

Ischaemic stroke

Most strokes happen because of a blockage in an artery leading to the brain. This is called an ischaemic stroke. This guide explains some of the causes of ischaemic stroke, as well as how it is diagnosed and treated.

What is an ischaemic stroke?

An ischaemic stroke happens when a blockage cuts off the blood supply to the brain. You may also hear it referred to as a clot.

Around 85% of strokes are ischaemic. About 15% of strokes are due to bleeding in or around the brain, known as haemorrhagic stroke.

In ischaemic stroke, the blockage can be caused by a blood clot forming in an artery leading to the brain, or within one of the small vessels deep inside the brain.

What is a stroke?

A stroke is a brain attack. It happens when the blood supply to part of your brain is cut off, killing brain cells. Damage to brain cells can affect how the body works. It can also change how someone thinks and feels.

A transient ischaemic attack (TIA or mini-stroke), is the same as a stroke but the symptoms only last for a short amount of time. It is a major warning sign of a stroke and should always be taken seriously. For more information about the signs of stroke

and TIA turn to 'Spotting the signs of stroke' near the end of this guide.

What causes an ischaemic stroke?

There are a number of reasons why blockages can form and cause an ischaemic stroke.

Atherosclerosis

Atherosclerosis occurs when fatty deposits build up on the inside walls of your arteries. These deposits are called plaques or atheromas.

They cause your arteries to become harder and narrower, making them more likely to become blocked. The narrowing of your arteries is called stenosis.

Our arteries naturally become thicker and less flexible as we get older, but atherosclerosis can speed this process up.

Lifestyle factors like smoking, lack of exercise and eating unhealthy food, as well as certain medical conditions, such as high blood pressure, high cholesterol or diabetes, can lead to atherosclerosis.

Ischaemic stroke

Atheromas can build up in any artery, especially the ones in your neck leading to your brain. As well as narrowing the artery, making it harder for blood to pass through it, the fatty deposits can break down or become inflamed. When this happens a blood clot forms around the atheroma, which can block the artery. It may break off and move through the bloodstream, causing a blockage to an artery in the brain.

Small vessel disease

Small vessel disease damages the tiny blood vessels deep inside the brain. This reduces blood flow, which means brain cells are not getting the oxygen and nutrients they need. A brain scan might show small scars in the white matter, which can be linked with thinking and mobility problems.

Small vessel disease can cause a stroke, or several very small strokes. Over time, small vessel disease can lead to a type of dementia called vascular dementia. High blood pressure is a major risk factor for small vessel disease.

Heart conditions

Atrial fibrillation

Some conditions can cause blood clots to form in your heart, which can then move through your bloodstream up into your brain. This is called an embolism.

The most common condition to cause this is atrial fibrillation or AF (a type of irregular heartbeat). Some people with atrial fibrillation can feel their heart beating irregularly, but many cannot. AF can come and go at intervals. A GP can check for AF, and refer you for tests if AF is suspected.

Other heart conditions, such as a recent heart attack or a mechanical heart valve, can cause embolisms too.

Patent foramen ovale (PFO)

'Foramen ovale' is the name of the hole between the right and left side of the heart of a baby in the womb. This hole normally closes after birth, but in as many as one in four people it remains open or 'patent'. A PFO is sometimes referred to as a 'hole in the heart'.

Having a PFO can be a risk for stroke, if a blood clot forms in the heart and passes from one side of the heart to the other and up to the brain.

In children, surgery can be used to close the PFO. If an adult has a stroke and a PFO is thought to be the most likely cause, treatment options include blood thinning medication to reduce the risk of clots, or surgery to close the PFO. Your doctor will talk to you about the best treatment for you.

Arterial dissection

Sometimes tears in the lining of an artery can develop and allow blood to get between the layers in your artery walls. This is called arterial dissection. It can happen for no clear reason or it can be the result of an injury.

