycine antagonists

A glycine antagonist called gavestinel (also known as GV150526) is being tested in people who've had a stroke. In studies it has been given as a drip into a vein over about three days.

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Treatment with this drug has to be started within six hours of the first symptoms of a stroke.

Lubeluzole

Doctors think that lubeluzole may be able to stop nerve cells dying. It is given as a drip into your vein for an hour a day over five days.

NMDA antagonists

Selfotel is one drug of this type that has been tested in people who've had a stroke. It is given as a single injection within six hours of the first symptoms of a stroke. NMDA stands for N-methyl-D-aspartate receptor. Another example of an NMDA antagonist tested in people who've had a stroke is aptiganel. This is given as a drip.

Tirilazad

Tirilazad has been designed to stop brain cells dying after a head injury, bleeding in the brain or an injury to the spinal cord, as well as after an ischaemic stroke (caused when a blood vessel becomes blocked). It has to be given within 24 hours of the beginning of stroke symptoms.

How can they help?

So far, there is no evidence that neuroprotective drugs help people who've had a stroke. Nor have they helped reduce the amount of disability that someone is left with. ^[77] ^[78] ^[79] ^[80] ^[81] ^[82] ^[83] ^[84] ^[85] ^[86] ^[87] ^[88] ^[89] ^[90] ^[91] Two of the treatments (tirilazad and injections of calcium channel blockers) made things worse, especially tirilazad. If you take tirilazad your chance of dying or being left disabled is 20 percent higher than if you have no treatment at all. ^[87]

How do they work?

All of these drugs work in different ways. We've given a brief explanation below. However, you should remember that these theories haven't been proved.

Calcium channel blockers

When the blood supply to part of your brain is cut off during an ischaemic stroke (which happens when a blood vessel is blocked by a clot) the amount of calcium inside the nerve cells rises. This is part of a chain of events that causes cells to die. Calcium channel blockers stop this happening. The theory is that this may stop cells dying and reduce the amount of brain damage and disability caused by a stroke. ^[90]

Gamma-aminobutyric acid (GABA) agonists

Researchers have suggested that GABA agonists may protect cells from being destroyed, improve the circulation of blood in the brain, or make platelets less sticky. ^[91] ^[92] (Platelets help your blood to clot.) By doing these things GABA agonists may make it less likely

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that you'll have clots that can cause a stroke. GABA receptor agonists can also lower the body temperature which may protect the brain during a stroke. ^[91]

Glycine antagonists

These drugs prevent a chemical called glycine from doing its job. Glycine is released by brain cells when they stop getting blood during a stroke, and the release of glycine is part of a chain of events that causes cells to die. In studies in animals, preventing this reaction reduces the amount of damage caused to the brain, so it could also reduce the damage from a stroke in humans. ^[83] ^[84]

Lubeluzole

Lubeluzole stops a chemical called **glutamate** being released by brain cells during a stroke. This chemical plays a part in the chain of events that causes brain cells to die. The theory is that stopping glutamate being released will help prevent brain damage. ^[82]

NMDA antagonists

There is a small area of cells in your brain that allows a chemical called **NMDA** to latch onto it. This area is called the **NMDA receptor**. When enough NMDA gets there, it sets off reactions in the cell that kill it. NMDA antagonists are thought to stop this area accepting any NMDA, and this is how they may prevent cells dying. ^[85] ^[86] NMDA stands for N-methyl D-aspartate.

Tirilazad

Tirilazad has been tested in people who've had a haemorrhagic stroke (where a blood vessel in the brain bursts) and has been found to protect against brain damage. It's not known exactly how, but it's thought to have something to do with stopping reactions in cells that rely on iron. Because it works for haemorrhagic strokes, the theory is that tirilazad will do the same for people who have had an ischaemic stroke (where a blood vessel is blocked by a clot). ^[87]

Can they be harmful?

Yes. Some neuroprotective drugs may be harmful. For example, patients who have had an ischaemic stroke (caused by a clot in a blood vessel) and been treated with tirilazad were nearly one-fifth more likely to die or be disabled than patients who didn't have the drug. ^[87]

NMDA antagonists, selfotel and aptiganel, may also increase the risk of dying. ^[85] ^[86]

Calcium channel blockers (also known as calcium channel antagonists) are not effective, and people were less likely to recover when the drug was given as a drip, rather than as tablets. Also, the higher the dose, the less likely people were to recover. ^[90]

Gavestinel, a glycine antagonist, does not seem to have any serious side-effects. ^[83]

We don't know if piracetam, a GABA agonist, is harmful when taken for ischaemic stroke.^[92] We do know that clomethiazole, a GABA agonist, makes people feel very sleepy.^[91]

How good is the research on neuroprotective drugs?

There is good evidence that neuroprotective drugs don't help if you've had a stroke.

There have been **systematic reviews** of most of the neuroprotective drugs.^{[90] [77] [92] [87] [82] [88] [93] [89] [91]}

In a systematic review, researchers take a good look at all the studies of a particular drug or treatment.

There haven't been any systematic reviews of gavestinel and selfotel but we found reliable evidence from large studies.^{[85] [80] [81]} Neither of these drugs helped people who'd had a stroke.

Some of the studies of selfotel and aptiganel had to be stopped when researchers noticed that more people who were given those treatments were dying compared with those who didn't have any medicine.^{[85] [86]}

Lowering blood pressure

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[Can it be harmful?](#)

[How good is the research on lowering blood pressure?](#)

This information is for people who have an ischaemic stroke. It tells you about lowering blood pressure, a treatment used for this type of stroke. It is based on the best and most up-to-date research.

Does it work?

Probably not. Reducing your blood pressure quickly is not likely to help you recover from a stroke.

What is it?

Blood pressure is a measure of how strongly your blood pushes against the walls of your blood vessels as it's pumped around your body. If your blood pressure is higher than normal for your age, you have a higher risk of having a stroke or a heart attack.

Lots of drugs can be used to keep blood pressure within the normal range, and they all work in slightly different ways.

Because having high blood pressure puts you at greater risk of having a stroke, doctors thought that if someone with a stroke had raised blood pressure they should try to bring it down.

