Ischaemic stroke

Most strokes happen because of a blockage in an artery leading to the brain, called an ischaemic stroke. This factsheet explains how ischaemic strokes happen, the risk factors for them and the treatments available including thrombolysis, a clot-busting treatment for some types of ischaemic stroke. We have also included a glossary of medical terms.

What is a stroke?

A stroke happens when the blood supply to part of the brain is cut off. About 80 per cent of strokes happen because of a blockage in an artery. These are called ischaemic strokes. About 20 per cent of strokes happen due to bleeding in or around the brain. These are called haemorrhagic strokes. (For more information see our factsheet F26, Haemorrhagic stroke.)

A transient ischaemic attack (TIA) is very similar to a stroke, but the effects are temporary. Symptoms may last for a few minutes or up to 24 hours but they should be treated seriously. Most TIAs are caused by a blockage, rather than by bleeding in the brain. (For more information see factsheet F1, Transient ischaemic attack (TIA)).

Why does this happen?

Atherosclerosis

When we are young our arteries are wide and flexible, but as we get older the artery walls become thicker and less flexible. A condition called atherosclerosis can then develop. This is a term used to describe the hardening and thickening of the large arteries in the body. A harmful build-up of fatty deposits, or patches called ‘atheroma’ develop on the inside walls of the arteries. They can become more and more ‘furred up’ over time, as the patches make them narrower and reduce the blood flow through them. This makes a blockage more likely to occur.

As well as making arteries narrower, atherosclerosis can make the inner surface of the artery walls fragile and likely to break up. This exposes the lining of the artery and causes blood to clot over it. This clot can then cause a blockage in the artery...
Ischaemic stroke

at this point, or the clot could break off and travel in the bloodstream causing a blockage somewhere else. About 50 per cent of ischaemic strokes are caused by atherosclerosis in the large arteries in the body. This is more likely to be the cause of stroke in older people.

Embolism from the heart
A blood clot forming in the heart and travelling to the brain causes about 20 per cent of ischaemic strokes. The heart condition atrial fibrillation (AF) is the most common cause of this. If you have AF your heart beats very fast and irregularly, making blood clots much more likely to form. Strokes caused in this way are usually more severe as the blood clots that travel from the heart are often quite big, and can therefore cause more damage.

Small vessel disease
This is a condition where the tiny blood vessels deep in the brain can become completely blocked and cause a stroke. About 25 per cent of ischaemic strokes are caused in this way and they are often called lacunar strokes. Some people experience silent lacunar strokes, which have no symptoms and may only be discovered when having a brain scan for another reason.

Other causes
About five per cent of ischaemic strokes are caused by other rarer causes such as:

- Arterial dissection - sometimes a tear can develop in an artery. This usually happens in an artery in the neck, and is due to an injury such as whiplash, but it can happen for no apparent reason. When an artery tears, blood can get between the layers of artery walls which can lead to a clot forming, causing a blockage. This is more common in younger people.

- Patent foramen ovale (PFO) - a condition affecting the heart. Foramen ovale is the name of the hole between the right and left side of your heart. This hole should close after birth, but in as many as one in four people it remains open. It usually causes no problems but it is possible for a blood clot to travel from the right to the left side of the heart and then enter the circulation system, potentially causing a stroke. This is more likely to occur in younger adults.

What are the risk factors for ischaemic stroke?

There are a number of risk factors that increase the chances of having an ischaemic stroke. Ones that we can’t change include:

- age – strokes are more common as we get older
- ethnicity – strokes are more common in South Asian and African Caribbean people
- family history of stroke.

A number of medical conditions can increase your risk of stroke including:

- High blood pressure - the biggest risk factor for stroke. High blood pressure can damage the artery walls, contributing to atherosclerosis.
- Atrial fibrillation – a type of fast and irregular heart beat.
- High cholesterol - too much fat in your diet can lead to atherosclerosis.
- Diabetes - a condition where your body does not produce any or enough insulin. This means there are high levels of sugar
Ischaemic stroke

(glucose) in your bloodstream and this can contribute to damage in your arteries.

