

Pediatric Pulse



Not All Strokes Are Created Equal! Why children with a suspected stroke in the Kansas City area should go to Children's Mercy first!

Jennifer Flint, MD, Pediatric Critical Care, and Lisa Pruitt, BSN, RN, C-NPT

Stroke in a child? Really? Yes!

A pediatric stroke occurs as often as a pediatric brain tumor. The World Health Organization estimates about two in 100,000 babies and children will have a stroke. Unfortunately, there is up to an 11 percent mortality rate and up to 75 percent will experience lasting neurological deficit and disability. Pediatric Acute Ischemic Strokes (AIS) differ from adult strokes in etiology, physiology and natural history. Therefore, stroke is often under or misdiagnosed.

Pediatric risk factors include the following: congenital heart disease, recent head and/or neck infection, acute systemic viral illness, prothrombotic state, autoimmune disorders, arteriopathies and unvaccinated children are thought to be at higher risk. However, 24 percent are considered idiopathic!

Bringing all pediatric patients with an acute neurological deficit to Children's Mercy will allow them expedited care and rapid imaging, ensuring they receive the most appropriate care and treatment.

Younger children are more likely to present with "vague" neurological symptoms as compared to older children and adults, making pre-hospital determination extremely challenging, if not impossible. Clinical presentation of pediatric stroke can include: first-time seizure with postictal neurological deficit, irritability or altered level of consciousness, use of non-dominant hand and refusal to walk.

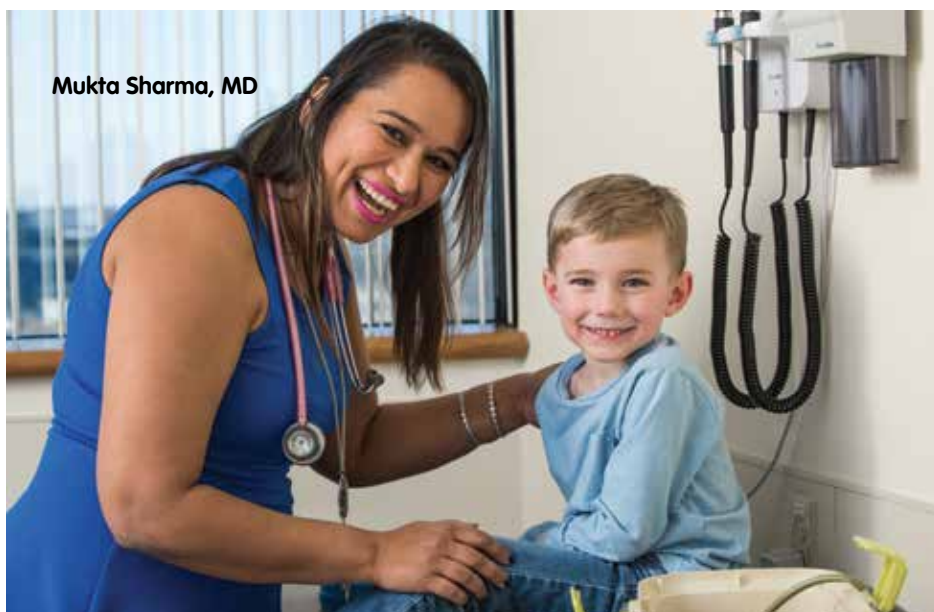
I suspect this pediatric patient could be having a stroke. Now what?

Time is brain. Rapid identification, diagnosis and treatment are critical! It is imperative these children be transported to a pediatric stroke program.

What makes a pediatric stroke program different from "an adult comprehensive stroke center"?

- ✓ Standardization of care and collaborative stroke activation.
- ✓ Immediate and accurate diagnosis can be made at Children's Mercy because the hospital has a robust and collaborative team of pediatric specialty providers in place 24/7.
- ✓ Pediatric neurologists: There is no pre-hospital stroke scoring tool for kids! The Pediatric NIH Stroke Scale is only validated for clinical use by a trained pediatric neurologist.
- ✓ Pediatric radiologist: MRI/MRA is preferred for stroke confirmation due to the high likelihood of a non-stroke diagnosis.
- ✓ Pediatric anesthesia: Ability to provide pediatric anesthesia immediately upon arrival and need for rapid imaging.
- ✓ Pediatric hematology: Consultation available for appropriate and safe thrombolysis for pediatric patients.

