# Stroke and the psyche

LISETTE HILTON

**Ms Hilton** is a medical writer in Boca Raton, Florida. She has nothing to disclose in regard to affiliations with or financial interests in any organization that may have an interest in any part of this article.

In addition to claiming a physical toll, the residual effects on children who have experienced strokes often include emotional, behavioral, and cognitive problems. Pediatricians can help orchestrate much-needed long-term care.

Pediatric stroke has far-reaching effects that go beyond the physical. Lifelong physical and mental problems are common among the 60% to 80% of children who survive stroke.[1] For infants and children who survive stroke, an estimated 50% to 80% face serious, long-term challenges, including hemiplegia or hemiparesis, seizures, as well as problems with speech, vision, behavior, and learning.[2]

These children can be complex patients to manage, but the pediatrician is ideally suited to coordinate what can be a rather extensive contingent of providers for pediatric stroke survivors, according to Mark Sandberg, PhD, who is board certified in both neuropsychology and rehabilitation psychology.

*Mark Sandberg, PhD*

"Whether the team is comprised of physical therapists, occupational therapists, educators within schools, neuropsychologists, speech pathologists—I think the pediatrician should see himself or herself within the context of being the conductor of an orchestra," Sandberg says.

## No one size fits all after pediatric stroke

As in adults, pediatric stroke can have many causes. Sometimes, it's the result of brain hemorrhage, sometimes of an infarction. Similarly, long-term effects also vary widely, depending on which part of the brain has been affected. Effects also tend to depend on the age at which a child has experienced a stroke, whether it interferes with normal emotional and behavioral development, and whether it leaves a child with severe medical problems, says E. Steve Roach, MD,

child neurologist, chief of child neurology at Nationwide Children's Hospital in Columbus, Ohio, and professor of pediatrics and neurology at The Ohio State University.

After suffering a stroke, children can experience acute changes in cognitive function, depending upon the locus of the insult within the brain. Because for most individuals the left side of the brain is dominant for language, pediatricians might expect changes in that functionality. Following stroke affecting the right side, they might be more likely to see problems with visual-spatial awareness, according to Sandberg. "Sometimes, you also get changes in personal awareness—their ability to appreciate the changes that have come about as a result of the stroke," he says.

*E. Steve Roach, MD*

Subsequently, Sandberg says, these children may overestimate their ability, and that can lead to a whole host of rehabilitation and adjustment concerns upon which the family and rehabilitation providers have to focus.

Furthermore, adds Sandberg, it's critical to distinguish emotional from cognitive mental health issues. "Of course, they'll have changes in emotion. That also corresponds to [the affected] parts of the brain," Sandberg continues. Even the degree and manifestation of these changes can be cognizance dependent. "If there's diminished awareness on the part of the child with respect to the changes that have come about, they may be less affected emotionally than if they are accurately aware of what has happened to them."

In some instances, behavioral issues that arise are reactions because the child is unhappy about having to contend with residual post-stroke conditions such as epilepsy, Roach says. In other cases, behavior might be altered because of the stroke itself. Lingering behavioral issues can range from impulse control problems or poor self-esteem to anger management issues or attention deficit, notes Roach, who led the committee that wrote the American Heart Association/American Stroke Association guidelines for managing stroke in children.

In addition, there's the possibility of the onset of depression, a clinical feature that often emerges following pediatric stroke. It is essential that pediatricians and other healthcare professionals attend to the treatment of this condition as much as changes in language, memory, or attention and skills, according to Sandberg.

## Studies illustrate the complexity

A review of the cognitive outcomes in children following perinatal stroke finds that behavioral comorbidities are complex and challenging to define, but there are clear risk factors. For instance, poor behavioral and emotional outcomes frequently correlate to the age at which stoke occurs.

