



# Advancing Pediatric Trauma Care

2018 Annual Report



NATIONWIDE  
CHILDREN'S

*When your child needs a hospital, everything matters.<sup>SM</sup>*



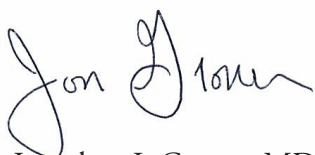
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**M**oments are critical when you are faced with a trauma. That's why the expert pediatric team at Nationwide Children's Hospital is committed to the most advanced care possible for every injured child that comes through our doors.

The Level I Pediatric Trauma Center at Nationwide Children's provides around-the-clock services to the central Ohio region and beyond. Every patient benefits from our state-of-the-art rehabilitation facilities, in-house radiology coverage and a comprehensive pediatric burn program verified by the American Burn Association. Our program is supported by a wide-range of pediatric subspecialists including critical care, orthopaedic surgery, neurosurgery, plastic surgery, otolaryngology, anesthesia, emergency medicine, social work, psychology and pediatric trauma surgery, allowing our team to handle the most complex cases.

As a leading pediatric academic medical center with a dedicated Pediatric Trauma Research Center, we go beyond patient care, serving as a resource for injury prevention and education throughout the nation.

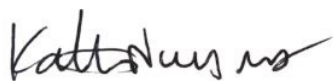
Join us as we highlight our program advancements for 2018 in the enclosed Trauma Program Annual Report – delivering on our institutional journey to create best outcomes for children everywhere.



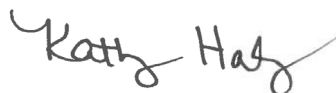
Jonathan I. Groner, MD



Rajan Thakkar, MD



Kathy Nuss, MD

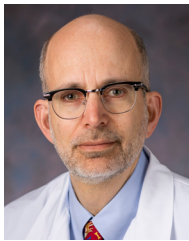


Kathy Haley, MS, RN

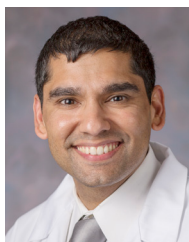


# TRAUMA

## Program



**JONATHAN GRONER, MD**  
Trauma Medical Director



**RAJAN K. THAKKAR, MD**  
Associate Trauma  
Medical Director



**KATHY NUSS, MD**  
Trauma Quality  
Medical Director



**KATHY HALEY, MS, RN**  
Program Manager

Pediatric trauma care is complex and continues to evolve as a discipline. The trauma program at Nationwide Children's is one of the largest freestanding Level 1 Pediatric Trauma Centers in the country and is committed to contributing to the science of pediatric trauma care, advocating for trauma related issues and providing pediatric trauma education.

Tragically, one child dies roughly every hour from traumatic injuries, and trauma remains the leading cause of death for children in the United States. Research dollars spent on trauma continue to be disproportionately low compared to non-trauma pediatric illnesses. Advocacy for pediatric trauma care continues to be important.

The expansive trauma care continuum at Nationwide Children's and the Center for Pediatric Trauma Research continue to improve outcomes for children and their families. Maintaining a highly competent workforce for pediatric trauma care continues to be an important factor in achieving best outcomes. In the United States, methods for providing pediatric trauma care are varied. We continue to research the best methods to provide pediatric trauma care and provide state-of-the-art pediatric trauma education.

### 2018 faculty additions and education accomplishments:

- Jeremy Fisher, MD, joined the trauma surgeon panel
- Amalia Cochran, MD, joined the burn surgeon panel
- Hosted the first Trauma Resuscitation in Kids (TRIK) course in the United States
- Published on a unique method for ensuring a meaningful trauma nursing education process

### 2018 highlights for quality initiatives:

- Participation in the inception of a national injury quality collaborative – The Pediatric Injury Quality Improvement Collaborative
- Eric Sribnick, MD, was invited to write guidelines for the American College of Surgeons Trauma Quality Improvement Program as part of the Pediatric Trauma Society Nonaccidental Trauma Best Practices Guideline Project
- Jonathan I. Groner, MD, was named to lead the pediatric focus group for the National Trauma Research Action Plan (NTRAP)
- Kathy Haley, MS, RN, served on an advisory group for a national pediatric trauma toolkit
- Trauma program members presented quality improvement data and scientific research at the Pediatric Trauma Society meeting