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The main groups of medicines used to reduce high blood pressure (and their brand names) are:

- **ACE inhibitors** : Drugs in this group include captopril (Capoten), enalapril (Innovace), lisinopril (Zestril), perindopril (Coversyl arginine), and ramipril (Tritace)
- **Beta-blockers** : Drugs in this group include atenolol (Tenormin) and timolol (Betim)
- **Calcium channel blockers** : Drugs in this group include diltiazem (Tildiem), nifedipine (Cardene), nifedipine (Adalat), and nimodipine (Nimotop)
- **Alpha-adrenoreceptor blockers** : Drugs in this group include prazosin (Hypovase), terazosin (Hytrin), and doxazosin (Cardura)
- **Angiotensin II receptor antagonists** : Drugs in this group include losartan (Cozaar), valsartan (Diovan), and candesartan (Amias).

There are other drugs that can lower blood pressure. To learn more, see our articles on [High blood pressure](#) .

How can it help?

We don't think it does help. Research so far says that taking drugs to lower blood pressure quickly, immediately after a stroke, doesn't work any better than taking a dummy (placebo) drug. This treatment doesn't seem to help people live longer, or reduce the amount of disability they have. ^[94]

How does it work?

It is not very clear what should be done about high blood pressure in the first few days after someone has had a stroke. If you have high blood pressure, you run a higher risk of bleeding in the part of the brain that has been damaged. This can make the effects of the stroke worse. So doctors thought that lowering a patient's blood pressure might be helpful.

But some doctors believe that raised blood pressure should not be lowered just after someone has had a stroke because the brain needs all the blood it can get. Reducing someone's blood pressure may mean there is less blood in areas of the brain where it's needed, and this may make any brain damage worse.

A group of experts who looked at treating strokes recommend that blood pressure in people who have just had a stroke should only be lowered when the person is at risk of extra problems from high blood pressure. ^[95]

Can it be harmful?

Some studies have found that being treated with a drug that reduces your blood pressure straight after a stroke increased the risk of dying early from a stroke, or being more disabled. ^[96] ^[97] ^[98]

But two more recent summaries of the research ([systematic reviews](#)) found that this didn't seem to be true. Blood pressure-lowering treatment, taken immediately after a stroke, doesn't seem to make much difference, good or bad. ^[94] ^[99]

How good is the research on lowering blood pressure?

There have been two summaries of the research ([systematic reviews](#)) on lowering blood pressure. The summaries looked at 48 studies. Both summaries concluded that blood pressure lowering made little difference to how well people do after they've had a stroke.

Erythropoietin

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What is it?

Surgery to remove blood that collects in the brain

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[How good is the research on surgery to remove blood that collects in the brain?](#)

This information is for people who have a haemorrhagic stroke. It tells you about surgery to remove blood that collects in the brain, a treatment used for this type of stroke. It is based on the best and most up-to-date research.

Does it work?

Yes. Some research suggests it may reduce your risk of dying or having to depend on someone else for your care after a stroke.

Doctors think that surgery is the right treatment for some people who've had a haemorrhagic stroke. So they do recommend it sometimes. But there's not much research looking at which groups of people can benefit most from surgery.

Because surgery techniques are changing and improving, recommendations about who would benefit most from surgery are likely to change.

What is it?

When an artery in your brain bursts during a haemorrhagic stroke, a pool of blood collects in your brain. This blood then clots and becomes a solid mass. Doctors call this clotted blood a **haematoma**.

To learn more about the different types of strokes, see [What is a stroke?](#)

Bleeding in your brain (a **haemorrhage**) can cut off the blood supply to another part of your brain. It can also kill brain cells directly. The clot that forms (the haematoma) can also lead to brain damage. For this reason, doctors may decide to drain the blood if they think it will reduce damage to the brain. However, they are still not certain whether this is a good idea.

Surgery is used more often to treat a brain haemorrhage in some parts of the world than others. In Germany and Japan about half of all people with a haemorrhage in the top, front part of the brain have surgery. In other parts of the world only about 3 in 100 of those people are operated on. ^[100]

In this section we look at operations that are sometimes used to treat blood clots found in two different parts of the brain.

- A **supratentorial haematoma** is the name used when a blood clot forms in the top part of the brain.
- An **infratentorial haematoma** is the name used when a blood clot forms in the lower part of the brain.

The names of the operations used to drain pools of blood are given below. Surgery to drain blood is sometimes called **evacuation**.

Craniotomy

A craniotomy is a cut made into the skull (which is also known as the cranium). This is done after a **CT scan** (a type of **x-ray**), so that doctors can check where the blood clot is. The doctors then make a hole in the skull that allows them to get near the blood clot. This hole reduces the pressure inside the brain that would otherwise build up as the pool of blood got bigger. It also allows doctors to drain the blood from the brain.

Endoscopy

An endoscope is a thin tube that has a tiny camera and a light on the end. It lets doctors see into the body without making large cuts into it. In people who have had a stroke, doctors insert the endoscope through a small cut in the skull to help them pinpoint exactly where the haematoma is. They then drain the blood off.

Stereotactic aspiration

In this operation a patient's head is put in a frame to keep it very still. An image of the brain is displayed on a computer screen. This allows doctors to insert small probes or rods through the skull to the exact place where the blood clot is. This releases the pressure on the brain and allows the clot to be removed.

Surgery for problems caused by a stroke

Sometimes a stroke can cause other problems, such as a build up of fluid in your brain. This can be treated with surgery. We haven't looked at the research on this in the same way that we have other types of surgery. But to read more, see [Ventricular shunting](#) .

How can it help?

All the research we found looked at people with a blood clot in the top part of their brain (a supratentorial haematoma). Older reviews of the research found no evidence that surgery can reduce the risk of dying from a haemorrhagic stroke. ^[101] ^[102] ^[103]

However, surgery techniques and equipment have evolved, and a more recent review found that surgery may reduce the risk of dying or having to depend on someone else for your care after a stroke. ^[100] ^[104] Endoscopic or stereotactic surgery (which only needs a small cut in the skull to get to the blood clot) might be better than craniotomy (which needs a bigger cut). ^[100] ^[104]

One study looked at whether it's better to have surgery quickly (within 24 hours) or to wait up to 72 hours to see if it's really necessary. ^[105] Having surgery earlier didn't seem to be any better than waiting. Between 63 in 100 and 64 in 100 people were still alive six months later, whether they waited for treatment or not. But, again, we need more research to know for sure.

