Childhood stroke

### About childhood and perinatal stroke

The term ‘childhood stroke’ covers stroke occurring from 29 days old up to the age of 18.

The term ‘perinatal stroke’ covers stroke from week 20 of pregnancy until 28 days after birth.

Several hundred children a year have stroke in the UK.

**Causes and effects of stroke in babies and children**

The causes and the effects of a stroke are likely to be different depending on how old the child is.

The causes of stroke in children are very different from those in adults. This guide explain the causes, treatment and impact of stroke on children and families, and lists sources of help and support.

It's important to know that for some children there may not be a clear cause of stroke, or it may take a long time to be determined.

In this guide, you can find information about the different types of childhood stroke and their causes along with common symptoms of stroke.

## What is a stroke?

A stroke happens when the blood supply to part of the brain is cut off, killing brain cells. Damage to the brain can affect how the body works. It can also change how you think and feel.

There are two main types of stroke. Ischaemic strokes are due to a blocked blood vessel in the brain. Haemorrhagic strokes are due to bleeding in or around the brain. In children, both types of stroke are rare and they occur in similar numbers.

Children can also have transient ischaemic attacks (also known as TIA or mini-stroke). A TIA is the same as a stroke, except that the symptoms last for a short amount of time. In a TIA, a blood vessel in the brain gets blocked, but the blockage clears by itself. TIA is a major warning sign for stroke and should always be taken seriously.

**Perinatal stroke (stroke in unborn and newborn babies)**

Although it's very rare, babies can have a stroke in the womb or just after birth. Find out more about [perinatal stroke](https://www.stroke.org.uk/childhood-stroke/stroke-unborn-and-newborn-babies-perinatal-stroke), which is the name for stroke in a baby from week 20 of pregnancy until 28 days after birth, at **stroke.org.uk/childhood**

### Ischaemic strokes in children

[Ischaemic strokes](https://www.stroke.org.uk/what-is-stroke/types-of-stroke/ischaemic-stroke) are caused by a blockage in the blood supply to the brain. Strokes can happen for different reasons in children than they do in adults. For children, stroke due to a clot can happen for a number of reasons.

Strokes in children from 29 days to 18 years old are often associated with existing conditions, most commonly congenital heart disease and sickle cell disease. Other risk factors include infectious diseases, trauma to the head or neck, vascular problems and blood disorders. See the ‘Risk Factors’ section below for more information.

Strokes can also affect previously healthy children and in around 1 in 10 cases, there is no identified cause.

### Risk factors for ischaemic stroke in children

There are several different conditions which can make children more likely to have an ischaemic stroke. These fall mainly into four categories:

* Heart disorders.
* Blood disorders.
* Infections.
* Vascular disorders.

### Heart disorders

Heart disorders increase the risk of ischaemic strokes in children. Some children are born with a heart problem, known as congenital heart disease, and heart problems that develop in childhood are known as acquired heart disease. Sometimes a heart disorder is only diagnosed after a stroke.

#### Heart surgery and stroke

If a child has surgery for a heart condition, this can raise the risk of a stroke. But the outcome of any serious operation depends on the individual child and their unique health needs. If your child needs heart surgery, the doctor should explain the likely risks and benefits of the operation. If your child had a stroke after heart surgery, your medical team can help you understand why this happened. They can also support you and your child with recovery.

### Blood disorders

#### Sickle cell disease (SCD)

Sickle cell disease is an inherited condition affecting red blood cells. These are the blood cells that carry oxygen around your body. In sickle cell disease, some red blood cells change shape from round to a narrow sickle (half-moon) shape. The damaged cells are less able to carry oxygen around the body. They can also block blood vessels and cause clots in the brain. SCD can also lead to a bleed in the brain, but this is rare in children under 18 years old.

‘Silent’ strokes can also affect children with SCD. This sort of stroke may not have obvious physical signs, but can be picked up on an MRI sign. Silent stroke can cause cognitive problems such as with thinking and learning, and an increased risk of another stroke.

SCD is most common among Black Caribbean, Black African and Black British people, but cases can also occur in people with heritage from the Middle East, parts of India, the eastern Mediterranean, and South and Central America. It affects boys and girls alike.

#### Blood clotting disorders

Some types of rare blood clotting disorders make it more likely for clots to form, raising the risk of a stroke. Sometimes known as ‘sticky blood’ disorders, they may be diagnosed after a stroke.