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Mukta Sharma, MD

Talan Turner Inspires Creation of Stroke Protocol

On March 22, 2016, as 2 1/2-year-old Talan Turner played in the back yard of his home in McLouth, Kan., the unthinkable happened—the toddler had a stroke.

“Talan had just thrown the ball to our dog, and the dog kicked it back,” said his mother, Tiffany. “When Talan bent over to pick the ball up, he literally just fell over.”

When Tiffany reached Talan, the whole left side of his body was limp and he couldn't speak. She called 911.

“Our local EMS team transported him over an hour away to Children's Mercy. They knew he would get the care he needed there,” Tiffany said.

The Children's Mercy Hospital Emergency Department staff suspected Talan had suffered a seizure, a common occurrence in young children.

Doctors admitted the toddler, but the next day the weakness on his left side and his inability to communicate persisted. This prompted the neurology attending physician to order an MRI. The test confirmed that Talan had suffered a stroke.

“Talan had what is called focal cerebral arteriopathy, a condition responsible for about 35 percent of all pediatric strokes. Of those, the majority have had a recent viral illness,” explained Roha Khalid, MD, Talan's pediatric neurologist.

Talan had had a stomach virus a few weeks earlier; it had caused inflammation in his body, likely making the vessel in his brain spasm. The stroke weakened his left arm and leg, and severely restricted his ability to communicate.

Talan's doctors prescribed physical, occupational and speech therapies to help him regain the skills he had lost. After a 12-day hospitalization, he returned home to begin the long road back to his childhood.

Talan is doing well now, but continues to recover from the devastating impact of the stroke thanks to a combination of therapy at Children's Mercy and Parents as Teachers from his local school district.



Talan Turner

An Inspiration for the Comprehensive Stroke Clinic Team

“When Talan came into the ER, we did not have a stroke protocol in place or a stroke team,” Dr. Khalid said. “His case made us realize that we needed to have a better system in place to take care of children experiencing stroke.”

With Talan as their inspiration, Dr. Khalid and her colleagues, Mukta Sharma, MD, Hem/Onc and Sathya Vadivelu, DO, Rehabilitation Medicine, developed a stroke protocol. Children presenting with stroke-like symptoms are emergently triaged to undergo neurologic evaluation and neuroimaging within an hour of presentation.

Children from infants to 18 years old who are diagnosed with a stroke are followed in the Children's Mercy Comprehensive Stroke Clinic. The clinic streamlines hematology, neurology and rehab services under one umbrella for the best outcomes and the family's convenience. Now Children's Mercy is one of the few pediatric hospitals in the country with a coordinated pediatric stroke program.

“Talan's case made it obvious to us that even pediatric health care workers don't always recognize how common stroke is in children,” Dr. Khalid said. “We want everyone to think stroke first. Whether you are a medical professional or a parent, if you see a child who is experiencing unexplained weakness on one side of the body, you need to think stroke.”

Not All Strokes Are Created Equal!

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Children's Mercy is the Region's Only Pediatric Stroke Program

Because etiology, presenting symptoms, history and radiologic imaging of AIS vary so greatly from adult strokes, it is critical these children be transported to the facility that can make the timeliest, and most accurate diagnosis to ensure these patients receive the most timely and appropriate treatment! Bringing all pediatric patients with an acute neurological deficit to Children's Mercy will allow them expedited care and rapid imaging, ensuring they receive the most appropriate care and treatment.

Children's Mercy has set up a fine-tuned Stroke Alert and Stroke Activation plan throughout the institution. Upon arrival to the Children's Mercy Emergency Department, if a Stroke Alert is made, pediatric neurology performs a Pediatric NIH Stroke Scale assessment and score. Again, this is only validated for clinical use by a pediatric neurologist. If a stroke is suspected, a stroke activation is made and the patient is sent immediately for rapid imaging where a pediatric radiologist is available immediately to make a critical diagnosis.

Stroke in children is extremely rare and difficult to diagnose. In reality, most children who present with a neurologic deficit or suspected stroke actually have another acute process requiring **urgent treatment at a pediatric facility**. Stroke mimickers are far more common than pediatric stroke and can include the following: Todd's paralysis, hypoglycemia, intracranial hemorrhage, child abuse, traumatic injury, brain tumor, electrolyte abnormalities, complex migraines, intracranial infections, brain abscess and Moyamoya.