Many doctors think that surgery is the right treatment for people with some types of stroke caused by bleeding. They may suggest surgery if both of the following are true:

- The blood clot is in the lower, back part of your brain, called the cerebellum (that is, you have an **infratentorial haematoma**)
- You're starting to lose consciousness.

But we didn't find any research on surgery for this group of people.

Doctors may also recommend surgery for people who've had bleeding between the outside of their brain and the layer of tissue around it (called a **subarachnoid haemorrhage**). They may recommend an operation to repair the blood vessel that's bleeding, or to reduce pressure in the brain.

Surgery is the usual treatment for people who get a build up of fluid in their brain (called water on the brain, or hydrocephalus). To read more, see [Ventricular shunting](#) .

How does it work?

A blood clot in your brain can be dangerous and can increase the amount of damage done by a stroke. Doctors believe that some people who are losing consciousness will improve if the haematoma is removed.

Can it be harmful?

Most studies haven't looked at how likely you are to get problems (complications) related to these surgeries. However, all operations have risks, including bleeding, infection, and problems with the **anaesthetic**. In brain surgeries, there's also the risk that brain tissue might be damaged.

How good is the research on surgery to remove blood that collects in the brain?

There is some evidence that surgery can benefit people who have had a haemorrhagic stroke. But we need more research to know which type of surgery is the best and which people would benefit the most from surgery.

We found four **systematic reviews** (where researchers examine the results of all the available studies). The first review found no clear benefit from two types of surgery (craniotomy and endoscopy) used in people with supratentorial haematomas (blood clots that form in the top part of the brain). ^[102]

By the time of the second review, more research had been done. When the results of the old studies were combined with the newer ones, surgery still didn't seem to help. But when the old studies were not included in the analysis, modern surgery seemed to be slightly more helpful. ^[101]

Two, more recent reviews, found that surgery may reduce your risk of dying or having to depend on someone else for your care after a stroke, but we still need more evidence to be sure. ^{[100] [104]}

One study looked at whether it's better to have surgery quickly (within 24 hours) or to wait up to 72 hours to see if it's really necessary. ^[105] Having surgery earlier didn't seem to be any better than waiting. Between 63 in 100 and 64 in 100 people were still alive six months later, whether they waited for treatment or not.

There are no studies looking at whether surgery helps if you have a collection of blood in the lower part of your brain (what doctors call an infratentorial haematoma). ^[22]

Drugs that stop bleeding in the brain

In this section

[Does it work?](#)

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Stroke, emergency care

This information is for people who've had a haemorrhagic stroke. It tells you about drugs to stop bleeding in the brain, a treatment that's sometimes used for this type of stroke.

Does it work?

We haven't looked at the research on drugs to stop bleeding in the brain 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?

The only drug to stop bleeding in the brain that's being studied at the moment is called recombinant activated factor VIIa (seven). The brand name is NovoSeven. Factor VII is a protein found in the blood that helps the blood to clot when you cut yourself. The word 'recombinant' means that this drug has been made in a laboratory to be exactly like the natural factor VII in your body.

NovoSeven is used to stop bleeding inside the body. If you bleed inside, the blood collects in a pool called a [haematoma](#). NovoSeven keeps this haematoma as small as possible to stop it damaging the surrounding tissue. If you have a stroke caused by a blood vessel bursting in the brain (called a [haemorrhagic stroke](#)) you may bleed for many hours. In studies doctors have used NovoSeven to try to stop this bleeding. The drug is given to people as soon as possible after doctors know for sure that they've had a haemorrhagic stroke. To diagnose what type of stroke you've had you'll usually have a brain scan. To learn more, see [How do doctors diagnose a stroke?](#)

How can it help?

There have been two studies on factor VII injections given to people who have had a haemorrhagic stroke.^[106] ^[107] The first study looked whether it was safe give people factor after a stroke.^[106] It included 48 people and the results showed factor VII was safe.^[106] This led to a bigger study that looked at the effects of factors VII.^[107]

In the second study, 399 people who had just had a stroke caused by a burst blood vessel were either given a dummy treatment (called a [placebo](#)) or one of three doses of factor VII.^[107] The injections were given within three hours of the symptoms of stroke starting. All the people in the study had a brain scan to check they had bleeding in their brain. After 24 hours they were examined again.

- The people who had factor VII were much more likely to have a smaller haematoma than the people who had the dummy treatment.
- The smallest haematomas were found in people who had the highest dose of factor VII.

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- Fewer of the patients treated with factor VII died. Three months after their strokes, nearly 3 in 10 people who took a dummy treatment had died. But less than 2 in 10 of the people who had factor VII died.
- People who had factor VII were less likely to be badly disabled after their stroke.

Can it be harmful?

People who are treated with factor VII are more likely to get blood clots in other parts of their body.^[106] ^[107] These clots can block arteries and can sometimes be serious. In the large study we looked at, 7 in 100 people treated with factor VII had a serious blood clot. About 2 in 100 of the people who had a placebo had a serious blood clot.^[107]

Treatment in a stroke unit

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[How good is the research on treatment in a stroke unit?](#)

This information is for people who have a haemorrhagic stroke. It tells you about specialist stroke units, where some people who've had a stroke are treated. It is based on the best and most up-to-date research.

Do they work?

Yes. If you're treated in a specialised stroke unit instead of an ordinary hospital ward, you have a greater chance of:

- Being alive a year later
- Leaving hospital sooner
- Being able to live at home (rather than in a nursing home) as long as 10 years later (the length of time that patients were followed in some studies).

In the UK, doctors are advised to admit all patients suspected of having a stroke to specialised stroke units.^[44]

What are they?

Specialised stroke units are services run by doctors, nurses, and other health professionals who only look after people who have had a stroke. These teams are very experienced. Stroke units may be based in a ward in a general hospital or in a special unit. They usually

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offer physiotherapy, occupational therapy, and speech and language therapy, as well as the more usual medical care.

There are three main types of stroke units:

- Acute (or intensive) stroke units admit you as soon as you get to hospital, and usually discharge you early (within about seven days)
- Rehabilitation stroke units admit you about seven days after your stroke. They focus on rehabilitation (restoring your health and getting you back to what you were able to do before the stroke)
- Combined acute and rehabilitation units admit you soon after a stroke and also provide rehabilitation care for at least a few weeks.