#### Infections

Chickenpox is linked to an increased risk of childhood stroke for around six months after the infection. Although chickenpox is a very common childhood illness in the UK, stroke is an extremely rare complication. Other serious infections affecting the brain and other organs may cause a stroke, such as bacterial meningitis, encephalitis and sepsis.

### Vascular disorders

Vascular disorders are problems with blood vessels in the body which can affect the blood flow. In children, vascular problems can be caused by an injury, by inflammation, or by the blood vessels developing abnormally (malformation). The type of vascular problems leading to stroke in adults tend to be changes due to age and fatty deposits accumulating in the arteries, which do not affect children in the same way.

#### Arterial dissection

A cervical arterial dissection happens when a tear develops in the lining of one of the large arteries in the neck. A clot can form and block the artery, which can cause a stroke.

It can happen after an injury or an activity like sport. It can also be related to an infection or a health condition such as Ehlers-Danlos syndrome and Marfan syndrome. A spontaneous dissection can have no apparent cause.

An arterial dissection does not always have symptoms. However, it can cause headaches, pain in the face or neck, and also stroke symptoms if it leads to a stroke. It’s important to get immediate medical help if you suspect a dissection or a stroke.

#### Moyamoya syndrome

In Moyamoya syndrome, the main arteries in the brain become narrowed. To compensate for the reduced blood flow in the main vessels, a network of small blood vessels grows inside the brain. Moyamoya means ‘puff of smoke’ in Japanese, referring to the appearance of the abnormal blood vessels in the brain scan image.

It does not always have symptoms, but it can cause headaches, slurred speech and weakness on one side of the body. It can lead to strokes and TIA in some children. Moyamoya syndrome has been found in children with sickle cell disease, Down syndrome and neurofibromatosis. It sometimes occurs in otherwise healthy children, when it is known as Moyamoya disease.

It is very rare, with around one in a million people in the UK affected. It is more common among people from Japan and some other East Asian countries and there are certain genes associated with predisposition towards Moyamoya.

#### Vasculitis

A rare condition in which the blood vessels inside the brain become inflamed (known as central nervous system vasculitis), which can lead to a stroke or TIA in children.

#### Cerebral venous thrombosis

Large veins drain the blood away from the brain through spaces under the brain known as the venous sinuses. If a clot (thrombosis) develops in this space, it can cause symptoms such as headaches, seizures and blurred vision. It is known as a cerebral venous sinus thrombosis (CVST). It can be due to conditions including blood-clotting disorders, infections and congenital heart disease.

**Inherited metabolic disorders**

Some inherited metabolic disorders have been linked to an increased risk of ischaemic stroke and also metabolic stroke. In metabolic stroke, a child may experience stroke-like episodes but without a clot or bleed in the brain.

## Strokes due to a bleed (haemorrhagic stroke)

Up to 50% of strokes in children are haemorrhagic. They can be due to problems with the blood vessels in the brain and other conditions.

### Arteriovenous malformation (AVM)

In an AVM, the blood vessels carrying blood to and from the brain grow together in a cluster, often in the brain or spine. An AVM can reduce the blood flow in the brain, and compress the surrounding brain tissue. The blood flow can be diverted from arteries into veins, damaging the veins and sometimes causing bleeding.

### Aneurysm

An aneurysm is a weakness in an artery wall which can sometimes burst, causing bleeding in the brain. In children, this can happen for several reasons including head injury, connective tissue disorders, and heart conditions. Sometimes it may not be possible to find a cause.

### Cavernous malformation or cavernoma

A cavernous malformation is a small cluster of abnormal blood vessels in the brain, often said to look like a raspberry. It is made up of a series of connected ‘bubbles’, or caverns, filled with blood. Often these do not cause any symptoms unless the structure is pressing on the surrounding brain tissues. But if the walls of the caverns are weak, blood can leak out or a large bleed can happen. Symptoms of a cavernoma or a bleed can include seizures, headaches and slurred speech. Those with multiple cavernous malformations may have an underlying genetic predisposition, so other family members may need to be screened.

### Other disorders

Some of the disorders that have already been mentioned -including Moyamoya syndrome, some types of vasculitis, sickle cell disease and clotting disorders - are also known risk factors for haemorrhagic stroke in children. Deficiency of Adenosine Deaminase 2 (DADA2), an extremely rare genetic disorder, has also been linked to an increased risk of haemorrhagic and ischaemic stroke.