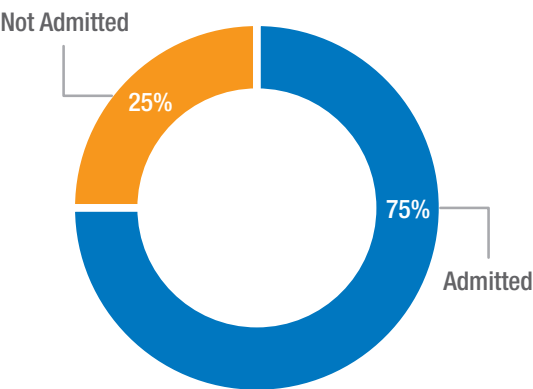


**2018 external validation of meeting national pediatric trauma standards:**

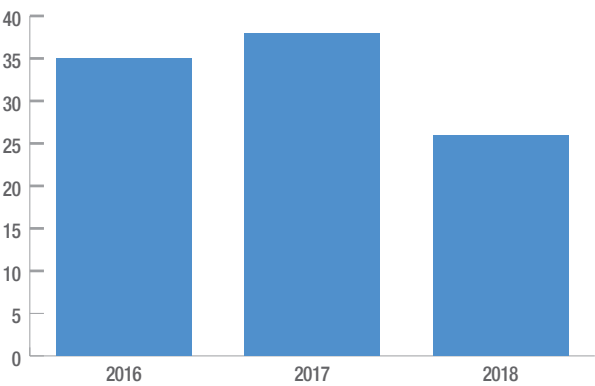
- Successful re-verification by the American College of Surgeons as a Pediatric Level 1 Trauma Center.  
Nationwide Children’s Hospital has been successfully re-verified since 1991, and was the first in Ohio to have this distinction
- Successful re-verification by the American Burn Association as a Burn Center

Trauma Program Fast Facts 2018:			
Total trauma volume . . . . .	1,961	Total trauma patients in need of OR . . . . .	882
Total trauma admissions . . . . .	1,475	Total number of operative procedures . . . . .	2,690
Average length of stay . . . . .	3.0 days		

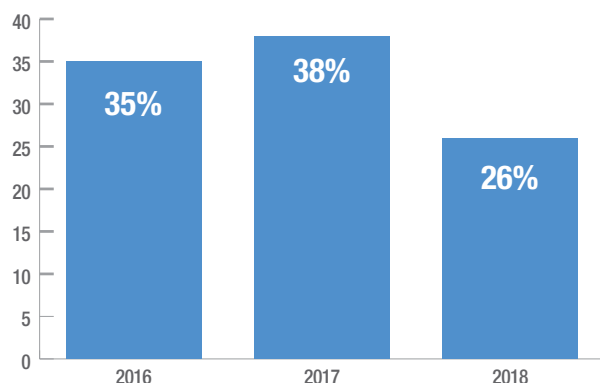
**Patients that met National Trauma Quality Improvement Program (TQIP) Criteria**