Some stroke units will use a care pathway. This is way of organising the services people receive to make sure they get all the treatments they should. For example, if the unit where you are being treated used a care pathway, you might be given a daily written care plan which tells you the treatments or tests you are going to have that day. You might see a physiotherapist in the morning, and have an appointment with a speech therapist in the afternoon. Writing everything down in this way can help staff make sure you get the best care. You might hear care pathways called care maps, clinical pathways, or critical pathways.

How can they help?

Being treated in a stroke unit rather than on an ordinary hospital ward increases your chance of: ^[45] ^[47]

- Being alive a year later
- Being able to look after yourself (being less disabled)
- Being able to live at home one year after your stroke
- Going home sooner.
- Being alive and living at home 10 years after your stroke.

Being monitored constantly for at least 48 hours after you are admitted to hospital may increase your chances of surviving your stroke even more, although this isn't certain. ^[48] Constant monitoring means you are attached to machines which check things such as your oxygen levels, heart rate, and temperature. Normally these things are checked every few hours, rather than all the time.

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All patients who've had a stroke seem to be helped by being treated in stroke units. It doesn't seem to matter what type of stroke you've had, how severe it was, or your age or sex.

If the stroke unit where you're treated uses a care pathway then you may be: ^[49]

- More likely to have the tests you need
- Less likely to get an infection in the tubes that carry your urine (called a **urinary tract infection**)
- Less likely to have to be admitted to hospital again after you are sent home.

But the care pathway may not change your chance of surviving and being able to care for yourself.

How do they work?

The care in stroke units is well co-ordinated and given by experts. Other things that stroke units do that may help your recovery include:

- Getting you up and moving around sooner, instead of letting you stay in bed (early mobilisation)
- Giving you intravenous saline solutions (salt solutions given as a drip) within 12 hours of your arrival in the hospital to stop you getting dehydrated and developing low blood pressure
- Checking on you to make sure that you don't have a fever and treating it if you do. A raised temperature has been shown to slow down recovery.

Can they be harmful?

There's no evidence that being treated in a stroke unit is harmful in any way.

How good is the research on treatment in a stroke unit?

There is strong evidence that specialised stroke units are helpful for people who have had a stroke. A big summary of the research (a **systematic review**) found that: ^[47]

- People who were treated in a stroke unit were more likely to be alive, independent, and living at home one year later
- And after five years and 10 years, people treated in stroke units were more likely to live at home and be less disabled. ^[47]

Another systematic review found that any type of specialist stroke care worked better than non-specialist care. ^[50]

Further informations:

Risk factors for stroke

There are many things that can increase your chance of having a stroke. Doctors call them risk factors. Some are things that you can't change.

Yourself

The older you are, the more likely you are to have a stroke. In one study, the average age of people who had a stroke was 72. ^[3] After the age of 55, your risk of having a stroke doubles every 10 years.

Men are slightly more likely than women to have a stroke (about seven men have a stroke for every six women), although women are more likely to die from a stroke (six women die of a stroke for every four men).

Up to the age of 85, black men and women are two or three times more likely to have a stroke than white men and women. After that age, their risk drops below that of white men and women. ^[4] People of South Asian origin also have an increased risk of stroke. ^[5] These differences are due to genes and lifestyle.

If either of your parents has had a stroke, your risk of having one is increased. The reasons for this aren't clear, but they may have to do with similarities in your lifestyle or the genes you have inherited. ^[2]

A previous stroke

If you've already had a stroke, your chance of having another is higher. The risk of having another stroke is shown in the table below. ^[2]

| Time since your stroke | Risk of having another stroke |
|------------------------|-------------------------------------------------------------------------------------|
| One month | 3% (About 3 people in 100 will have another stroke one month after their first one) |
| 16 months | 5% to 14% |
| 20 months | 13% |
| 2 years | 6% to 14% |
| 5 years | 30% |
| 15 years | 27% |
| 23 years | 32% |

Other conditions

High blood pressure

Your blood pressure is a measurement of how much force your blood puts on the walls of your blood vessels. 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 (120/80 mm Hg, for example). The first, higher number is called the systolic pressure, and the second, lower number is the diastolic pressure. Systolic pressure is when your heart is pumping blood around your body. Diastolic pressure is when your heart is relaxing between beats. You'll hear the numbers described like this: "one-hundred-and-twenty over eighty".

Normal blood pressure varies with age, but **high blood pressure** (hypertension) is an important risk factor for strokes. The higher your blood pressure, the higher your risk of having a stroke. But most people with high blood pressure don't know they have it.

About 40 percent of strokes are linked to high blood pressure. Normal systolic blood pressure is about 120 mm Hg, but blood pressure that is linked with strokes is usually over 140 mm Hg.^[6] People with high blood pressure higher than 120/80 mm Hg are twice as likely to get a stroke as people with lower blood pressure.^[7]

High blood pressure damages the blood vessels and causes hardening of the arteries (atherosclerosis). When this happens, fatty deposits build up in your blood vessels and provide the right conditions for clots to form. This makes an [ischaemic stroke](#) more likely.

Lowering your blood pressure (usually with tablets) can lower your chance of having a stroke.

To learn more, see our information on [high blood pressure](#) .

Heart disease

Some types of heart disease can increase your chance of having a stroke. These include:

- Atrial fibrillation
- Heart failure
- A recent heart attack
- Some types of problems with the heart valves.

If you have atrial fibrillation, your heart beats irregularly because of a problem with the electrical signals in your heart. Atrial fibrillation can cause symptoms such as palpitations (when you feel your heart beating more strongly than usual) or shortness of breath, but people often don't know that they have atrial fibrillation.

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If your heart isn't beating regularly, blood isn't pumped out of your heart as well as it should be. So some of the blood may stay in your heart and form small clots. These clots can travel to your brain and cause a stroke.

If you have atrial fibrillation, your chance of having a stroke is 4 percent to 6 percent higher. Many people who have atrial fibrillation are treated with a drug called warfarin (brand name Coumadin). This helps stop blood clots forming.

High cholesterol

Cholesterol is a fatty substance found in your body. If you have high levels of a type of cholesterol called LDL cholesterol ('bad' cholesterol), you're more likely to have a stroke or a heart attack.

