



NATIONWIDE CHILDREN'S
When your child needs a hospital, everything matters.™

Helping Hand™

Health Education for Patients and Families

Strokes in Children

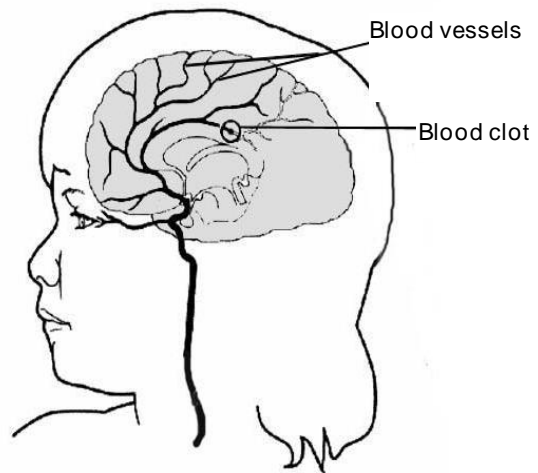
A stroke happens when the blood flow in or near the brain is suddenly blocked or cut off. It can cause permanent injury to the part of the brain that is not getting blood. Sometimes a stroke can lead to bleeding in the brain.

Strokes can happen at any age. Strokes in children are sometimes hard to diagnose because other neurologic (brain) problems have the same symptoms.

Kinds of strokes

There are two types of strokes: ischemic and hemorrhagic.

- **Ischemic** (iss-KEEM-ick) **strokes** occur when the blood flow to the brain is blocked by a clot or there is reduced blood flow in an artery or vein (Picture 1). There are 2 kinds of ischemic strokes:
 - Arterial ischemic when in an artery in the brain.
 - Cerebral sinus venous thrombosis (CSVT) when in the large vein spaces between the outer layers of the brain. These spaces help blood drain from the brain.
- **Hemorrhagic** (hem-or-AJ-ick) **strokes** happen when a weak spot (aneurysm) or injury in the blood vessel wall leaks or bursts.



Picture 1 A blood clot in the brain can cause an ischemic stroke.

Signs

Signs of a stroke can be easily missed. They can look like other illnesses, such as a migraine or epilepsy. Strokes will be different in each child depending on their age and the type of stroke.

- For infants and young children, the signs may be sudden or may not show up until years later.
- For older children, the signs are sudden and similar to those of an adult.

When you see one or more of the following signs happen all of a sudden, act FAST and call 911.

Act FAST and call 911

- **F**acial droop – Part or all of one side of the face drops down.
- **A**rm weakness – One side of the body becomes weak, numb or cannot move. It could be just an arm, leg or face or all of these at once.
- **S**peech problems – Child has slurred speech, is not able to speak or has trouble speaking or understanding what is said.
- **T**ime to call 911

Other signs that may come on suddenly include:

- seizure
- cannot understand simple ideas or instructions
- confused or not aware of what is going on
- headache (worst headache in child's life)
- dizziness
- loss of balance or coordination
- trouble walking
- sleepiness or lethargic (no energy)
- changes in vision in one or both eyes
- trouble swallowing

If you think your child is having a stroke, **call 911**. If the squad is not available, **take your child to the nearest hospital emergency department right away**.

Diagnosis

To diagnose a stroke, the health care provider will:

- Take a clinical history of what happened.

- Do a neuro (neurological) exam. Check things like hand and leg strength, reflexes, senses (vision and touch) and memory.
- Ask about your child's and the family's health history.
- Do tests. Which test is ordered depends on the type of stroke your doctor thinks your child has had.
 - CT scan (computed tomography) takes a picture of the brain. It may be done first since it gives fast results.
 - MRI (magnetic resonance imaging) shows small changes in the brain and blood vessels. It can give a better picture of the brain than a CT but takes longer to do. Your child may need to be sedated (calmed by medicine) before the MRI so that they stay still during the test.
 - Angiograms - The MRA (magnetic resonance angiogram), CT angiography and MRV (magnetic resonance venography) take a closer look at the blood vessels.

Causes

It is important to try to find the cause of the stroke to decide on the right treatment. Sometimes a cause is not found. Treatment can help reduce the risk of more damage and the chance of future strokes.

Common causes of ischemic stroke:

- Abnormal blood vessels in the brain or neck
- Problems in the heart, heart valves or blood vessels
- Sickle cell disease (SCD)
- Metabolic disorders
- Dehydration (dried out)

Common causes of hemorrhagic stroke:

- Abnormal blood vessels in the brain – an aneurysm or AVM (arteriovenous malformation). AVM is a tangle of abnormal blood vessels that may bleed.
- Tumors
- Significant premature birth – blood vessels are fragile and immature

Both types of strokes can occur with the following causes:

- Injury or a tear in the blood vessel wall
- Infection, such as meningitis

- Bleeding or clotting disorders
- Inflammation (swelling)
- Heart or brain surgery or injury to a blood vessel wall

What to expect in the hospital after diagnosis

- A team of specialists will care for your child and do the following:
 - Check vital signs often, like heart rate (pulse), blood pressure, breathing and temperature.
 - Do neuro checks and watch for changes or potential problems, such as seizures, increased pressure in the brain and signs of another stroke.
 - Check for problems with function, like speech, movement, learning, behavior or a delay in the growth of the child's brain (development).
- If the cause of stroke is not known, the health care provider may order more tests, such as:
 - blood tests that look at clotting, bleeding or inflammation
 - brain imaging, brain and neck blood vessel imaging
 - an Echo (echocardiogram) to look at the heart
 - a spinal tap (lumbar puncture) to look for infection in the spinal cord or brain
- Your child may need:
 - treatments to get more oxygen and blood to the brain
 - medicines to open a blockage and blood thinners (anticoagulants) to prevent clots
 - antibiotics to treat infection
 - procedures or surgery to help open a blockage or to decrease the effect of brain swelling
- If your child has lost function, the health care provider may make a referral for neuro rehabilitation. This team of experts may include different doctors, nurses and physical, occupational and speech therapists. They will help your child get back their highest level of functioning, physically, emotionally and socially.

Follow-up care after discharge

- How fast your child recovers depends on the cause of the stroke, how much of the brain was affected and your child's response to treatment. Some children are back to normal quickly. Others may need a longer time to recover.
- For a more serious stroke, your child may need to go to a rehabilitation facility for intensive therapy before going home.
- Your child will follow-up at the Pediatric Stroke Clinic. They may need separate appointments with different health care providers.
- Your child may need to take medicine to prevent clots. **You should not give your child any over the counter medicines without asking their health care provider first.** Some pain medicines, like ibuprofen (Motrin[®]), may cause problems with your child's treatment.
- Bring a list of all medicines that your child takes to the follow-up appointments. That way, the health care team can change your child's medicines as needed.

If you have any questions, be sure to ask your child's doctor or nurse.

Pediatric Stroke Resources:

- Children's Hemiplegia and Stroke Association: www.chasa.org
- Pediatric Stroke Warriors: www.pediatricstrokewarriors.org
- Sickle Cell disease Association of America: www.sicklecelldisease.org
- United 4 Pediatric stroke: www.united4pediatricstroke.org/life-after-stroke-resources
- International Alliance for Pediatric Stroke: www.iapediatricstroke.org