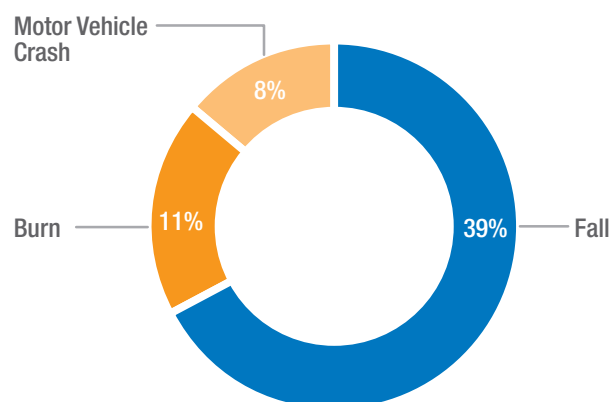
**2018 Trauma Deaths**



## Children with Penetrating Trauma



## Leading Causes of Injury



## Grants

- Rajan Thakkar, MD. Systemic and Local Immune Function after Pediatric Thermal Injury 1/1/2018 – 12/31/2022  
Role: Principal Investigator; K12 NICHD, University of Utah, 5K12HD047349-14, Sub award # 10034012-NWCH  
Major goal: To understand both systemic and local immune function in pediatric burn injury with a specific focus on the role of the programmed death-1 (PD-1) pathway. The final support of this award is complete with acceptance of the NIH-K08. \$96,500
- Rajan Thakkar, MD. Systemic and Local Immune Function after Pediatric Thermal Injury; 9/1/2018 – 8/31/2022  
Role: Principal Investigator; 1K08GM124499-01A1 NIH - NIGMS  
Major goal: To understand both systemic and local immune function in pediatric burn injury with a specific focus on the role of the programmed death-1 (PD-1) pathway. \$753,840

## Research/Publications Highlights

Hodosevich Z, Wheeler KK, Shi J, Coffey R, Bailey JK, Jones LM, Thakkar RK, Fabia RB, Groner JI, Xiang H. Incidence of unplanned 30-Day readmissions in adult burn patients in the United States. *Journal of Burn Care & Research*. 2018 Oct 23; 39(6):923-931.

Noffsinger DL, Wurster LA, Cooley J, Buchanan L, Wheeler KK, Shi J, Xiang H, Groner JI. Alcohol and drug screening of adolescent trauma alert patients at a level pediatric trauma center. *The American Journal of Emergency Medicine*. 2018 Dec 7. [Epub ahead of print]

Wheeler KK, Shi J, Xiang H, Thakkar RK, Groner JI. US pediatric trauma patient unplanned 30-day readmissions. *Journal of Pediatric Surgery*. 2018 Apr; 53(4):765-770.







**MICHAEL STONER, MD**  
Chief, Section of  
Emergency Medicine



**BARB ABDALLA, RN, MSN, CPN**  
Nursing Director, Emergency  
Department/Main Campus Urgent Care



**SRIKANTH ARAVAPALLI, MD**  
Trauma Liaison

Nationwide Children's emergency care consists of two pediatric Emergency Departments (ED). The main campus houses our trauma bays. The main campus ED is the third busiest ED in the nation (NACHRI benchmarking data). Our service line also includes seven Urgent Care Centers located throughout central Ohio. Our quality data supports we provide optimal lifesaving resources for all levels of acuity patients including injured children. Our multidisciplinary team, along with a state-of-the-art physical plant helps to ensure patients receive the highest quality care.

### 2018 achievements:

- Fisher Kenny E, Martin M, McClain A, Stanley R, Saunders J, Lo C, Cohen D. Using High-Fidelity Simulations to Train Emergency Department Staff in Preparation for a Clinical Trial. Accepted Clinical Simulation in Nursing 9.21. This study demonstrated that simulation is feasible, and increased knowledge of the trial will likely enhance collaboration and communication
- Traumatic Injury Clinical Trial Evaluating Tranexamic Acid in Children (TIC-TOC): A Pilot and Feasibility Study, PI Dr. Rachel Stanley. This is a Phase II, multi-center, randomized, double-blinded, placebo-controlled trial whose primary objective is to collect preliminary data on the safety and efficacy of TXA in severely injured children
- Development and Testing of a Pediatric Cervical Spine Injury Risk Assessment Tool (C-Spine), Julie Leonard, MD. This study proposes to develop and test a Pediatric CSI Risk Assessment Tool that can be used by EMS and ED providers to determine which children warrant spinal precautions and cervical spine imaging after blunt trauma