Large amounts of LDL cholesterol can cause hardening of the arteries (a condition called atherosclerosis). Your blood vessels may become clogged with fats, making it more difficult for blood to get through. If blood vessels in your brain become blocked, you may have a stroke.

Reducing your levels of LDL cholesterol, usually with drug treatment, lowers your risk of having a stroke by about one-third. ^[8]

High levels of other fatty substances called triglycerides can also increase your risk of having a stroke.

To read more, see our information on [High cholesterol](#).

Diabetes

If you have diabetes, your body doesn't control the level of sugar in your blood properly. Diabetes makes you two or three times more likely to have a stroke.

This is because people with diabetes are more likely to have hardening of the arteries (atherosclerosis), which can cause a stroke and high blood pressure.

To learn more, see our information on [type 1](#) and [type 2](#) diabetes.

Obesity

If you are very overweight (obese) you are more likely to have high blood pressure, high cholesterol and diabetes. All of these are risk factors for a stroke.

Even being a little bit overweight increases your chance of having a stroke, especially if you carry the extra weight around your stomach rather than on your hips and thighs. We don't know why the place your extra weight is carried makes a difference.

To learn more, see our information on [obesity](#).

Lifestyle

Smoking

People who smoke are one-and-a-half times more likely to have a stroke. ^[2]

Smoking damages the delicate lining of your blood vessels, making your arteries harder and causing them to clog up.

Stopping smoking really helps. Smokers who stop for five years are no more likely to have a stroke than people who have never smoked. ^[7]

Staying active

If you stay active, your chance of having a stroke is reduced, probably because physical activity helps control blood pressure, keeps your weight down and helps keep your levels of 'bad' (LDL) cholesterol down.

Exercising also helps keep your heart in good shape so that it's able to pump more blood around your body and cope with any extra stress put on it.

Diet

Eating lots of salt increases the risk of having a stroke because it increases your blood pressure. But eating a balanced diet rich in fruit and vegetables and low in saturated fats reduces your blood pressure. Saturated fats are found in dairy products and meat. Eating less fat helps bring down the amount of cholesterol and other fatty substances called triglycerides in your blood.

Alcohol

Drinking a moderate amount of alcohol (a small glass of wine, or a half or a pint of beer a day, and not drinking extra at weekends) can help protect you against having a stroke.

But people who drink more than 30 units of alcohol a week are four times more likely to have a stroke than moderate drinkers. ^[9] (A unit is one small glass of wine, a half pint of beer or one measure of a spirit.) Too much alcohol can raise your blood pressure and increase the risk of a haemorrhagic stroke.

Drugs

People who take cocaine, amphetamines (speed), cannabis, ecstasy or heroin are more likely to have a stroke than those who don't. Some of this risk is probably because of the effect these drugs can have on your blood pressure. And some drugs damage your blood vessels.

Medicines

Oral contraceptives (the pill)

Older types of pill (with more than 50 micrograms of oestradiol, a form of the hormone oestrogen) were linked with a small increase in the risk of having a stroke.^{[4] [2]} This may be because the pill can raise your blood pressure and make your blood more likely to clot.

Newer, low-dose oral contraceptives (that contain less than 50 micrograms of oestradiol) are much safer.^{[4] [2]}

If you smoke and take the pill or if you have diabetes and take the pill, you may have an increased risk of having a stroke. But this risk is very small. When you stop taking the pill this increase in risk disappears.^[10]

Hormone replacement therapy (HRT)

Before they go through the menopause, women are less likely to have a stroke than men. Women's natural sex hormones (called oestrogen and progesterone) are thought to protect them from strokes and other conditions that affect the circulation.

But after the menopause (when the amount of these hormones in women's bodies falls), a woman's chance of having a stroke increases.

- Doctors used to think that taking HRT would protect women from strokes because it gives women back some of the hormones they stop making after the menopause. But this doesn't seem to be the case. In fact the opposite is true.
- A large review of the research looked at the results of more than 28 studies that involved nearly 40,000 women who took HRT.^[11] It found that women who took HRT were more likely to have a stroke than those not taking HRT. Researchers followed women for between six months and seven years. The risk of a stroke was about 2 in 100 for women not taking HRT and about 3 in 100 for women who took it.
- HRT increased the risk of type of stroke caused when a blood clot stops blood reaching your brain (called an ischaemic stroke).
- After having a stroke women who were taking HRT didn't recover as much as women who weren't taking HRT.^[11]

How to reduce your risk of a stroke

Every year, about 150,000 people in the UK have a stroke.^[12] ^[13] But the good news is that there are many things you can do to reduce your risk of having a stroke, even if you've had one before.

Here's a checklist of things you can do to help yourself.^[2] ^[14] ^[10] These guidelines are especially important if members of your family have had a stroke, because this can increase your risk of having one.

Have regular blood pressure checks

Get your **blood pressure** checked regularly, especially as you get older. Keeping an eye on your blood pressure, and making sure you take any medicine your doctor has prescribed for it, reduces your risk of having a stroke.

High blood pressure damages blood vessels and makes them harder and more prone to a condition called **atherosclerosis** (hardening of the arteries). When you have atherosclerosis, fatty deposits build up in your blood vessels, providing the right conditions for clots to develop and for an ischaemic stroke (a stroke caused when a blood clot stops blood from reaching your brain).

To learn more, see our information on [high blood pressure](#) .

Don't smoke

Smoking damages your blood vessels and makes a stroke more likely. If you do smoke, ask your doctor or pharmacist for advice about stopping smoking.

If you take the contraceptive pill, it is especially important that you do not smoke, because this combination can push up your risk of a stroke by increasing your blood pressure and making your blood more likely to clot.

Watch your cholesterol levels

Cholesterol and triglycerides are fatty substances found in your blood. High levels of these fats greatly increase your risk of having an **ischaemic stroke** because the extra fat builds up in your blood vessels, making it easier for clots to form.

If you can reduce your lipid levels, even if they are normal, you can reduce your risk of having a stroke by a third. This can be done by changing your diet. If you have high levels of a type of cholesterol called LDL or 'bad' cholesterol, you may need to take cholesterol-lowering medicines prescribed by your doctor.