**Lifestyle factors** can also increase your risk of stroke. They include:

- smoking
- drinking too much alcohol
- eating an unhealthy diet
- being overweight
- lack of exercise.

These lifestyle factors increase the chances of developing the medical conditions described above, and can contribute to damage to your arteries.

There are lots of things you can do to manage these risk factors and reduce your risk of stroke. Contact us to find out more (see page 8 for details).

**What are the symptoms of stroke?**

The FAST test can help you to recognise the symptoms of a stroke or TIA. These symptoms usually come on suddenly.

Facial weakness
Can the person smile?
Has their mouth or eye drooped?

Arm weakness
Can the person raise both arms?

Speech problems
Can the person speak clearly and understand what you say?

Time to call 999
Stroke is a medical emergency.

If you see any one of these signs, seek immediate medical attention.

Other symptoms include sudden weakness or numbness on one side of the body, sudden confusion, dizziness or unsteadiness or a sudden visual problem.

**What happens when I go to hospital?**

After dialling 999 you will be taken to accident and emergency (A&E) where further screening tests will be carried out. With a suspected stroke, you should then be taken to the acute stroke unit.

Here, stroke is dealt with as an emergency. An acute stroke unit has a range of trained professionals who are experienced in stroke care. Evidence shows that being in a stroke unit improves your chances of recovery. If your hospital does not have an acute stroke unit you may be taken to a high dependency unit.

In more and more parts of the UK stroke services are improving. Many areas now have hyperacute stroke units (HASUs) which have been set up to treat and monitor patients in the first few days after their stroke. In some areas they are also known as comprehensive or primary stroke services. These services aim to be open 24 hours a day and have stroke consultants and equipment in one place so that the process is as fast as possible.

**What tests will I have?**

**Brain scans**
The first thing that needs to happen is for the medical staff to make sure that your symptoms are being caused by a stroke, and to identify what type of stroke you are having; this is very important as the treatments differ. They will do this by carrying out a brain scan.
Ischaemic stroke

This should be done as quickly as possible. You should be prioritised for a scan if you have symptoms such as a severe headache or a low level of consciousness, which may indicate you have a bleed in the brain. You should also be prioritised for a scan if it is thought that you may benefit from treatment such as thrombolysis (see below). Otherwise, scanning should be as soon as possible and within 24 hours of your stroke.

There are two types of brain scan:

- A computed tomography (CT) scan is a form of x-ray of the brain. It will show which part of the brain has been damaged by the stroke, and will show if you have had a bleed or any previous strokes. This is usually the first choice of brain scan.

- A magnetic resonance imaging (MRI) scan produces a much more detailed picture of the blood vessels in your brain and can be helpful in certain circumstances, for example if your stroke happened more than 10 days ago and you have not had a scan yet.

Monitoring

During an ischaemic stroke it is likely that your body will experience changes that could make the outcome of your stroke worse. An important part of treatment is the management of these changes. For example, blood pressure is raised in over 80 per cent of people and may need to be lowered.

As well as blood pressure, careful monitoring of your blood glucose (sugar), oxygen levels, temperature, and hydration (supply of water to the body) will be carried out. You may also have your breathing, heart and pulse rate measured.

What acute treatments are available?

Thrombolysis

If your stroke is ischaemic, and caused by a blood clot, treatment with a clot-busting medicine may be available. The medicine itself is called alteplase, or recombinant tissue plasminogen activator (rt-PA). This is the same kind of drug that is often given for heart attacks. The process of being given this medicine is known as thrombolysis.

Thrombolysis can break down and disperse a blood clot that is preventing blood from reaching your brain. For it to have any effect, it can only be given within four and a half hours of the start of your stroke symptoms, though the sooner it is given the better. Damage to brain cells occurs very quickly when the blood supply is cut off. This is why such fast action is vital – in order to save as many brain cells as possible.