For questions or for more information/education on pediatric stroke and the preferred system for routing this critical population of patients, please contact Heather Scruton, Assistant Director of Transport and EMS Relations at Children's Mercy, hkscruton@cmh.edu, (816) 983-6449.

For questions or concerns regarding a patient with suspected stroke, EMS providers please contact the Children's Mercy's Emergency Department at (816) 234-3430. Physicians or other referring providers, please call 1 (800) GO-MERCY.

Pediatric Burn Injuries

Pablo Aguayo, MD

Director, Burns; Associate Director Trauma, Critical Care; Assistant Program Director Surgical Critical Care Fellowship; Assistant Professor of Pediatric Surgery, University of Missouri-Kansas City School of Medicine

In 1953, a 49 percent total body surface area, or TBSA, burn produced an expected mortality of 50 percent in a child. Today, the same mortality rate is only seen with burns that are 99 percent TBSA.

Although several major advancements in burn care have occurred over the last 70 years, pediatric burn injury continues to be a major cause of unintentional death and injury in children less than 14 years of age. In the United States, burn injury continues to be one of the top 10 causes of unintentional death in children, with more than 6,200 deaths reported from 2000 to 2015.

Measuring TBSA

The majority of pediatric burns are minor, often resulting from scald accidents and affecting less than 10 percent total body surface area. Such burns are usually limited to partial-thickness injury of the skin and can be managed on an outpatient basis. Larger burns require transport for inpatient admission and special attention.

A fundamental component of initial burn care is an accurate measurement of the TBSA of injured skin. Not reporting an estimated TBSA is akin to reporting someone is hypertensive without providing a blood pressure reading, or someone is hyperglycemic without providing a glucose level. Both state a fact, but both are inadequate.

There are several techniques to estimate the TBSA of a burn. The Lund and Browder chart provides an accurate determination of burn area in children, as it compensates for variations in body shape and proportions versus the Wallace rule of nines.

For a rapid estimation of burn size, the palmar method can be used. The palmar surface of the patient's entire hand, including fingers, is approximately 1 percent of the TBSA and is best used for estimating small surface area burns. Currently, there are more than 45 free smart phone applications to estimate TBSA. Most of them work well for initial



Pablo Aguayo, MD

evaluations. One can also easily access the Lund and Browder chart on any internet-connected device.

Managing Burn Injuries

A prerequisite for the optimal management of pediatric burns continues to be a multidisciplinary approach to care by a team of pediatric health care providers, therapists, social workers and emergency medical service personnel in an environment with data-driven guidelines and protocols designed specifically for children.

At Children's Mercy Kansas City, we

admit approximately 100 pediatric burn victims every year, and we have over 1,300 outpatient visits per year, caring for more pediatric burn patients than any hospital in the region. We are constantly creating and updating our guidelines and procedures. These include transport procedures for >20 percent TBSA pediatric burns.

These guidelines include estimating an accurate TBSA prior to arrival at our burn unit, ensuring proper IV access with two large-bore IVs, or interosseous access if appropriate; keeping transport vehicle temperature at 31°C (87.8°F); obtaining Foley catheter and NG/OG to suction when

possible; and ensuring burned sites are covered with clean, dry sheets.

For fluid resuscitation, we recommend utilizing the American Burn Association transfer protocol. We recommend NS for patients >20kg and D5NS for children <20kg for maintenance IVF if LR is not available. Transport IV fluids should be based on age as follows:

- a. <5 years: LR at 125 ml/hr
- b. 6-14 years: LR at 250 ml/hr
- c. >15 years: LR at 500 ml/hr

We discourage the administration of IVF boluses as much as possible, but if one is required, we recommend giving 10 ml/kg of LR or NS. We defer full IVF resuscitation calculations for large burns until the patients have undergone a formal debridement at our burn unit.

Under the direction of Dr. Aguayo, Children's Mercy operates the only burn unit devoted exclusively to pediatric patients between St. Louis and Denver. The Burn and Trauma Staff includes board-certified surgeons, a wide variety of specialists, subspecialists and ancillary services, all available 24 hours per day. Our outcomes for pediatric trauma patients are above the national average.

For more information, visit childrensmercy.org/burn.