As blood builds up a clot can form. If this clot restricts the flow of blood to your brain, or moves up into your brain, it can cause a stroke.

How is an ischaemic stroke diagnosed and treated?

Diagnosis

If someone has any signs of a stroke, it's time to call **999** immediately. Turn to page 9 for information about the signs of stroke.

Ambulance paramedics are trained in stroke, and will assess the person and take them to the right type of hospital for the treatment they need.

This could be a hospital with a specialist stroke unit or a hyper-acute stroke unit. A stroke unit has an inter-disciplinary team of trained professionals who are experienced in stroke care.

The quicker your stroke is diagnosed and treated, the better your chances of recovery. Once you're admitted to hospital, you will have tests and checks to confirm if you have had a stroke, and what type of stroke it is.

Brain scan

If you have a suspected stroke, you should receive a brain scan, within one hour if possible. A brain scan can help doctors decide on the right treatment for you if are:

- Eligible for an urgent clot-busting alteplase injection (thrombolysis).
- Eligible for mechanical clot removal (thrombectomy).
- Taking blood-thinning medication.
- Thought to have bleeding in or around your brain.

You will either have a computed tomography (CT) scan or a magnetic resonance imaging (MRI) scan. Both of these produce pictures of your brain and will help doctors to rule out other causes of your symptoms and see how much of your brain has been affected. It will also help them decide how best to treat you, as treatments are different depending on the cause of your stroke.

Sometimes these scans will involve an injection to highlight the arteries of the neck and brain more clearly, known as computed tomography angiography (CTA) or magnetic resonance angiography (MRA).

Other checks and tests

Your blood pressure is checked, and you will have blood tests for health conditions linked to stroke, such as diabetes and high cholesterol.

You may have other tests to check for conditions that could have contributed to your stroke. These include an electrocardiogram (ECG), which checks for an irregular heartbeat, or a Doppler ultrasound scan to check for narrowing of the arteries in your neck.

Treatment

Thrombolysis

Around 12% of people with an ischaemic stroke are eligible for clot-busting treatment, known as thrombolysis.

Thrombolysis uses medication to break up a clot that is blocking the blood supply to your brain. It needs to be given within four and a half hours of stroke symptoms starting. In some circumstances your doctor may decide that it could still be of benefit beyond four and a half hours.

Who can have thrombolysis?

Not everyone who has an ischaemic stroke is suitable for thrombolysis. A scan can tell doctors if you had an ischaemic stroke, and they then assess whether thrombolysis is possible for you.

If you are not suitable, it may be because:

- Your stroke was not caused by a clot.
- You do not know or cannot tell doctors when your symptoms began.
- You do not reach hospital within the time limits for receiving thrombolysis (within three hours but can be up to four and a half hours for some individuals).
- You have a bleeding disorder.
- You have recently had brain surgery.
- You have had another stroke or head injury within the past three months.
- Your current medication is not compatible with alteplase.

If you are suitable for thrombolysis, your medical team will explain the treatment to you. You do not have to sign any paperwork – a verbal agreement is enough. If you are unable to give your consent, either because of the effects of your stroke or

another reason, the medical team will seek permission from your next of kin or another family member.

Time is critical so if it isn't immediately possible to talk to your family, the medical staff will make the decision based on what they feel is in your best interests.

Thrombolysis uses a drug called alteplase, or recombinant tissue plasminogen activator (rt-PA). You are given alteplase through a small tube into a vein in your arm. During this procedure, which takes around one hour, the medical team will closely monitor your blood pressure, body temperature, breathing and blood sugar levels to ensure that they remain stable.

Risks and benefits

After thrombolysis, 10% more patients recover with no significant disability. Despite its benefits, there is a risk that thrombolysis can cause bleeding in the brain. Within seven days of having thrombolysis, about one in 25 people treated will have bleeding in the brain, and this can be fatal in about one in 40 cases.

