



Talking About The Facts: Stroke In Children





AWARENESS LEADS TO A QUICKER RESPONSE AND LIFESAVING OUTCOMES FOR CHILDREN.

Pediatric Stroke Warriors continues to strengthen communities by providing support to families and promoting advocacy, public awareness and education of current resources related to stroke in children, as a service to communities.

Although awareness and education continues to overall increase, the most common misconception about stroke that exists, is that it only impacts older people.

Pediatric Stroke Warriors encourages anyone to reach out, gain knowledge and to always consider the possibility of stroke no matter what a person's age.

We thank you for the desire in learning the importance of stroke recognition in children and invite you to reach out to learn more about how you can get involved with these efforts by increasing awareness and education among your community.

Pediatric Stroke Warriors

Be Brave. Be Fierce. Be Mighty.

THE MISSION WITH PEDIATRIC STROKE WARRIORS

Pediatric Stroke Warriors is committed to serving the needs of children impacted by stroke, their families and the caregivers involved in their care. We are dedicated in a mission of building community awareness for Pediatric Stroke and hope for impacted children and families.

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QUICK GLANCE AT THE FACTS

- The causes of stroke in children are many and often not well understood. Recognition of stroke is often delayed or even missed in children.
- Stroke is as common as brain tumors in the pediatric population.⁵
- Stroke is one of the top ten causes of death for children.¹
- Of children surviving stroke, roughly 60% will have permanent neurological deficits, most commonly hemiparesis or hemiplegia. Hemiplegia is the most common form of cerebral palsy in children born at term, and stroke is its leading cause.²
- Other long-term disabilities caused by a stroke in childhood can include cognitive and sensory impairments, epilepsy, speech or communication disorder, visual disturbances, poor attention, and behavioral problems.²



WHAT IS STROKE?

Stroke happens when blood that carries oxygen and nutrients stops flowing to part of the brain. Without a steady supply of blood, brain cells in the area begin to die within seconds. This can lead to stroke symptoms and sometimes to lasting neurologic deficits or sadly, death.⁴

While most have heard of stroke in adults, a stroke can and does happen at any age. Stroke can happen in newborns, children, teens - and even around the time of birth. Stroke in children is often different from adult stroke, with different causes and sometimes different symptoms and treatments. In babies and children, epilepsy, tumors, migraine headache and many other conditions can mimic stroke. Careful, expert diagnosis is essential to tell pediatric stroke from other health problems so your child gets the right treatment.

A stroke is a medical emergency. If you think a child is having a stroke, call 911. A rapid response, quick diagnosis and treatment for a child may help limit damage to the brain.

CATEGORIES FOR PEDIATRIC STROKE

There are two age categories when referring to pediatric stroke:

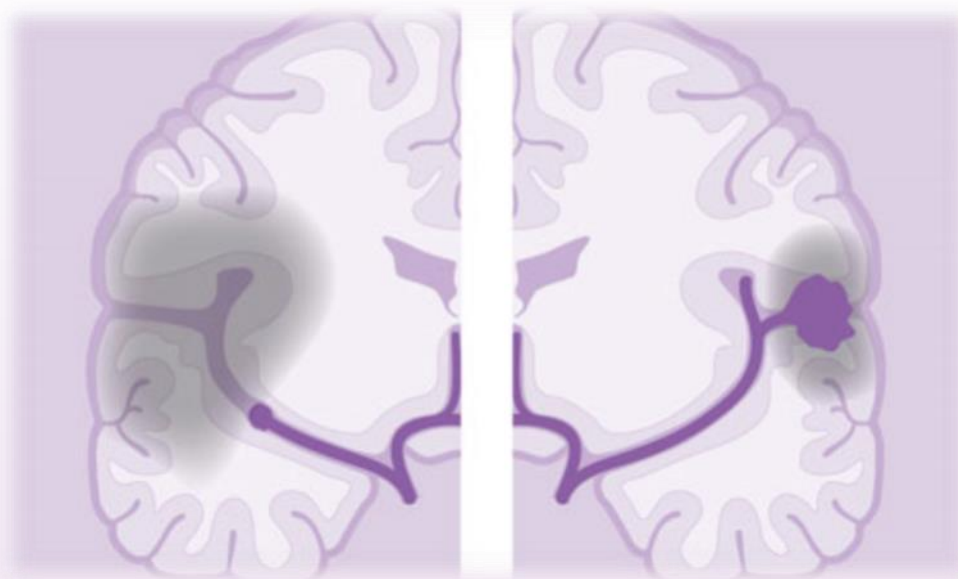
- **Perinatal**, which refers to the last 18 weeks of gestation through the first 30 days after birth. Other terms for this include **fetal**, **prenatal**, **in utero** for the period before birth. **Neonatal** and **newborn** for birth through one month of age.⁵
- **Childhood**, which refers to ages 1 month to 18 years.⁵