We admit approximately 100 pediatric burn victims every year, and we have over 1,300 outpatient visits per year, caring for more pediatric burn patients than any hospital in the region.

Criteria for Children's Mercy Tom Watson Emergency Department

Children's Mercy Hospital Kansas in Overland Park provides a comprehensive pediatric community emergency department. The

department is staffed with dedicated pediatric emergency physicians and specialized pediatric nurses.

The following conditions and patients with potential immediate trauma or surgical needs should be preferentially routed to the Children's Mercy Adele Hall Campus, 2401 Gillham Road, Kansas City, Mo.

- Major burns >10% TBSA
- Penetrating injury to head, chest, abdomen, neck or groin
- Airway burns or trauma
- Occupant ejection
- Fall from height >10 feet or twice the patient height
- Pedestrian hit at speed of >20 mph
- Death of same car occupant
- Prolonged extrication >20 minutes
- Neurological deficits-any body parts
- Neurosurgical emergencies of any type
- Amputations-any body part
- Femur or pelvic fractures
- Traumatic cardiopulmonary arrest patients
- T&A bleeding
- Drownings that require resuscitation (CPR)



Meet Heather Scruton, MBA, MSN, RNC-OB, CEFM

Assistant Director of Transport and EMS Relations, Children's Mercy Kansas City

Children's Mercy Critical Care Transport is pleased to announce the addition of Heather Scruton, our new Assistant Director of Transport and EMS Relations. Heather will be working with our community partners to collaborate between multiple hospital departments, regional health care facilities and EMS agencies to facilitate optimal regional specialty transport.

Heather began her health care career in 1994, working as an EMT in a community hospital emergency department. She went on to earn her nursing degree from the University of Kansas in 1996, and her master's degrees in both health care administration and business administration from the University of Mary in 2013.

For the past 18 years, Heather's clinical specialty has been high-risk obstetrics and perinatology. She was integral in the design and implementation of the

Children's Mercy's Elizabeth J. Ferrell Fetal Health Center and the Critical Care Maternal-Fetal Transport service line. She has presented both regionally and nationally on topics including health care innovation, simulation, transport, leadership and advocacy.

Heather looks forward to promoting the industry best practices of the Children's Mercy's Critical Care Transport team, while maintaining and expanding partnerships within the EMS and the air medical transport communities. She will continue to be a liaison between our valued referral organizations and our exemplary transport crews, communication specialists and leadership.

Please feel free to reach out at any time with questions regarding transport services, promotional events, educational offerings or other inquiries.

You can reach Heather at (816) 983-6449, or by email at hkscruton@cmh.edu.

Three Things You May Not Know About Heather!

1. Heather was the recipient of the 2018 March of Dimes Women's Health Nurse of the Year award in Kansas City.
2. During her career, she has worked in emergency medicine, psychiatry, obstetrics and now critical care transport.
3. When she's not working, Heather spends her time with her two teenagers, Adam, age 19, and Alison, age 16, and her husband of 22 years, Jay.

Children's Mercy Offers Highest Level of Pediatric Surgical Care

Children's Mercy is one of only 13 centers in the U.S. to be verified as a Level 1 Children's Surgery Center, the highest rating possible from the American College of Surgeons, which has set the highest standard of care in the United States. By joining this elite group of Level 1 Children's Surgery Centers, Children's Mercy is contributing to the innovation of pediatric surgery, which impacts the lives of children around the world.

The review process to become verified is rigorous and stringent, including a thorough site visit by an ACS team of surveyors who review the hospital's structure, process and clinical outcomes. The team, which consists of experienced pediatric surgeons, anesthesiologists and nurses, visit all areas of the hospital to make sure the people, resources, the culture of safety and administrative support ensure patients receive the highest level of care.