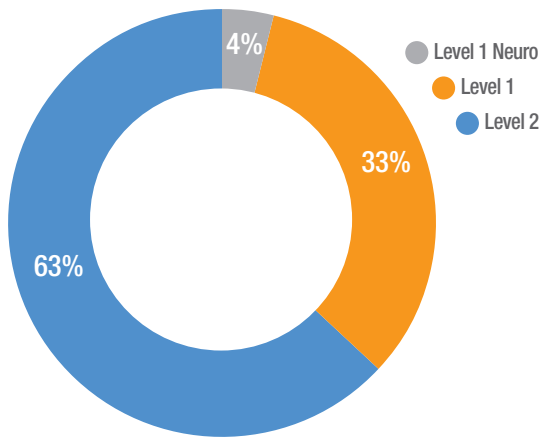
### Trauma Nurse Leader Program:

The Trauma Nurse Leader Program was started at Nationwide Children's Hospital in 2005. The purpose of the program is to improve the overall quality of trauma care in the emergency department. Trauma Nurse Leaders are highly trained RNs who have a minimum of 2 years trauma nursing experience and have demonstrated strong leadership and knowledge about pediatric emergency trauma care. These nurses are responsible for several key components of the resuscitation of the trauma patient, including triage



direction and decision making, monitoring fluid management and ensuring completion of the primary and secondary assessments. The program is one of the first of its type in the country and is a model that many other hospitals have emulated. There are currently 17 trauma nurse leaders (TNL) at NCH. This nurse led group is involved in many important decisions affecting changes within the organization, and helps to provide education to the unit as well as serving as mentors to all nurses within the department.

**Alert Activation Levels  
Requiring Admission for Injury**



**1,393**

**Trauma patients admitted through  
the ED (includes non-alerts)**

# PEDIATRIC ORTHOPAEDIC SURGERY

## Program



**ALLAN C. BEEBE, MD**  
Director of Pediatric  
Orthopaedic Trauma

The Department of Orthopedics specializes in diagnosing, evaluating and treating problems of the musculoskeletal system, trauma and fractures, complex conditions of the hip, and scoliosis and other spinal abnormalities.

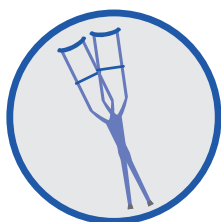
- **The Center for Hip Preservation** at Nationwide Children's offers patients an expanded and formalized, comprehensive care approach to hip health and trauma issues. In order to offer a broad spectrum of operative and non-operative care options to preserve and improve the native hip joint, the Center for Hip Preservation brings together clinicians from orthopedics, radiology, physical therapy, healthy weight and nutrition, physical medicine and more.
- **Medical device and imaging advancements** are providing orthopaedic physicians an unprecedented level of control in treating and managing congenital, developmental and neuromuscular-related spine conditions. Our specialists not only use many of the latest techniques and technologies, but are also developing innovative surgical methods to improve outcomes and meet the individual needs of patients who have years of growth ahead of them.
- **Innovative Research Venous Thromboembolism (VTE)** has previously been poorly studied in pediatric orthopaedic trauma/infection/elective surgery, yet it is associated with significant morbidity and hospital resource utilization. The primary objective of this multicenter study is to define the North American epidemiology of VTE in pediatric orthopedics by creating a multi-center open database. Nationwide Children's is proud to be a member of this huge research initiative across the country.
- **The Center for Limb Lengthening and Reconstruction** offers specialized limb length discrepancy and deformity treatment as part of a broad and advanced reconstructive medicine program. In addition to ongoing management of a wide range of congenital and acquired limb conditions, our team, led by Director Christopher Iobst, MD, provides both non-surgical and surgical treatment options for limb deformities and trauma patients. Dr. Iobst is one of the world's leading experts in limb lengthening and trains physicians globally in his technique for simultaneous correction of limb length discrepancy and deformity. The center also conducts large animal research studies in its Biomechanical Lab to improve, develop and design new options for limb implants and surgical technologies.
- **Adaptive Sports Medicine Program.** Patients of the Limb Deficiency Clinic receive the attention of a subspecialist in physical medicine and rehabilitation, as well as a community prosthetist and orthotist who specialize in pediatric limb deficiency care. The clinic focuses exclusively