To learn more, see our information on [high cholesterol](#) .

Watch your weight

Being overweight can push your blood pressure up. Try to keep your weight within the range that's recommended for your height. To find out if you are overweight, you have to work out your body mass index (BMI). If you are a healthy weight, your BMI should be between 18 and 25. You can use our [calculator](#) to work out your BMI.

Keep active

Physical activity can help lower blood pressure and cholesterol. Both are risk factors for a stroke. Being active helps by making your heart stronger and fitter. Don't forget that your heart is a muscle; when it's in good shape it can pump more blood around your body with each beat and cope with any extra stress. The government advises adults to do physical activity that makes them warm and slightly out of breath for at least 30 minutes on most days of the week. Brisk walking is one of the most convenient ways of keeping active, but swimming or dancing are also good.

Watch what you eat

A diet that is low in fat and contains five portions of fruit and vegetables per day can help keep harmful cholesterol under control.

Drink only moderate amounts of alcohol

It's OK to drink one to two units of alcohol a day. Doing so may help your heart. A unit is half a pint of ordinary strength beer or a single shot (25 millilitres) of a spirit, such as whisky or gin; a small glass (125 millilitres) of wine is about one and a half units. Bear in mind that different beers and wines have different strengths of alcohol.

You should avoid heavy drinking as this can push up blood pressure and lead to hardening of the arteries. The Stroke Association suggests that drinking five or more units a day doubles the risk of stroke. ^[15]

Ischaemic stroke

- An ischaemic stroke happens when one of the blood vessels supplying your brain with blood gets blocked, usually by a blood clot.
- Blood vessels can also be blocked by a condition called **atherosclerosis**. This happens when fatty substances build up on the inside walls of your blood vessels and make them narrow and hard.
- Sticky cells in the blood (called **platelets**) help clots to form. Blood clots normally form when you cut yourself to stop you losing too much blood.

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- But sometimes a blood clot forms inside a blood vessel when you haven't cut yourself. This usually happens when the inside wall of the blood vessel has been damaged. A clot inside a blood vessel can interrupt the flow of blood and cause serious problems.
- Platelets also release chemicals into the blood that make the blood vessels narrower.

Platelets can be triggered into action by a number of things.^[17] These include:

- Smoking
- Diabetes
- High blood pressure
- High levels of fats called lipids in your blood, such as cholesterol and triglycerides.

Two types of blood clots can lead to an ischaemic stroke.

- Sometimes a clot forms on the inside wall of a blood vessel, then breaks away and is carried around in your blood. This is called an **embolus**. These clots often come from the large blood vessels in your neck. They travel through the bloodstream, eventually getting stuck in an artery in your brain. A stroke caused by an embolus is called an **embolic stroke**.
- A clot that stays connected to the blood vessel wall is called a **thrombus**. If this type of clot gets so big that it stops blood flowing through to the brain, it can cause a **thrombotic stroke**.

Strokes can be large or small, depending on where in your brain the blockage is. A blockage in a big artery usually affects more of your brain than a blockage in a smaller one.

Haemorrhagic stroke

When an artery in your brain bursts, blood leaks out into the brain itself. This is called an intracerebral haemorrhage. It is most often caused by high blood pressure .

There are several ways this kind of stroke can cause brain damage. The bleeding into the brain can kill brain cells. The blood vessel that has burst can start to spasm, cutting off the blood supply. A large amount of bleeding can cause swelling in the brain. Bleeding can also block other blood vessels that would usually supply the brain with blood.

Transient ischaemic attack (TIA)

A transient ischaemic attack (TIA for short) is sometimes called a mini-stroke. It happens when a blood clot temporarily blocks a vessel leading to your brain. But the clot moves away, so your brain doesn't get starved of oxygen for long. This means your brain doesn't get permanently damaged, and the symptoms go away.

Because the symptoms go away, some people don't take a TIA seriously. But having a TIA is a warning sign that you might have a stroke in the next few days or weeks. In people who have a TIA, 1 in 10 go on to have a stroke in the next week. ^[18]

The symptoms of a TIA are the same as those of a stroke. If you get these symptoms, it's important to get medical help straight away. Treat it as a medical emergency.

Research shows that having treatment for a TIA quickly, within a day of having symptoms, cuts your chances of having a full stroke within the next three months from 10 in 100 with normal treatment, to 2 in 100 for people who are treated quickly. ^[18]

Treatments for a TIA include high-dose aspirin and clot-dissolving drugs.

Possible health problems after a stroke

Deep vein thrombosis and pulmonary embolism

Deep vein thrombosis (DVT) is a condition where a blood clot forms inside one of the veins deep in your body, usually in your legs.

If you've had a stroke, you're at risk of getting a blood clot in a vein. This is because a stroke can make it harder for you to move about. If you get deep vein thrombosis in your leg, it may feel swollen and painful. But you don't usually get symptoms, and it can be hard to know if you have it. Deep vein thrombosis is not usually dangerous, but it can make it more difficult for you to recover.

If a piece of the blood clot breaks away, it can travel around your body. If it gets stuck in a blood vessel that supplies your lungs, it is called a pulmonary embolism. A pulmonary embolism is serious and can kill you if it is not found and treated quickly.

Studies suggest that about 5 in 100 people who've had a stroke get a deep vein thrombosis that causes symptoms, but another 45 in 100 may have one without knowing it. ^[22]

No one knows how many people get a pulmonary embolism after a stroke. Studies estimate that this condition affects between 1 in 100 and 40 in 100 patients who have had a stroke. ^[33] ^[34] A pulmonary embolism may be a cause of death in about half the people who die of a stroke.

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If you have good hospital treatment straight after your stroke, it reduces your risk of getting deep vein thrombosis. You will be encouraged to drink plenty of fluid and to get up and move around as soon as you can. You may also be told to wear compression stockings (elasticated stockings or socks that apply pressure to your legs), which prevent blood collecting in your legs. Drugs that thin the blood and reduce the risk of clots forming (such as aspirin or anticoagulant drugs) may also be used.

Pneumonia

About 7 in 100 people who have a stroke get pneumonia in the days afterwards.^[35] Your chance of getting pneumonia is linked to your ability to swallow. If you can't swallow properly, you're at risk of breathing in bits of food. Instead of the food going into your stomach, it gets stuck in the tubes in your lungs. These tubes can swell up and give you problems breathing. This is called **aspiration pneumonia**. If you get pneumonia, you may be given oxygen to help you breathe.