Thrombolysis is only suitable for some people who have had an ischaemic stroke. It is not available everywhere in the UK, yet is on offer in an increasing number of hospitals. At present, only five per cent of patients who might benefit from thrombolysis are receiving it. It is hoped that this figure will increase if people get to hospital sooner, and if hospitals can increase their opening hours and respond more quickly to the needs of patients with strokes.

If thrombolysis is available and suitable for you, the medical staff will explain what they are going to do and ask if you agree to it. You do not have to sign any paperwork – a verbal agreement is enough. If you are unable to give your consent because of the severity of your stroke, or other reason, the medical staff will make this decision for you based on
Ischaemic stroke

what they feel is in your best interests.

If you are able to have thrombolysis you will be laid flat on a bed and will receive the medicine though a tube into one of the veins in your arm. During this procedure, which takes around one hour, you will have your blood pressure, body temperature and glucose levels closely monitored and stabilised. You will continue to be closely monitored for 24 hours afterwards to make sure you are not getting any worse. This treatment does carry the risk of causing a bleed, although this is rare, affecting two to three per cent of people.

About 10 per cent of people treated with thrombolysis will make a good recovery. If it is given within two hours, the recovery rate is even better. Although thrombolysis can improve the chances of recovery for some people, unfortunately it cannot help people who have had a very serious stroke who may not survive.

Unfortunately, a lot of people are unsuitable for thrombolysis. Some possible reasons for this are:

- you have a bleed in the brain
- you do not know or cannot tell the staff when your symptoms began
- you have a bleeding disorder
- you have had major surgery within the past two weeks
- you have had another stroke or head injury within the past three months
- you are aged under 18 or over 80
- you do not reach hospital in time.

If your blood clot has not been dissolved using thrombolysis, it will be broken down naturally by the body within a few days or weeks. Sadly, this natural process takes too long to prevent the damage caused in the first few hours of a stroke.

Blood thinning medicine
You will probably be given aspirin which helps to prevent the blood from clotting. Initially this is given at a high dose (300mg) within twenty four hours (England, Wales and Northern Ireland) or forty-eight hours (Scotland) of your stroke. If you have received thrombolysis you will not be given aspirin for at least twenty four hours afterwards.

If aspirin is not suitable for you, alternatives are available (such as clopidogrel) and may be given depending on your individual circumstances.

If you have an arterial dissection, you may be offered a type of medicine called an anticoagulant. Examples of these are heparin and warfarin. These drugs reduce the body’s ability to form blood clots. However, large scale clinical trials are currently underway to find out which medicines are the best treatments for this condition so you may be offered a different type of drug.

Surgery
When the brain is injured the tissue can swell. If you have had a very large stroke there is a danger that the swelling can put increased pressure onto other areas of your brain, causing further damage. About one per cent of patients will need an operation called decompressive hemicraniectomy. It involves opening up a section of the skull which allows the brain to swell without becoming squashed.

Finding the cause of your stroke
The doctors will investigate what caused your stroke so that they can give you
Treatment and advice to lower your risk of having another one. **This should happen quickly** and definitely within a week.

It will involve having your **blood pressure** measured and some **blood taken** to check for the presence of **atheroma** (plaque or fatty deposits) inside your arteries. Your blood test results will also show whether there is any disease in your arteries (for example, atherosclerosis) or if there are any **underlying conditions** increasing your risk of stroke or making your blood more likely to clot, such as diabetes.

You should also have your **heart checked** in case your stroke was caused by an embolism. This test will be carried out using an **electrocardiogram (ECG)** which monitors the rhythm and electrical activity of your heart. If you have a history of heart problems you will probably have more extensive tests carried out to check how your heart is functioning.