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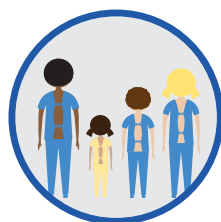
on young patients with congenital and acquired limb differences, including birth defects and amputations due to tumors, infection or trauma. The team offers treatment for all limb-related needs, including prosthetic and orthotic assistance, injury and use assessments and treatment, physical and occupational therapy, psychological support and long-term follow-up assessments to adjust care plans and monitor growth and function. Jonathan Napolitano, MD, directs the Limb Deficiency Clinic and is the Director of the Adaptive Sports Medicine Program.

- **The Honda Center for Gait Analysis and Mobility Enhancement (G.A.M.E.)** opened in August 2018, providing access to in-depth analysis of gait and motion for children and adults with mobility limitations, spinal conditions, neuromuscular disorders and congenital and acquired limb conditions. Director of Gait Analysis Amanda T. Whitaker, MD, and the GAME team provides personal assessments and a comprehensive consultation with orthopedic surgery, physical medicine, neurosurgery and physical therapy experts to craft customized care plans for each patient.



**622**

Admitted trauma  
patients with orthopaedic  
involvement



**471**

Trauma orthopaedic  
admissions



**151**

Trauma orthopaedic  
consults



**457**

Admitted trauma  
patients requiring  
operative management



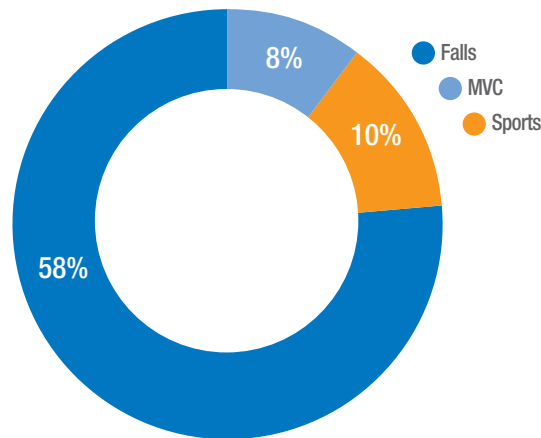
**440**

Admitted trauma patients  
with orthopaedic operative  
management in less than  
24 hours of admission



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## Top 3 Causes of Trauma Orthopaedic Injuries Requiring Hospital Admission



### Research/Publications Highlights

Gill LE, Klingele KE. Management of foot and ankle injuries in pediatric and adolescent athletes: a narrative review. *Orthopedic Research and Reviews*. 2018 April 4; 10:19–30.

Iobst CA, Rozbruch SR, Nelson S, Fragomen A. Simultaneous acute femoral deformity correction and gradual limb lengthening using a retrograde femoral nail: technique and clinical results. *Journal of the American Academy of Orthopaedic Surgeons*. 2018 Apr 1; 26(7):241-250.

Iobst CA, Singh S, Yang JZ. Opioid prescription patterns for pediatric orthopaedic fracture patients. *Journal of Clinical Orthopaedics and Trauma*. 2018 Aug 31. [Epub ahead of print]

Little KJ, Godfrey J, Cornwall R, Carr P, Dolan K, Samora JB. Increasing brace treatment for pediatric distal radius buckle fractures: using quality improvement methodology to implement evidence-based medicine. *Journal of Pediatric Orthopaedics*. 2018 Aug 4. [Epub ahead of print]

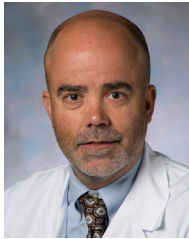
Persinger F, Davis RL 2nd, Samora WP, Klingele KE. Treatment of unstable slipped capital epiphysis via the modified Dunn procedure. *Journal of Pediatric Orthopaedics*. 2018 Jan; 38(1):3-8.

Samora JB, Samora WP, Dolan K, Klingele KE. A quality improvement initiative reduces cast complications in a pediatric hospital. *Journal of Pediatric Orthopaedics*. 2018 Feb; 38(2):e43-e49.