TYPES OF STROKE

THERE ARE TWO MAIN TYPES OF STROKE:

- A blood vessel in the brain is blocked. This is ischemic stroke (**pronounced iss-KEE-mik**). Blood cannot get through the vessel to deliver oxygen and nutrients to the cells that need it.⁴
- A blood vessel in the brain is bleeding. This is hemorrhagic stroke (**pronounced hem-or-ADJ-ik**). Blood is leaking from the vessel before it can get to the cells that need oxygen and nutrients.⁴



ISCHEMIC STROKE

In ischemic stroke, the blood vessel may be blocked by a blood clot that formed in the blood vessel (thrombus) or a clot that formed somewhere else in the body, such as the heart, and then traveled to the brain through the bloodstream (embolism).⁴

Doctors group pediatric ischemic strokes by the age of the child.

- Perinatal ischemic stroke (PIS): Stroke before birth or in a newborn (age 28 days or younger).
- Childhood arterial ischemic stroke (childhood AIS or CAIS): Stroke at age 29 days or older.⁴

HEMORRHAGIC STROKE

In hemorrhagic stroke, the lack of oxygen-rich, nutrient-rich blood to brain cells is only one problem. Another problem is that blood builds up where it does not belong - in the brain but outside a blood vessel. This blood can put pressure on the brain, form clots or cause nearby blood vessels to close up (vasospasm), which can also damage the brain.⁴

Causes of hemorrhagic stroke include:

- Weak blood vessel bursting
- Trauma, such as a head injury, that tears the wall of a blood vessel
- Blood that does not clot as well as it should

PERINATAL STROKE KEY POINTS

- The majority of Pediatric Strokes occur in the perinatal period affecting roughly 1 in 2000 live births.¹
- The most common type of stroke in the perinatal period is ischemic stroke.⁵
- Less than 1% of children who have had perinatal stroke will go on to have more strokes.¹
- A stroke before birth may be called fetal, prenatal or in-utero.⁴
- A stroke just before birth may be called neonatal or newborn.⁴
- In most cases of perinatal stroke a cause cannot be determined.
- Perinatal strokes are often missed because the signs and symptoms are subtle. Many infants do not show any signs of stroke until they are 4 to 6 months old.
- Infants with early hand preference before 12 months should see their pediatrician and request a referral to a pediatric neurologist to rule out anything neurological.¹



PERINATAL STROKE SYMPTOMS

Symptoms of stroke tend to be different in newborns (age 28 days or younger) than in older children. Seizures are a common symptom of perinatal stroke. They usually start 12 to 48 hours after birth and repeat.⁴

Some babies have no clear symptoms for weeks or months after their stroke. Often parents, caregivers and doctors do not notice any signs of perinatal stroke until age 4 to 6 months, when the baby starts to appear weaker or partly paralyzed on one side of the body (hemiplegia or hemiparesis).⁴

Symptoms may include:

- Baby not moving one side of their body as well as the other
- Baby keeping fingers and toes on one side of the body clenched in a fist
- Child clearly using 1 hand more than the other (not common before age 1 in healthy babies)⁴

PERINATAL STROKE RISK FACTORS

- Disorders of the placenta
- Congenital heart disease
- Sickle cell disease or other blood conditions that cause abnormal clotting (thrombosis) or bleeding
- Infections, such as meningitis⁴

It is very important for mothers to understand that there is often nothing they did or did not do during their pregnancy that lead to their child's stroke.