One study found that: "Following a perinatal stroke, approximately 60% of children have cerebral palsy (usually presenting as a spastic hemiplegia); 30% to 60% experience epilepsy; 25% show language delay; and up to 22% manifest behavioral abnormalities (defined as physician-diagnosed attention, hyperactivity, or behavioral problems)."[3]

In another study published in the March 4, 2014, issue of *Neurology*, Studer and colleagues reported that specific risk factors for poor cognitive outcome after pediatric stroke were: younger age at onset; presence of seizures; lesion location that included both cortical and subcortical regions; and severe neurologic impairment.[4]

In 2008, German researchers conducted a study on 111 pediatric stroke patients, aged 3 to 18 years, and found: "Children tend to develop more behavioral problems due to stroke. Especially, there is an increase of social and attention deficiencies. Furthermore, the children show an increase of school-based problems. More problems in behavior and temperament can be found in patients with perinatal stroke and stroke in childhood than children with stroke in infancy."

The study, according to the researchers, puts a spotlight on the need for comprehensive psychologic diagnostics and multiprofessional intervention at an early stage to prevent stable psychologic or psychiatric disorders after stroke in childhood.[5]

Further, researchers have also reported that symptoms of attention-deficit/hyperactivity disorder occur more often in a sample of childhood stroke survivors than in a healthy population. Here, age of stroke onset was again an issue: Strokes that occurred in childhood (ages 5 to 10 years) led to better cognitive outcomes than those in very early or late childhood.[6]

## Specter of recurrence

There is also the concern about the risk of stroke recurrence, which ranges between 10% and 20% in

# RESOURCES FOR PHYSICIANS AND FAMILIES

## VIDEO SERIES

The *Brendon's Smile Foundation* has partnered with the Washington University School of Medicine, Department of Pediatric Neurology in St. Louis, Missouri, to educate doctors and medical professionals through the Annual Brendon's Smile Foundation Lecture Series on Pediatric Stroke. Although these informative lectures, presented by leading experts in the field of pediatric stroke, are intended for healthcare professionals, the information discussed is of great value to anyone interested in learning more about pediatric stroke.

- **bit.ly/Brendons-Smile-Foundation-Lecture-Series**

In early 2014, one of the lectures was made available for Continuing Medical Education (CME) credit. The 2013 lecture by Adam Kirton, MD, titled "Perinatal Stroke: Black Boxes and Brighter Directions," can be accessed for CME credit by registering at the Washington University School of Medicine CME-online site. Once on the website, click on "Course Catalog," then "CME Credit Courses," and then "Pediatrics" to access the lecture.

- **https://cme-online.wustl.edu**

## TOOLS

Download a free and comprehensive 35-page PDF for families touched by pediatric stroke published through the Canadian Stroke Best Practices/Heart and Stroke Foundation of Canada. Designed to provide basic information about stroke and stroke care to families of children who have had a stroke, it is an educational resource based on the Canadian Stroke Best Practice Recommendations for Stroke Care (2010), current research, and expert opinion.

- **bit.ly/stroke-best-practices**

The pediatric stroke outcome measure determines neurologic impairment after stroke. Researchers in this study assessed 36 children with stroke with the measure, testing for cognitive ability, problem behavior, adaptive behavior, and social participation. They found the total measure is useful for anticipating poor outcomes after pediatric stroke, and it could help clinicians in the treatment of these children.

- **Lo W, Gordon AL, Hajek C, et al. Pediatric stroke outcome measure: predictor of multiple impairments in childhood stroke. *J Child Neurol.* 2014;29(11):1524-1530.**

## GUIDES AND OTHER RESOURCES

What's also lacking is infant and childhood research on stroke. This gap in research affects everything from early detection of pediatric stroke to the need for long-term care of these patients. For example, parents and health professionals often don't suspect stroke in infants or children because of a lack of awareness. This leads to common delays and misdiagnoses of pediatric stroke. For more information:

### CHILDREN'S HOSPITAL CLEVELAND CLINIC

Facts about pediatric stroke:

- **bit.ly/pediatric-stroke-fact-sheet**

### NATIONAL STROKE ASSOCIATION

- **www.stroke.org**

Pediatric stroke, common risks/unique symptoms:

- **bit.ly/pediatric-stroke-impact**

### CHILDREN'S HEMIPLEGIA AND STROKE ASSOCIATION (CHASA)

- **www.CHASA.org**
- **www.KidsHaveStrokes.org**

CHASA infant and child pediatric stroke fact sheet:

- **www.chasa.org/medical/pediatric-stroke/**
- **E-mail: info437@chasa.org**
- **Phone: 817-492-4325**