Doctors carefully balance the risk to the patient against the potential benefit of the treatment. So someone may not be eligible for thrombolysis if they have conditions like internal bleeding or head injury, an aneurysm or uncontrolled high blood pressure.

Thrombectomy

Thrombectomy involves extracting the blood clot using a clot retrieval device. This is done by inserting a mesh device into an artery in your groin, moving it up to your brain, and pulling the blood clot out.

This process can be used for strokes where the blood clot is in a large artery, in roughly 10% of people with ischaemic stroke. It is usually carried out as soon as possible after the stroke and within six hours at the latest. However it can be done up to 24 hours after the stroke, if doctors think it will benefit the person.

Thrombectomy is a relatively new procedure, and is gradually becoming more available in stroke units across the UK.

What happens if the clot is not treated?

If left untreated, the blood clot will usually break up naturally within a few days or weeks. You will have treatment to reduce your risk of another stroke, such as medications to prevent clots forming and reduce blood pressure. If you are being looked after on a specialist stroke unit, the expert care you will receive can support your recovery.

Surgery

In a very small number of cases an operation may be needed to relieve pressure on your brain. When the brain is injured the tissues can swell, just like a bruise. If there is a lot of swelling, there is a danger that it will put increased pressure onto other areas of your brain, causing further damage. If this is the case you will need a procedure called a decompressive hemicraniectomy. This involves opening up a section of your skull to allow the brain to swell outwards and relieve some of the pressure. This can only be carried out in neurosurgery centres so

people often have to move hospital for this treatment.

Preventing another clot

Most people who have an ischaemic stroke will be given anti-platelet medication, which helps to prevent clots from forming. For most people this will be a daily dose of aspirin, and doctors will advise you how long you will need to take this.

If you receive thrombolysis, you have to wait at least 24 hours before you can begin taking aspirin. If aspirin is not suitable for you, you may be given an alternative drug, such as clopidogrel.

In the longer term you will be prescribed blood thinning medication to take indefinitely. For most people this will be an anti-platelet medication, but for others such as those with atrial fibrillation, it will be an anticoagulant such as warfarin, apixaban, dabigatran, edoxaban or rivaroxaban.

The first 24 hours after a stroke

The team on the stroke unit will continue to monitor you closely for at least 24 hours to ensure you remain stable. After a stroke, you should have a swallowing test. It can be dangerous to give you fluids, food or oral medication to take if you're experiencing swallowing problems, so you won't be allowed anything to eat or drink until your ability to swallow has been checked. This should be done within four hours of you being admitted to hospital.

You may see some signs of recovery from your stroke early on, but if you're still showing lasting effects after 24 hours, you will need to have a full assessment with

all the professionals on the stroke team. This means that according to your needs, you might be seen by a physiotherapist, speech and language therapist, occupational therapist, dietitian, orthoptist and a psychologist.

You will be supported to get up, or walk around as soon as you are able to. After 24 hours, you may be able to start moving around more or having rehabilitation therapy.

If you're not able to move about very much, the way you are positioned is very important if you are to avoid problems with breathing, chest infections (pneumonia), shoulder pain or pressure sores. The members of your stroke team should work with you to find the best position for you to sit or lie down, and help you to reposition yourself at regular intervals.

As soon as you are well enough, your doctor should talk to you about what may have caused your stroke and what action needs to be taken to reduce your risk of it happening again. This could mean taking medication, or making changes to your lifestyle, or both. Make sure you understand what you need to do and why.

What effects can a stroke have?

The effects of stroke depend on both the location of the stroke in your brain, and how much the stroke has damaged your brain. Although the effect of each stroke is different, people may experience some of the following:

- Movement and balance problems: stroke often causes weakness or loss of coordination down one side affecting the arms and legs. This can lead to problems with walking, balancing and holding things.
- Communication problems: many people experience aphasia. This affects their ability to use language. While their intelligence is unaffected, they can have difficulty with reading, writing, using numbers, speaking and understanding speech. Some people have dysarthria: muscle weakness or loss of coordination in the face, mouth, tongue and throat can lead to slurred speech.
- Problems with memory, concentration and thinking (cognition).
- Problems being able to notice things to one side (spatial neglect).
- Problems with vision.
- Problems with swallowing.
- Continence problems.
- Fatigue (severe tiredness).