If the cause of your stroke is unclear, then more tests should be carried out looking for rare causes. Sometimes, no single cause of a stroke can be found. Try not to worry if this happens to you – there isn’t always a straightforward reason.

**What longer term treatments are available?**

**Surgery for other conditions**

If the cause of your stroke is related to another condition, having surgery for that condition may be essential to reduce the risk of another stroke. One common example of this is surgery on the **carotid arteries** to reduce narrowing and increase blood flow to the brain. The operation is called a **carotid endarterectomy** or you may be offered an alternative procedure called carotid angioplasty. See our factsheet *F40, Carotid artery disease* for more information.

If you have a **Patent foramen ovale (PFO)** and have had more than one stroke you will probably be offered surgery to close this hole.

**Managing longer term complications**

You may have some **weakness or paralysis** because of your stroke. If you are lying in one position for a long time and are unable to move by yourself, you might be at risk of **pressure sores** and/or **deep vein thrombosis (DVT)** (a blood clot in your leg). The medical team will need to take care to move you regularly to avoid these problems (there are special mattresses that can do this) and to try to get you moving as soon as you are well enough.

If you develop a DVT you will be given anti-coagulant medicine instead of aspirin to treat the condition.

**Medicine**

You may have to continue taking **blood thinning medication** on a long-term basis (usually for the rest of your life). Clopidogrel is the medicine that is usually recommended first. However, if you cannot take this medicine you will usually be prescribed aspirin combined with another medicine known as dipyridamole.

For some underlying conditions, **anticoagulant medicine** will be given instead. For example, if you have **atrial fibrillation** (an irregular heart beat) you will be taken off aspirin after two weeks and given another medicine, like warfarin. Again, these treatments tend to be for life.
Ischaemic stroke

You may also receive medicines to help lower your blood pressure and to help lower your cholesterol if you have these conditions.

As well as medicine that can help to prevent a stroke, there may be medicine that you need to know about that you should avoid. For example, the combined oral contraceptive pill should not be routinely prescribed following an ischaemic stroke. If you are taking this, or thinking about taking this, ask your consultant or doctor for advice. The same is true of Hormone Replacement Therapy (HRT).

What can I do to lower my risk?

After any kind of stroke there is an increased risk of another one. Approximately a quarter of people will have another stroke in the following five years. This is an important time to do everything you can to lower this risk. Although this may seem daunting, after you have had extensive tests and have been given medicines and lifestyle advice, you are better placed to make some changes that will help you to prevent another stroke.

This checklist suggests things you can do to help you lower your risk:

1. Try to attend all of your follow up appointments.
2. Follow your aftercare advice (if any).
3. Take your medicine correctly.
4. Check your medicine is working for you (your GP can help you to find out).
5. Tell your GP about any health problems you are experiencing. (Never ignore problems – they may be a sign of something more serious.)
6. Make positive changes to your lifestyle, for example, by:
   - Stopping smoking
   - Reducing your alcohol intake
   - Following a healthy diet
   - Taking regular exercise
   - Losing weight if necessary

Ask your GP for help making these lifestyle changes. Lots of help is available.

Will I get better?

Every person’s stroke is different but there are things you can do to improve your chances of making a recovery.

Because the brain controls everything we do, many things can be affected by stroke. As well as the better known symptoms of weakness or paralysis on one side of the body and speech problems, there can be a number of other effects of a stroke. These could include problems with memory or concentration, swallowing, continence, emotional changes and tiredness.

A stroke causes some brain cells to die, and others to become injured. The injured cells are often found around the main area of damage. The area of injured cells is known as the penumbra. In the first few days and weeks, and as the brain swelling goes down, these injured cells may heal causing some spontaneous recovery.

Sadly, dead brain cells cannot start working again, but it is possible for the brain to reorganise itself and find new pathways to perform the lost functions. This process is known as neuroplasticity and is something that everyone’s brain does constantly.
Ischaemic stroke

throughout life in response to their experiences and environment. After a stroke it is vitally important for you to use the skills you have and to practise new ones as much as possible.