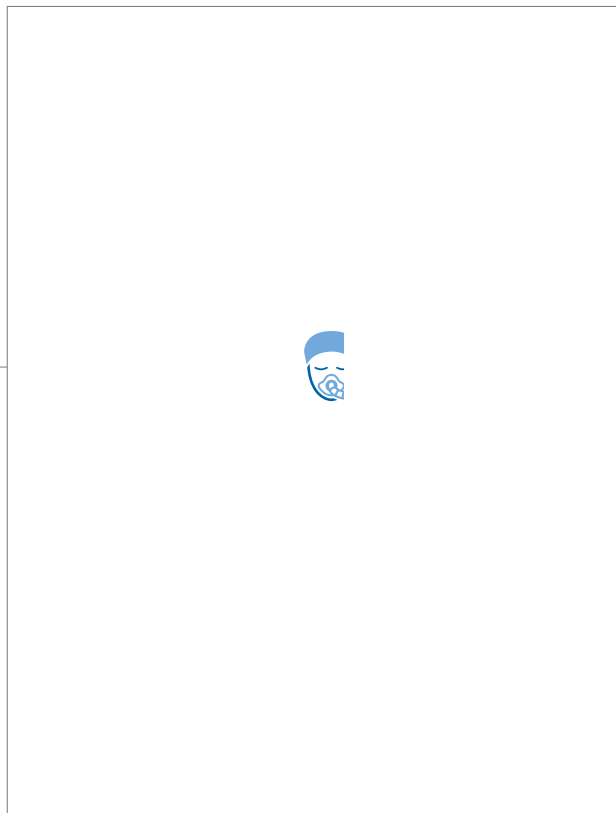
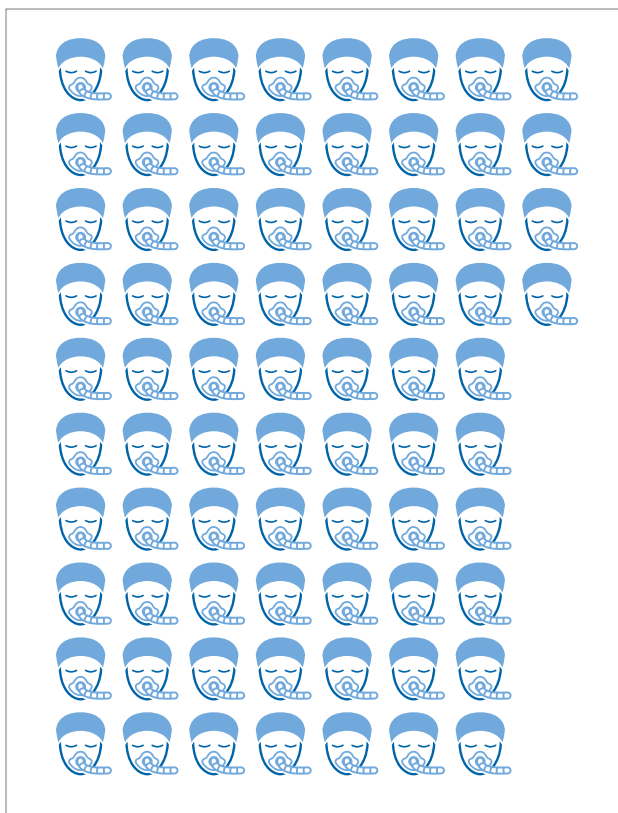
An important component of providing this level of surgical care is the expertise of pediatric anesthesiologists. At Children's Mercy, only highly experienced pediatric anesthesiologists care for each child. This ensures the patient has a safe and smooth anesthetic experience.

In fact, the pediatric anesthesiologists at Children's Mercy administer anesthesia for more than 27,000 children each year—that's 74 each day. Most adult hospitals only treat about 200 children each year—less than one a day.



Children's Mercy **74** pediatric anesthesia procedures per day

Adult Hospitals **<1** pediatric anesthesia procedures per day



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Children's Mercy Offers Highest Level of Pediatric Surgical Care

SAVE THE DATE!

May 8

Mo/Kan Regional Burn Conference

For more information, contact:

Kayla Northrup
University of Kansas
Health System
knorthrop@kumc.edu

OR

Dan Marx
Children's Mercy
Kansas City
djmarx@cmh.edu

2019 TRAUMA EDUCATION OFFERINGS

June 4

Pediatric Topics in Trauma

- Children's Mercy Auditorium, Adele Hall Campus, telecast to offsite locations
- 1 to 5:15 p.m., June 4, 2019

March 1 | July 26 | Oct. 25

Advanced Burn Life Support

Courses are pending approval of continuing education unit for nursing, EMS and respiratory therapy.

For questions, please contact David Seastrom at (816) 983-6917, or via email: dwseastrom@cmh.edu.

To create an account and search for these classes in Cornerstone, visit: <https://childrensmercy.org/csce>.