- A stroke can also lead to psychological problems such as anxiety, depression or changes to your behaviour.

For some people the effects of a stroke may be relatively minor and may not last long, while others may be left with long-term effects or a disability.

Coping with the effects of a stroke

Stroke can have a powerful emotional effect on the individual and the people around them.

Stroke can change how people see themselves. Stroke usually comes as a big shock, and this shock can have a big emotional impact. Around a third of stroke survivors experience depression after a stroke.

Talking to the right people and finding answers to some of your questions will help you feel more in control of your situation and help you plan for the future.

- Try to find out as much as you can from professionals in hospital before you leave.
- Your GP is the person to ask for help with health problems or support needs after leaving hospital.
- You might need support from therapists, such as physiotherapists, occupational therapists, speech and language therapists and psychologists.
- You might have a community stroke nurse.
- You may have a social worker.
- Depending on where you live, you may have help from a Stroke Association Coordinator.

Around six months after you leave hospital, you should get a review of your progress. This makes sure you are getting the right support if your needs have changed. The review is sometimes carried out by a Stroke Association Coordinator, or by a specialist nurse or other stroke professional. If a review does not take place, contact your GP.

Will I be able to make a full recovery?

Everyone recovers differently. Some people recover fully. Other people will have health problems or a disability. The fastest recovery takes place in the first few months. After that progress can be slower, but people can continue to improve for months or years after a stroke.

Neuroplasticity

Although the brain cells that have been severely damaged or have died can't grow back, other parts of the brain can learn to take over the jobs that they did. This is called neuroplasticity.

Rehabilitation

You should receive rehabilitation soon after your stroke. It may begin in hospital and should carry on at home if you need it. Rehabilitation is part of your recovery. It means trying to restore function to as near normal as possible, and helping you adapt to disability.

During rehabilitation, the therapist carries out a full assessment and designs treatment tailored to your needs. Depending on the type of therapy, you may have exercises to practice. You may work towards building up stamina, or learn new ways of doing things.

You can read more about the different types of therapy in our guide 'Next steps after a stroke'.

Will I have another stroke?

One of the biggest worries for many people is whether they will have another stroke. This can be part of the emotional impact of stroke on you, your family and friends. But it can help to know that when you have a stroke, one of the main aims of your hospital team is to stop you having another stroke.

Brain scans and other test and checks find out what caused your stroke and allow doctors to target your treatment. After an ischaemic stroke, you will be given medicine to avoid blood clots forming. If you have a health condition linked to stroke such as high blood pressure, you will be given any treatment and advice that you need to help you avoid another stroke.

Having a stroke or TIA means that your risk of having another stroke is increased. In the UK more than a quarter of people who have had a stroke have had a TIA or a stroke before. The risk is highest in the days and weeks after a stroke, which is why doctors work so hard to reduce your risk early on.

In the months and years after a stroke, you can help to keep your risks low by following the treatments for your health conditions, and making any lifestyle changes that are possible for you.

When you have a stroke, doctors check you for any health conditions linked to stroke. These health conditions include:

- High blood pressure.
- Atrial fibrillation (irregular heartbeat).
- Diabetes.
- High cholesterol.

One of the best ways to reduce your risk is to carry on with any treatment you are given.

You should also be given advice about other ways of reducing your risk of a stroke. Some people need to lose weight, exercise more, give up smoking or drink less alcohol. You can find advice and information about reducing your risk on our website **stroke.org.uk**.