CHILDHOOD STROKE KEY POINTS

- Childhood strokes may be missed because there is a lack of awareness that children can indeed have a stroke. However, the risk of stroke from birth through age 19 is nearly 5 per 100,000 children per year.²
- Many children with stroke symptoms are misdiagnosed with the more common conditions that stroke can mimic such as migraines, epilepsy or viral illnesses.⁴
- In older children, the signs and symptoms of stroke are very similar to those in adults and depend upon the area of brain involved.
- It is very important that families take immediate action and call 911 if they see sudden signs of stroke or sudden changes in their child's health status.
- To date, the use of tPA (a clot busting treatment) is not currently FDA approved for children in the US.¹
- Early recognition and treatment during the first hours and days after a stroke is highly critical in long-term functional outcomes and minimizing recurrence risk.



CHILDHOOD STROKE SYMPTOMS

Children who have a stroke tend to have one or more of these symptoms that come on *suddenly*:

- Sudden weakness, paralysis or numbness in the face, arm or leg, most often on one side of the body
- Sudden confusion, trouble speaking or understanding language
- Sudden changes in vision, such as decreased vision or double vision
- Sudden dizziness, loss of balance or loss of ability to stand or walk
- Sudden, severe headache with or without vomiting and sleepiness
- Seizures in a child who has not had seizures before (usually on one side of the body)⁴

CHILDHOOD STROKE RISK FACTORS

In many cases of childhood stroke, a cause is not found. However, roughly half of the children presenting with a stroke have a previously identified risk factor.¹

- Congenital heart disease
- Abnormal blood vessels in the brain, such as moyamoya, vasculitis arteriovenous malformation⁴
- Infections such as chickenpox or meningitis⁴
- Head injury or trauma
- Arterial Dissection
- Sickle cell disease or other blood conditions that cause abnormal clotting (thrombosis) or bleeding⁴
- Autoimmune Disorders

ADDITIONAL RESOURCES

American Heart & Stroke Association is dedicated to building healthier lives, free of cardiovascular diseases and stroke for all ages. That single purpose drives all they do.

Canadian Pediatric Stroke Support Association (CPSSA) was founded in 2011 for children and their families impacted by pediatric stroke. The CPSSA is a joint effort between clinicians and families to build relationships and further strengthen communication for the purpose of research, awareness, and support. It is the CPSSA's vision to provide a compassionate community for Canadian families impacted by pediatric stroke.

Child Neurology Foundation connects partners from all areas of the child neurology community so those navigating the journey of disease diagnosis, management, and care have the ongoing support of those dedicated to treatments and cures.

International Alliance of Pediatric Stroke (IAPS) was established to facilitate collaboration among the many worldwide pediatric stroke communities.

World Pediatric Stroke Association Formerly Brendon's Smile, was officially founded in 2009 as a 501(c)3 not-for-profit organization to raise awareness of pediatric stroke. To increase awareness and knowledge among both the general public and medical professionals about strokes and cerebrovascular disease in children.

REFERENCES

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- ³ **American Heart Association**. Heart and Stroke Encyclopedia. http://www.heart.org/HEARTORG/Conditions/The-Heart-and-Stroke-Encyclopedia_UCM_445688_SubHomePage.jsp
- ⁴ **Seattle Children's Hospital**. Pediatric Vascular Neurology and Stroke Program (Online) - <http://www.seattlechildrens.org/medical-conditions/brain-nervous-system-mental-conditions/stroke/>
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