**Transient ischaemic attack (TIA or mini-stroke) in children**

It's important to remember that stroke symptoms that last a short amount of time can be a [transient ischaemic attack (TIA or mini-stroke)](https://www.stroke.org.uk/what-is-stroke/types-of-stroke/transient-ischaemic-attack). In a TIA, a blood vessel in the brain gets blocked, but the blockage clears by itself. A TIA is a major warning sign of a stroke, and you should **call 999**.

## Signs of stroke in children

It is important to know the warning signs of another stroke. The FAST test can be used to help identify strokes in children.

**Face**: Can the young person smile? Has their face fallen on one side?

**Arms**: Can they raise both arms and keep them there?

**Speech**: Can they speak clearly and understand what you say? Is their speech slurred?

**Time**: If you see any one of these three signs, it’s time to call 999.

However, children and young people may have other stroke symptoms, including:

* Sudden, severe headache.
* Seizures (fits).
* New and sudden vertigo, dizziness or confusion.
* Problems with walking or balance.
* Nausea/vomiting,drowsiness or loss of consciousness.
* Sudden blurred vision or loss of sight in both eyes.
* Weakness or numbness on one side of the body.
* Changes in sensation, like pins and needles in arms or legs.

For information on signs of stroke in babies up to 28 days old, see our [Perinatal Stroke webpage](https://www.stroke.org.uk/childhood-stroke/stroke-unborn-and-newborn-babies-perinatal-stroke) at **stroke*.*org.uk**

It is important to remember that stroke symptoms that last a short amount of time can be a transient ischaemic attack (TIA or mini-stroke). A TIA is a major warning sign of a stroke, and you should call **999**.

**Diagnosis of stroke in children**

### How do you test for childhood stroke?

### Brain scans

A brain scan should take place within an hour of arriving at hospital. Usually, a CT scan (computed tomography) is the quickest scan available but it is important to have an MRI scan (magnetic resonance imaging) as soon as it can be arranged. Sometimes your child might need to be transferred to another hospital for this.

The scans show the affected area of the brain and the blood vessels in the brain. Your child may need a general anaesthetic or sedative to help them keep still.

If your child becomes very sleepy and the doctors are concerned about their levels of consciousness, they will have an urgent brain scan, even if they have already had one scan.

### Other checks

An echocardiogram uses ultrasound to look at the heart and surrounding blood vessels. Children with sickle cell disease have a transcranial Doppler test, which uses ultrasound to check the rate of blood flow through the arteries.

Angiography uses X-rays (or other types of scan) to look for problems with blood vessels in an area, such as the brain or heart.

### Looking for the cause

Your child’s medical history may also provide clues as to the cause of the stroke, such as having sickle cell disease or congenital heart disease or infections.

Blood tests are used to check for any infections or blood clotting disorders.

It's important to know that for some children there may never be a clear cause or it may take a long time to be determined.

## What treatment will my child have?

If the stroke is due to a clot (ischaemic stroke), your child may be given blood-thinning medication such as aspirin to prevent another stroke.

A small proportion of children may be eligible for treatments to remove a clot. Thrombolysis is a clot-busting treatment which uses a drug to break up the clot. Thrombectomy is a treatment which physically removes a clot using a retrieval device.

Both treatments need to happen within hours of the stroke, and the child needs to meet strict criteria about their stroke and other health conditions. Your child may need to be transferred to a specialist centre for these treatments.

In some cases, doctors may undertake neurosurgery to help ease pressure building up in the brain.

### Treatment for sickle cell disease (SCD)

Children with sickle cell disease are not usually given blood-thinning medication. They will be given an urgent blood transfusion, and they should be seen by a paediatric haematologist. After the stroke, your child should be monitored to check for any signs of cognitive problems and changes to the blood flow in the brain.

To treat the sickle cell anaemia and reduce the chance of another stroke, your child may need regular blood transfusions. Stem cell transplants can sometimes be used to treat sickle cell disease, when more traditional approaches fail to control the disease and the benefits outweigh the possible risks.

### Moyamoya syndrome

If a stroke was due to Moyamoya syndrome, revascularisation surgery could potentially help improve blood flow to the brain.

**How will my child recover?**

The effects of stroke are different for every child. The impact of the stroke depends on the part of the brain affected and the size of the damaged area.