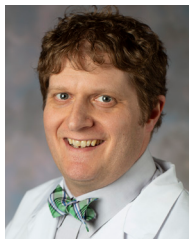
Triplet JJ, Samora WP, Samora JB. Distal humeral physal separation in a newborn: a case report and review of the literature. *Current Orthopaedic Practice*. 2018 Nov/Dec; 29(6):611-615.







**JEFF LEONARD, MD**  
Section Chief of  
Neurosurgery



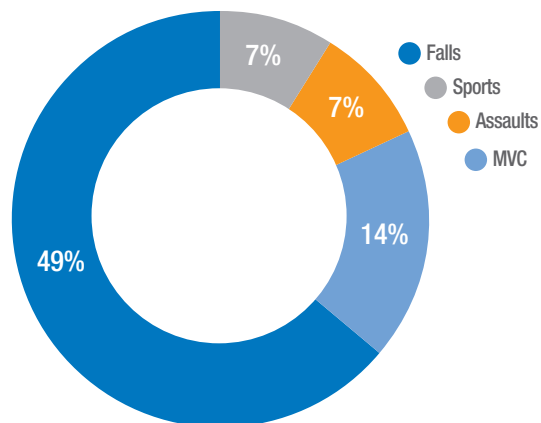
**ERIC SRIBNICK, MD, PHD**  
Pediatric Neurosurgeon  
Trauma Liaison

**T**rauma is the leading cause of death in children older than one year of age in the United States. Head trauma represents 80% or more of these injuries. Patients with severe head trauma are at risk for developing increased intracranial pressure and cerebral edema, leading to life threatening sequelae. Prompt neurosurgical care can be lifesaving for children suffering from head trauma. Nationwide Children's excels at providing rapid neurosurgeon involvement for the child with emergent trauma needs. The neurosurgical trauma panel has four neurosurgeons, all trained to care for injured children, especially in the surgical needs for decompressing the brain and prevention and stabilization of brain swelling. During 2018, the Nationwide Children's Division of Neurosurgery added Jeff Leonard, MD, as section chief and Annie Drapeau, MD, MSc, FRCSC, to the neurosurgical trauma team.

Other highlights included:

- Increased activation of a unique trauma alert team response called Level 1 Neuro Activation. NCH was one of the first pediatric trauma centers in the nation to provide this level of immediate response for children with serious head injury
- Provided EMS Outreach by working with EMS responders in the region to increase their knowledge about triage and care for the child with head injury
- Development of key protocols for the emergency room and intensive care unit to standardize care and improve efficiency in caring for children with traumatic brain injury

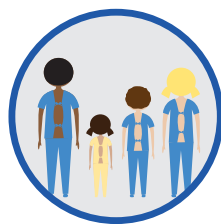
### Top Causes of Head Injury





**342**

Admitted trauma  
patients had neurosurgery  
involvement



**176**

Trauma neurosurgery  
admissions



**166**

Trauma neurosurgery  
consults



**32**

Trauma neurosurgery  
patients requiring operative  
management



**24**

Trauma neurosurgery  
patients to OR within  
24 hours

## Research/Publications Highlights

Hughes BD, Kreykes N, Nabaweesi R, Longshore S, Sribnick E, Petty J. Guidelines in Focus: Concussion in Children and Adolescents, Pediatric Trauma Society, 2018 (<http://www.pediatrictraumasociety.org/resources/concussion-guidelines.cgi>)

Sribnick EA. Neuro Trauma: One Size Does Not Fit All. Delivered to the American Association of Blood Banks on 2/28/18. <http://www.aabb.org/development/elearning/Pages/316.aspx>

Sribnick EA. Pediatric Head Trauma: Abusive Head Trauma Review. Presented at the Congress of Neurological Surgeons Meeting, October, 2018.