If you have problems swallowing, you are not usually allowed to eat. This is to stop you getting pneumonia. If you continue to have difficulty swallowing, you may be given liquid food through a tube that is passed into your nose and down your throat into the stomach. Alternatively, a tube can be passed through the skin of your abdomen and directly into your stomach.

Pain

You may have pain anywhere in your body in the days after a stroke. About a third of people do, probably because the part of the brain that receives pain signals isn't working properly.^[22] You can often be treated with painkillers, although if you're one of a small number of people (about 8 in 100) who has a severe burning pain that's made worse by cold, movement, and touch, standard painkillers probably won't work. You may need to see a specialist who will recommend other treatments.

Painful shoulder

Having a painful shoulder is common in people who've had a stroke. Between 2 in 10 and 6 in 10 people say they have a painful shoulder.^[22] The exact reason for this is unclear, although it may be caused by the weight of a weak arm pulling on the shoulder joint.

Shoulder pain can last for months or years, and can delay recovery and make you miserable. Many different treatments are available, including slings to support the arm, bandages, and painkilling injections.

Urinary tract infection

About 1 in 6 people who have a stroke get an infection in the tubes carrying urine from the bladder, which can be uncomfortable and sore.^[36] Treatment with antibiotics is usually needed to clear up the infection.

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You are most at risk of getting an infection if you aren't able to control when you urinate (this is called being **incontinent**). A narrow tube (called a catheter) may be passed into your bladder to drain your urine into a bag. The catheter makes it easier for bacteria to get into your urinary tract, and this can lead to an infection.

Epileptic seizures

A small number of people who have a stroke (about 1 in 20) will have an epileptic seizure in the first two weeks afterwards, usually within 24 hours. A year after a stroke, the chance of having a seizure drops to 1 in 100 to 2 in 100, but this is still about 20 times higher than people who haven't had a stroke. Seizures happen because the normal electrical activity in your brain is disrupted by the stroke. It may be that signals can't get through because some of the brain cells have died. Seizures are more common when the stroke is a **haemorrhagic stroke** (caused by blood seeping into the brain) rather than an **ischaemic stroke** (caused by blockage in a blood vessel).^[22] About half the people who have a seizure after a stroke will have another one and may need treatment with drugs.

Pressure ulcers

Pressure ulcers are wounds on the skin that you get when you are in the same position for a long time. The pressure on the skin from the weight of the body reduces blood flow to vulnerable areas where the bones stick out (for example, around the hips, shoulders, heels, spine, and bottom). Because there is no blood flowing to the area, the tissue dies, creating an open sore or pressure ulcer.

About 3 in 100 people who have a stroke get pressure ulcers.^[37] They are more likely to happen if you are incontinent, because wet skin increases the risk of pressure ulcers. You're also at risk of getting pressure ulcers if you're not eating properly or if you have another infection. Because they can take a long time to heal, pressure ulcers can slow down your recovery. To reduce the risk of getting pressure ulcers, nurses will regularly turn people who can't move themselves. There are also special cushions and mattresses that may help.

Ventricular shunting

A stroke can sometimes cause a problem where the natural gaps (ventricles) in your brain fill with fluid. Doctors call this condition **hydrocephalus**. It's sometimes called water on the brain.

The build up of fluid is dangerous because it puts extra pressure on the brain. This can damage brain cells.^[43] Water on the brain usually happens in the first few days after a stroke, but can also happen many years later.

The fluid that builds up isn't actually water. It's a type of fluid called **cerebrospinal fluid**, which surrounds the brain and the spinal cord. The job of this fluid is to cushion the brain and to stop it crashing into the skull when the head is bumped. It circulates through the

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ventricles, around the brain and spinal cord, and is eventually taken back into the bloodstream and replaced with new fluid.

If the circulation of the cerebrospinal fluid is blocked, it starts to build up. This can happen during a haemorrhagic stroke if a pool of blood builds up and presses against the channels that the fluid travels through. The build-up creates extra pressure in the brain and is the reason you're likely to get a headache if you have a haemorrhagic stroke.

To release the pressure, doctors can carry out an operation called **ventricular shunting**. This involves putting a narrow, flexible tube (a shunt) into your brain to help drain the fluid away. The other end of the shunt is passed under your skin, around your back and into your abdomen, where the extra fluid can be collected by your bloodstream again. There's a valve in the shunt that opens up to allow fluid to escape whenever pressure rises in your brain.

Glossary:

blood clot

A blood clot forms when the cells in blood clump together. Sometimes this happens to stop you from bleeding if you've had an injury. But it can also happen on the inside of your blood vessels, even when you haven't had an injury. A blood clot inside a blood vessel is called a thrombus.

carotid arteries

Carotid arteries are large blood vessels that carry blood from the heart to the front of the brain. The carotid arteries travel through the neck on the way to your head. You can feel the pulse in your carotids if you press the tips of your fingers in the space under your jawbone and back towards your ears, but don't press too hard because you might faint.

vertebral arteries

The vertebral arteries are blood vessels that carry blood to the bottom of your brain and the back of your brain. The vertebral arteries travel deep inside your neck and along the front of your brainstem.

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'.

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.

atrial fibrillation

Atrial fibrillation happens when your heart beats in an uneven or irregular way. Normally the beating of your heart is controlled by electrical signals. The signals make the upper parts of your heart (the atria) squeeze blood into the lower parts, which then squeeze blood out into your blood vessels. If you have atrial fibrillation, the electrical signal doesn't work well, so the upper parts of your heart don't beat at the right time.

heart failure

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

cholesterol

Cholesterol is a fat-like substance made by your liver or absorbed from food. It is used by your body to make bile acids (which help your intestines absorb nutrients) and steroid hormones (like testosterone or oestrogen). Cholesterol is also an important part of cell membranes, which are the structures that surround cells. 'Good cholesterol' is called HDL; 'bad cholesterol' is LDL.

triglycerides

Triglycerides are the form in which fat is stored in your body. Triglycerides are made from the fat found in food. They can be used by your body for energy.

diabetes

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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).