### Common effects of childhood stroke

The most common effects include:

* [Emotional and behavioural changes](https://www.stroke.org.uk/childhood-stroke/emotional-and-behavioural-changes-after-childhood-stroke)
* [Mobility problems](https://www.stroke.org.uk/childhood-stroke/mobility-and-dexterity-after-childhood-stroke)
* [Fatigue](https://www.stroke.org.uk/childhood-stroke/fatigue-after-childhood-stroke)
* [Communication problems](https://www.stroke.org.uk/childhood-stroke/communication-after-childhood-stroke)
* [Memory, thinking and concentration (cognition) problems](https://www.stroke.org.uk/childhood-stroke/memory-thinking-and-concentration-cognition-after-childhood-stroke)
* [Visual problems](https://www.stroke.org.uk/childhood-stroke/vision-after-childhood-stroke)

Visit **stroke.org.uk/childhood** or more information on these effects.

The effects of a stroke in a baby or very young child may emerge over time. A stroke can affect developmental stages like learning to walk and talk, and sometimes a stroke is only diagnosed when a child shows a developmental delay.

Usually, the fastest recovery happens in the early weeks and months following a stroke, but can continue for months or years after a stroke. It takes time and hard work, and rehabilitation therapies are crucial.

Some children will be able to leave hospital quickly, but others will need to stay in for some time. When your child is leaving hospital, you should have help from the hospital paediatric team. There may be a [portage service in your area](https://www.portage.org.uk/support/region) that you can access which can help babies and young children.

Portage is a pre-school service with some services offering support to families from birth and some supporting through to statutory schooling.

### Rehabilitation and recovery

Once your child is well enough, rehabilitation should begin. The recovery and progress each child makes is unique to them, and they should have support to enable them to make the best recovery possible. Rehabilitation is often focused on what is important to you and your child, and it works towards what they would like to be better at.

Rehabilitation also helps children to learn and develop in the years after a stroke. Rehabilitation may take place in hospital, community, home and school settings.

**Physiotherapy**

A physiotherapist can help with movement problems such as weakness and balance problems. The therapist will assess and design a programme to improve muscle strength and movement.

They might use equipment to help your child, like an ankle foot orthosis (a brace to support the ankle), which may help with stability.

It is important to encourage your child to use their affected limbs as much as possible, to help recover movement. Repeating therapeutic exercises and activities can make a big difference. Try to make these part of fun family activities to encourage your child to keep doing them.

Spasticity affects some children after a stroke. This means that the muscles, often in the arm or lower leg, go into spasm or have increased tone (tension). This can be painful and may cause problems with walking and using the hand and arm. Physiotherapy and medication such as baclofen, a muscle relaxant, can help.

Along with physiotherapy, children with spasticity may also have botulinum toxin type A injections prescribed by a consultant with expertise in this area. See our [Physical Effects of Stroke](https://www.stroke.org.uk/effects-of-stroke/physical-effects-of-stroke) guide for more information.

**Occupational therapy**

Occupational therapists help children to increase their participation and independence in everyday tasks, such as tying shoelaces, getting dressed, washing, eating and playing. The therapist might suggest aids and adaptations to make some tasks easier.

A therapist can also support with adapting school activities to help with learning and enable school staff to better support the child. They can help the child develop strategies to improve concentration and process information.

**Speech and language therapy**

A speech and language therapist (SLT) can help by assessing your child and designing a programme to improve their communication skills. If your child has severe speech problems, other modes of communication, such as signing or using communication devices, can be used.

Speech and language therapists also support children with eating and drinking if they have swallowing difficulties. They can advise on ways to eat and drink safely and to develop eating and drinking skills. Other professionals may also be involved in helping your child, for example, a dietitian.

**Psychological support**

A psychologist, such as a clinical, educational or neuropsychologist, may be involved with supporting your child.

Psychologists can assess emotional problems and offer treatments, especially if a child’s behaviour is affecting home or school life. Talking therapies may help your child understand why they feel the way they do.

They can also provide help with cognitive problems, such as with memory, thinking and concentration. They can assess your child’s cognitive ability and make recommendations for supporting them at home and at school.

**Returning to school after a stroke**

Returning to school after stroke may feel like a scary prospect, but see it as an achievement; it is a milestone in your child's recovery. It is also an opportunity for your child to see their friends and participate in class.

Our guide '[Supporting children after a stroke: Toolkit for teachers and childcare professionals](https://www.stroke.org.uk/resources/supporting-children-after-stroke-toolkit-teachers-and-childcare-professionals)' contains useful information for parents and carers as well as education professionals. It covers learning and development, communication and emotional changes.