# EMS OUTREACH AND EDUCATION

## Program



**LAURA HOLDREN, MSN, RN**  
EMS Coordinator

**E**mergency Medical Services (EMS) Outreach and Education is a cohesive team of one full time coordinator and two part-time paramedic educators. The department creates a bridge of communication between EMS agencies and Nationwide Children's through collecting quality improvement data, providing feedback to EMS agencies, as well as offering feedback to the Emergency Department. EMS Outreach and Education brings expert knowledge and skill- building classes to EMS personnel throughout the state and beyond.

EMS Outreach and Education also bridges the gap from hospital to home for technology-dependent or children with specialized health care needs through our referral-based outreach program. By working with NCH care managers and discharge planners, 49 informational packets for 49 children discharged from Nationwide Children's were created to provide individualized pre-hospital care plans for these children. EMS Outreach works directly with community paramedics to streamline care from home to hospital.

EMS Outreach and Education provided quarterly free CE education to community EMS personnel and hospital employees through their EMS Night Out. EMS Night Out brings pediatric experts from Nationwide Children's into a small group setting of EMS personnel in an open learning environment to teach best pediatric care practices and host an "ask an expert" forum. This is a unique opportunity for information sharing, reviewing best practices, and learning current trends in pediatric emergency care.

EMS Outreach and Education at Nationwide Children's Hospital is a participant in the largest EMS Registry in the United States, the Cardiac Arrest Registry to Enhance Survival (CARES). The CARES registry provides national out of hospital cardiac arrest data (OHCA) as well as individualized department-based data for CARES registry EMS agencies with the goal of improving survival rates for OHCA.

Nationwide Children's, the Ohio Department of Public Safety, Columbus Division of Fire and the Franklin Country Prosecutor's Office launched the first introductory module in an online curriculum to educate EMS personnel and police about child maltreatment. Subsequent modules will cover scene management, documentation and reporting, investigations, aftercare, and clinical recognition of child maltreatment.



108

EMS outreach  
classes held in 2018

1,500

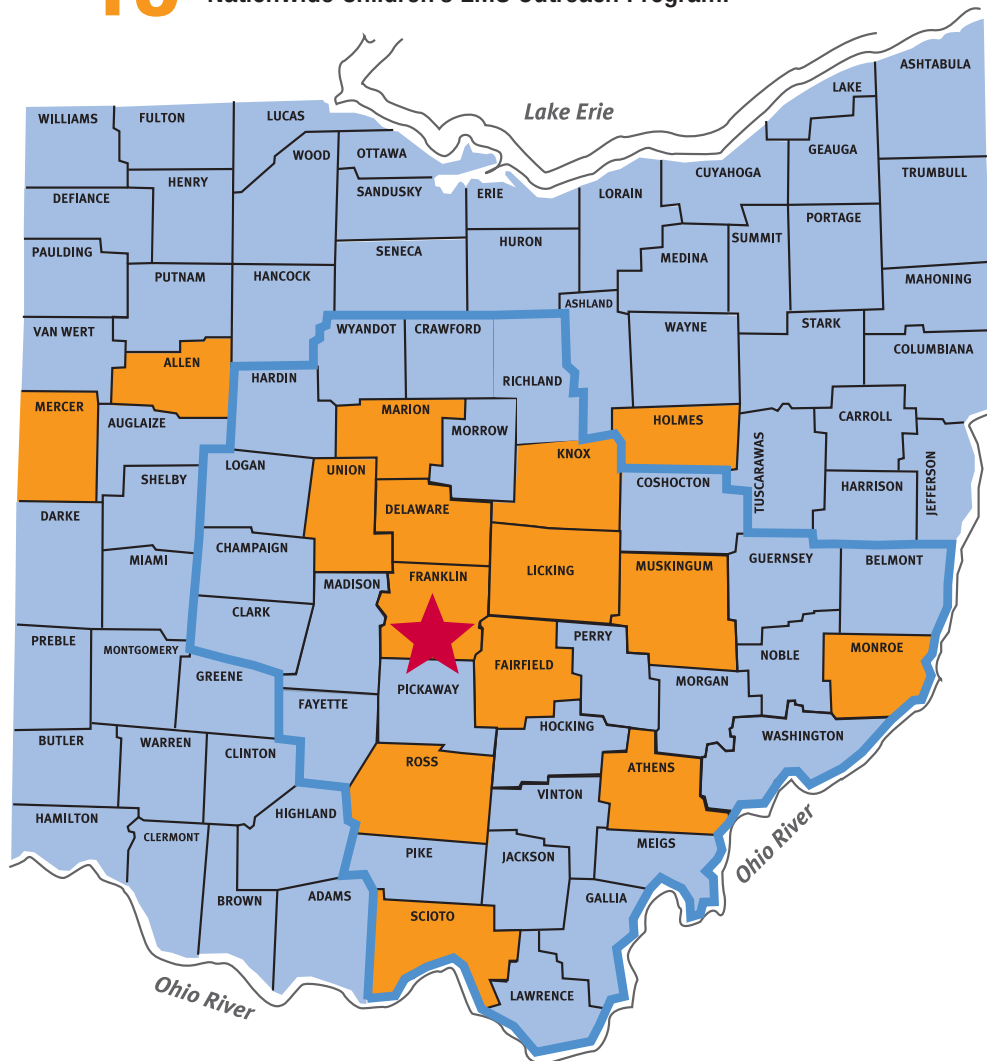
Prehospital providers  
reached through  
EMS Classes