If you have any questions about your medication, go back to your doctor or pharmacist and ask. Tell them if you are worried about side effects, as there will often be an alternative that you can take. If you don't know why you have been given a particular medication, or would rather not take it, ask your doctor. Never stop taking your medication without talking to your doctor first.

Spotting the signs of a stroke

FAST test



Face

Can the person smile? Has their face fallen on one side?



Arms

Can the person raise both arms and keep them there?



Speech

Can the person speak clearly and understand what you say? Is their speech slurred?



Time

If you see any of these three signs, it's time to call **999**.

Driving

You must not drive for a month after a stroke or TIA. You might need to tell the DVLA (or DVA if you are in Northern Ireland) about your stroke.

Depending what kind of stroke you had and the kind of driving licence you hold, you might not be able to drive for a longer period or may have to stop driving. To find out more you can talk to your doctor, call our Helpline or read our guide 'Driving after stroke'.

The FAST test (above) can help you to recognise the symptoms of a stroke. But there are also some others to look out for:

- Sudden weakness or numbness on one side, including legs, hands or feet.
- Difficulty finding words or speaking in clear sentences.
- Sudden blurred vision or loss of sight in one or both eyes.
- Sudden memory loss or confusion, and dizziness or a sudden fall.
- A sudden, severe headache.

If you spot any of these signs, call **999** straight away.

A transient ischaemic attack (TIA or mini-stroke) is the same as a stroke, except that the symptoms last for a short amount of time. A TIA is serious and should not be ignored. If you experience any of the symptoms described above, call **999**.

Where to get help and information

From the Stroke Association

Talk to us

Our Stroke Helpline is for anyone affected by a stroke, including family, friends and carers. The Helpline can give you information and support on any aspect of stroke.

Call us on **0303 3033 100**, from a textphone **18001 0303 3033 100** or email **helpline@stroke.org.uk**.

Read our information

Get detailed information about stroke online at **stroke.org.uk**, or call the Helpline to ask for printed copies.

My Stroke Guide

The Stroke Association's online tool My Stroke Guide gives you free access to trusted advice, information and support 24/7. My Stroke Guide connects you to our online community, to find out how others manage their recovery.

Log on to **mystrokeguide.com** today.

Other sources of help and information

Atrial Fibrillation Association (AFA)

Website: heartrhythmalliance.org

Tel: 01789 687 502

Provides information and support for people with atrial fibrillation.

Brain and Spine Foundation

Website: brainandspine.org.uk

Helpline: 0808 808 1000

Provides information and support to people affected by neurological conditions including stroke. The helpline is run by neuroscience nurses.

Chest, Heart and Stroke Scotland

Website: chss.org.uk

Helpline: 0808 801 0899

Provides information on local stroke groups in Scotland. It also runs an advice line staffed by nurses.

Different Strokes

Website: differentstrokes.co.uk

Tel: 0345 130 7172

Provides information and support for younger stroke survivors, including guides for survivors, their family and employers.

Headway

Website: headway.org.uk

Tel: 0808 800 2244

A national charity supporting people with a brain injury. They have local groups and branches, which include rehabilitation programmes, carer support, social activities, community outreach and respite care.

NHS UK

Website: nhs.uk

Information on health

About our information

We want to provide the best information for people affected by stroke. That's why we ask stroke survivors and their families, as well as medical experts, to help us put our publications together.

How did we do?

To tell us what you think of this guide, or to request a list of the sources we used to create it, email us at feedback@stroke.org.uk.

Accessible formats

Visit our website if you need this information in audio, large print or braille.

Always get individual advice

This guide contains general information about stroke. But if you have a problem, you should get individual advice from a professional such as a GP or pharmacist. Our Helpline can also help you find support. We work very hard to give you the latest facts, but some things change. We don't control the information provided by other organisations or websites.

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Every five minutes, stroke destroys lives. We need your support to help rebuild them.
Donate or find out more at stroke.org.uk.

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