To make your child's return to school as smooth as possible, contact your child's headteacher or the Special Educational Needs Coordinator (SENCO) well in advance of the return to school. Let the school know about the stroke and how your child has been affected. Ask for a meeting with all the professionals involved to discuss in more detail the support your child will need in the classroom and at break times. If your child is in secondary school, make sure that all of their teachers are made aware of the situation.

Schools must offer staged support for children with special educational needs and disabilities (SEND) (additional support needs (ASN) in Scotland) and if those needs are particularly complex you have the right to request a formal assessment from your local education authority or education board.

It might be helpful for the school to speak to other pupils about any physical effects of your child's stroke, if your child agrees. It may be helpful if the other children know what changes to expect and how to support their classmate. The classroom can be a noisy place and it can be tiring to return to school and learning, so a gradual return may be advisable.

It might be a good idea for your child to sit in a quieter position in the class, so it's easier for them to concentrate. Any therapy your child is still receiving should be planned in as part of their school day.

**Useful tips for you and your family**

Childhood stroke can have an effect on the whole family. Parents often feel a range of emotions from shock and bewilderment to feelings of isolation and frustration. Research shows that childhood stroke can affect a parent's emotions and health, so it is important to look after yourself.

Other children in the family can be affected in different ways. They may not understand what is happening to their brother or sister, which can be upsetting and confusing. They might not be able to cope with what has happened, and could be embarrassed by their sibling, especially in a school environment. They may even be jealous of the attention, care and money that their sibling is receiving because of their stroke. All of these reactions and emotions are normal.

If family members want to help you, think of ways that they can ease some of the pressures you are facing. They might be able to help you with the other children's routine, food shopping or keeping your household chores under control. They could spend time at the hospital with your child so you could see your other children, or give you time to sleep and have a break from the situation. Working together will help you cope better and come to terms with the stroke.

**Tips to help your child cope**

* Talk to your child about the stroke, try to answer all their questions. Encourage them to write lists of their questions to ask the doctor. Use simple and easy language.
* Reassure them that it is ok to be scared or upset.
* Try to keep your child in touch with their friends. Most hospitals have areas where mobile phones can be used. Friends can visit, or talk via video link on a mobile device.
* Be involved in your child's recovery and help them practice their exercises regularly. Focus on small steps forward and be positive about the future. Celebrate progress.
* Monitor your child's development and work with their teachers, carers and therapists to get the best results possible.

**Tips to help parents cope**

* Learn about your child's condition and do not feel scared to ask. Write down any questions you want to ask the nurses and doctors. The more you ask, the more you will understand how best to support your child. You can ask for a second opinion, or ask to see a specialist doctor or therapist.
* You might find it helpful to keep a diary or log of your child's treatment and recovery.
* Ask if you can help with your child's care in hospital. Help to wash them, play with them and feed them.
* Have a break! Taking time out is essential, so you can revitalise yourself and come back feeling refreshed.
* Family and friends will rally around at times like this. Their support and care is invaluable, but it can be draining keeping everyone updated. Nominate someone to pass on the news or set up an email list.
* Talk to people about how you are feeling. Speak to your family, friends, helplines and support groups so you can meet other people in a similar situation. Some parents tell us that they have found support by meeting other parents of children with stroke on social media.
* For advice on benefits, disability and your rights at work, call our Helpline on **0303 3033 100**.

**Tips to help siblings cope**

* Use simple, child-friendly language when talking about stroke. Use pictures and websites like the animations on our [childhood stroke resources](https://www.stroke.org.uk/childhood-stroke/childhood-stroke-resources) webpages to help you.
* Try to answer your children's questions honestly and prepare yourself for answers that can be upsetting or difficult. Do not avoid subjects. Your children will be more likely to worry and make up their own explanation for what is happening.
* If you're visiting the doctor, ask your children to write down any questions that they have. Include them in the situation.
* Spend a portion of time with each of your children. Having dedicated time for each child may help to avoid jealousy or rivalry.
* Include them in helping with any rehabilitation exercises and games, but ensure this should not become a big responsibility for them. You should also discourage them from talking on behalf of their brother or sister if they have a speech problem.
* If you think they feel embarrassed by their sibling, talk to them about it. Try to see it from their perspective and reassure them that they're not in trouble. Give them an explanation card explaining what a stroke is so if people stare they can hand it to them.
* Contact [Sibs](https://www.sibs.org.uk/) for advice on supporting siblings of disabled children, and [Carers UK](https://www.carersuk.org/) for more information on younger carers' supports services.

## 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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