saturated fats

Fat is one of the three nutrients (along with protein and carbohydrate) that supply calories to your body. Fats that we eat can be saturated or unsaturated. Eating too much saturated fat is one of the major risk factors (things that make you likely to get it) of heart disease because it increases the amount of cholesterol in your blood.

oestrogen

Oestrogen is the name given to three female sex hormones: oestradiol, oestrone and oestriol. Oestrogen causes women's sexual development during puberty: it is needed to develop breasts, have periods and get pregnant. Oestrogen is also thought to affect women's health in other ways. It may influence their mood, cholesterol levels and how their bones grow. Men have very low levels of oestrogen in their bodies, but doctors aren't completely sure what it does. Oestrogen is an important ingredient in most types of contraceptive pill and hormone replacement therapy.

progesterone

Progesterone is a hormone that plays a part in a woman's menstrual cycle and in pregnancy. A form of this hormone made in the laboratory, called progestogen, is often added to contraceptive pills and hormone replacement therapy (HRT).

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.

ischaemic stroke

An ischaemic stroke happens when a blood vessel is blocked and suddenly stops blood from getting to part of your brain. If this happens, brain cells get damaged because they don't get enough oxygen and nutrients. About 8 in 10 strokes are ischaemic.

CT scan

A CT scan is a type of X-ray. It takes several detailed pictures of the inside of your body from different angles. CT stands for computed tomography. It is also called a CAT scan (computed axial tomography).

MRI scan

A magnetic resonance imaging (MRI) machine uses a magnetic field to create detailed pictures of the inside 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.

physiotherapist

A physiotherapist is a health professional who is trained to use physical activity and exercises to help people's bodies heal.

hemiplegia

Hemiplegia is paralysis that occurs on one side of the body. This means that a person can't move their arm and leg on one side. If a person has a stroke, hemiplegia can happen in the arm and leg on the other side of their body, but this doesn't always occur. For example, if a person had a stroke in a particular part of the right side of their brain, the body is wired in such a way that they may have hemiplegia on the left side of their body.

antidepressant

Antidepressants are medicines used to treat depression and sometimes other conditions. They work by changing the levels of chemicals in your brain called neurotransmitters. There are three main types of antidepressants, which work in different ways: selective serotonin reuptake inhibitors (SSRIs), monoamine oxidase inhibitors (MAOIs) and tricyclic antidepressants (TCAs).

counsellor

A counsellor is a professional who is trained to help people, usually with the emotional part of their illness. Counsellors talk to people about their illness. They also suggest ways that people can make changes for the better.

deep vein thrombosis

A deep vein thrombosis is a blood clot that has formed in the deep veins of your arms or legs. These clots can form if a person doesn't move their limbs often enough. This is because blood is pushed through your veins by the contraction of muscles that occurs when a limb is moved. Blood tends to clot when it is not kept flowing, so clots can form if a person is not moving. Deep vein thrombosis is also called deep venous thrombosis or DVT.

pulmonary embolism

A pulmonary embolism can give you chest pain, make you feel breathless and uncomfortable or make you breathe rapidly. A pulmonary embolism is dangerous and can kill you if it is not treated.

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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.

urinary tract infection

A urinary tract infection (UTI) happens when bacteria invade the walls of your urinary tract, which includes your kidneys, bladder and urethra. An uncomplicated UTI is one that involves your bladder and urethra, but not your kidneys. A complicated UTI involves your kidneys and can be harder to treat. Doctors may refer to a kidney infection as pyelonephritis.

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.

vasoconstriction

Vasoconstriction is when a blood vessel gets narrower, changing the amount of blood that can flow through it. Vasoconstriction can be caused by a number of different chemicals released by cells in your body. Vasoconstriction is part of the normal way that your body regulates blood flow, but it can also play a part in the development of certain diseases.

haemorrhage

Haemorrhage is a word doctors use for bleeding. Any time blood escapes from a vessel, it's called a haemorrhage.

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.

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.

calcium channel blockers

These drugs are used to reduce blood pressure. Some of them can slow down your heart rate. When calcium flows into the muscle cells of your heart and the tiny muscles in the walls of blood vessels, it makes these cells contract. Calcium channel blockers stop calcium from going into these cells, so they contract less. If the muscle cells in your heart contract less, your heart rate can slow down. If the muscle cells in the walls of blood vessels contract less, the space within the vessels remains wider and more blood can pass through more easily. So, your blood pressure goes down.

glutamate

Glutamate is a molecule that helps send messages between nerve cells (neurones). Nerve cells communicate with each other by releasing molecules (like glutamate) called neurotransmitters. These molecules attach to other cells and cause changes in these cells that make it more or less likely that a signal is passed on. Glutamate is an important part of normal brain activity, but too much glutamate can damage cells.

ACE inhibitors

ACE inhibitors are drugs used mainly to lower blood pressure and reduce strain on your heart. ACE stands for 'angiotensin converting enzyme'. Angiotensin is a chemical that can make your blood vessels narrower. ACE inhibitors stop this happening, which helps to lower your blood pressure.

Beta-blockers

These drugs work by blocking the effects of certain chemicals produced by your body (such as adrenaline). Beta-blockers slow your heart rate and improve the beating of your heart. They are often used in people with angina or heart failure.

alpha-adrenoreceptor blockers

These drugs are used to lower blood pressure. When you take them they block places (called alpha-1 receptors) in the muscle cells of blood vessel walls. This makes the blood vessels wider so that more blood can pass through. This makes your blood pressure go down.

angiotensin II receptor antagonists

This class of drugs works similarly to ACE inhibitors to reduce blood pressure and strain on your heart. Angiotensin II receptor antagonists, also called angiotensin receptor blockers (ARBs), work by blocking the formation of angiotensin II, a substance that makes blood vessels narrower. Stopping it from being made helps to lower blood pressure.

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haematoma

A haematoma is a collection of blood in any part of your body. The blood has usually clotted or dried.

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.

anaesthetic

An anaesthetic is a chemical that blocks the ability to feel sensations like pain or heat. A local anaesthetic blocks the feeling in a specific area of the body. For example, your dentist uses a local anaesthetic like lignocaine in your gums so that you don't feel the pain of having a cavity filled. A general anaesthetic makes you completely unconscious and is usually used only in a carefully controlled environment like an operating room.

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