### AMERICAN HEART ASSOCIATION (AHA)/ AMERICAN STROKE ASSOCIATION (ASA)

Pediatric stroke resources:

- **bit.ly/AHA-ASA-pediatric-stroke-resources**

Guidelines for managing stroke in infants and children:

- **http://stroke.ahajournals.org/content/39/9/2644.long**

### SCREENING AND INTERVENTION

Another recent study offers clinical features to help clinicians target children who might benefit most from neuropsychologic screening and intervention:

- **Studer M, Boltshauser E, Capone Mori A, et al. Factors affecting cognitive outcome in early pediatric stroke. *Neurology.* 2014;82(9):784-792.**

children and can vary depending on cause. Although pediatric stroke risk is highest in the first year of life, stroke can occur anytime in childhood or adolescence.[1,7] Assessing and, if possible, addressing stroke risk factors in pediatric stroke patients to prevent recurrence is important not only to survival, but also to quality of life.[8]

## Beyond clinical impact

The reality is that pediatric stroke impacts not only patients, but also their families—and society—for decades.[2] Despite often long-term physical and mental health hurdles, more than 85% of babies who have strokes live to adulthood.

For families hit by stroke, financial burdens can quickly spiral. Many children who survive pediatric stroke require not only acute but also long-term rehabilitation. Researchers of 1 study found that medical costs in the year following pediatric stroke average $43,000.[9] That's not to mention the years of therapy; seizure and spasticity medications; orthotics; orthopedic surgery; behavioral interventions; and special education in schools that young stroke survivors may also need. Researchers have tallied substantial and long-term financial costs associated with pediatric stroke, concluding that patients incurred 5-year healthcare costs that were 15 times higher than children of the same age who have not had strokes.[10]

Beyond direct medical costs, pediatric stroke survivors and their families shoulder income and productivity losses in addition to altered family relationships and home life.[11]

Once a family gets through the acute concerns of postpediatric stroke, they settle into the realization that they and their child might be impacted for the long term. "It's important to distinguish the mental changes that have come about at the level of the family in terms of their own reaction to a child that has been acutely altered by some type of an illness, like stroke," Sandberg says. Siblings and other family members tend to suffer, too. Siblings might get less attention, for example, which can breed resentment.

## What can pediatricians do?

Ultimately, pediatricians can be central to the team of providers that help these children get back to doing what children do, Sandberg says.

Studer et al recommend that all children with arterial ischemic stroke undergo regularly scheduled neuropsychologic assessments to ensure implementation of needed interventions and environmental adjustments as early as possible.[4]

Sandberg concurs. "There needs to be a very detailed neuropsychologic assessment that speaks to the strengths and weaknesses the child has, so that the family and the school system—everyone—is aware of what changes have occurred as a result of the stroke."

Pediatricians also can partake in the rehabilitation focus of helping children reintegrate into school life, recognizing that they might need special help. Depending on the nature of the stroke and how it has affected the central nervous system, pediatric stroke survivors might have diminished abilities in reading, writing, and arithmetic, Sandberg notes.

In addition, the pediatrician practice can be key in guiding families to social and community support that can assist in meeting patients' and families' needs. Possible actions include referring a patient for psychologic evaluation, or helping that patient find a resource to deal with behavior issues more constructively. Behavior issues that are adversely affecting school can be a result of a child's academic expectations being outmatched by that child's ability. A psychologic evaluation can help to pinpoint the child's strengths and weaknesses, which, in turn, help to adjust or modify educational approaches and expectations.

Some patients with evidence of attention-deficit problems might benefit from medication, Roach adds.

Ultimately, pediatricians should understand that recovery holds an emotional dimension, a health dimension, and a dimension of the family and the family's ability to reorient. That means understanding the degree of the child's communications and capacity to move and be active.

Most critically, the pediatrician can initiate the conversations that can lead to true healing for the patient—and the entire family.

In summary, Roach says pediatricians should be mindful of the emotional, social, behavioral, and cognitive problems and pressures that follow pediatric stroke, and should ask questions. Sometimes, according to Roach, a question to the child or family as simple as "How are you dealing with this?" is enough to open the curative floodgates. ■

**For references,** go to **ContemporaryPediatrics.com/pediatric-stroke-psyche**