Rehabilitation is an important tool in helping you to recover. Trained professionals will help you to practise and show you new ways of doing things. These professionals include therapists, nurses and consultants. If you think you should be receiving help but are not, don’t be afraid to ask. If your therapy is coming to an end, ask for some exercises you can use to continue practising alone, or with others.

Your recovery process will be personal to you. There may be times when you feel tired, confused, stressed and low in mood. It is very normal to feel like this. With time, practice, and motivation you will start to see improvements, and with each achievement you should feel proud. Try your best to keep going!

Have you found out about any services available in your area? Meeting new people and accessing support and information have a positive impact on recovery and can help you stay motivated. Contact us - we can help with this.

Useful organisations

All organisations are UK wide unless otherwise stated.

**Stroke Association**  
**Stroke Helpline:** 0303 3033 100  
**Web:** stroke.org.uk  
**Email:** info@stroke.org.uk  
Contact us for information about stroke, emotional support and details of local services and support groups.

**NHS Choices (England and Wales)**  
**Website:** www.nhs.uk  
For general information on all aspects of health including stroke, maintaining a healthy lifestyle and health services.

**NHS Scotland**  
**NHS Inform Helpline:** 0800 22 44 88 (7 days a week, 8am - 10pm).  
Information on health conditions, treatments and health services in Scotland.

**Northern Ireland (NI) Direct Government services website:**  
www.nidirect.gov.uk/index/information-and-services/health-and-well-being.htm  
Information on health and well-being.

Disclaimer: The Stroke Association provides details of other organisations for information only. Inclusion in this factsheet does not constitute a recommendation or endorsement.
Ischaemic stroke

Glossary

**Aspirin** = type of blood thinning medication

**Anticoagulant** = the name for medications that thin the blood by increasing the time it takes for blood to clot

**Arterial dissection** = a tear in an artery wall

**Atheroma** = patches of fatty material in an artery

**Atherosclerosis** = the term for hardening and furring up of the arteries

**Cerebral** = relating to the brain

**Clopidogrel** = a type of blood thinning medication

**CT scan** = computed tomography, a type of brain scan

**Dipyridamole** = a type of blood thinning medication, often given with aspirin

**Embolism** = a blood clot or piece of fatty debris that is carried in the bloodstream

**Heparin** = an anticoagulant medication

**Ischaemic** = part of the body that has not had an adequate blood supply

**MRI scan** = magnetic resonance imaging, a type of brain scan

**Neuroplasticity** = the process of the brain finding new pathways to perform lost functions

**Patent foramen ovale (PFO)** = a heart condition where there is a hole between the two sides of the heart

**Thrombolysis** = the process of being given clot busting treatment for a stroke

**Thrombosis** = blood clot

**Transient ischaemic attack (TIA)** = a ‘mini stroke’ where the symptoms are temporary, lasting less than 24 hours

**Warfarin** = an anticoagulant medication
Ischaemic stroke

Produced by the Stroke Association’s Information Service.
For sources used, visit stroke.org.uk
© Stroke Association
Factsheet 35, version 02 published June 2011, updated April 2012 (next revision due September 2013). Item code: A01F35

£5 could help us answer a helpline call from a desperately worried person looking for answers about stroke. Text ‘stroke’ to 70007 to donate £5 today.
Texts cost £5 plus your standard network rate of which a minimum £4.70 will go to the Stroke Association. Full terms and conditions at www.stroke.org.uk/textterms

Stroke Association is a Company Limited by Guarantee, registered in England and Wales (No 61274).
Registered office: Stroke Association House, 240 City Road, London EC1V 2PR. Registered as a Charity in England and Wales (No 211015) and in Scotland (SC037789). Also registered in Isle of Man (No 945), Jersey (NPO 369) and serving Northern Ireland.