23

Community referral classes  
were a result of outreach  
referrals from NCH care  
planners or community  
paramedics

15

Ohio counties, where EMS Personnel received education from  
Nationwide Children's EMS Outreach Program.



# PASSENGER SAFETY

## Program



**CARRIE RHODES, CPST-I**

Passenger Safety  
Program Coordinator

The Passenger Safety Program (PSP) at Nationwide Children's continues to work to support best outcomes for all children. The program provides replacement car seats to children who have been involved in motor vehicle crashes and additional car seats as necessary in order to facilitate safe discharges for patients. Additionally, program staff provides families with education on how to safely use and install their car seats and offers training for staff on car seat safety.

In addition to the program's in-house work, PSP staff participate in local, state, and national initiatives to improve the safety of children everywhere. PSP staff regularly participate in community car seat check events through Safe Kids Central Ohio, assist with Child Passenger Safety Technician certification courses throughout the state, provide leadership for statewide injury prevention initiatives and collaborates with leading injury prevention experts on the national level.

The Passenger Safety Program is dedicated to the safe transportation for all children, including those with special healthcare needs. To this end, PSP staff collaborate with occupational and physical therapists to assist with transportation evaluations for children with special healthcare needs. The Passenger Safety Program piloted a medical car seat loaner program in 2018, enabling children with special healthcare needs to safely discharge home in their own vehicles, helping to protect these most vulnerable of patients.

**553**

Car seats distributed to  
facilitate safe discharge home

**87**

Additional families and  
staff assisted with car  
seat installation

**27**

Medical/special needs car seats  
provided on loan to children in hip casts  
or with complex medical conditions



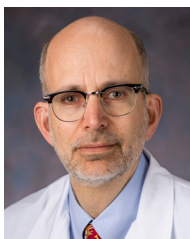


# CENTER FOR PEDIATRIC TRAUMA RESEARCH

## Program



**HENRY XIANG, MD, MPH, PHD**  
Center Director



**JONATHAN GRONER, MD**  
Center Medical Director



**JULIE LEONARD, MD, MPH**  
Associate Director



**KRISTA WHEELER**  
Research Project  
Development Specialist

The Center for Pediatric Trauma Research (CPTR) at Nationwide Children's conducts research to support global efforts in achieving the best outcomes for pediatric trauma patients. Using a multidisciplinary approach, CPTR researchers lead innovative projects to assess pre-hospital emergency medical service, acute medical and surgical management, rehabilitation, and family and community services that impact the short and long-term outcomes of injured patients. CPTR serves as a leader and a partner to translate cutting edge research findings to help patients, families, policy makers, and clinicians make informed decisions.

### Our Vision

To lead evidence-based trauma care and policy research to achieve the best outcomes for pediatric trauma patients.

### Our Mission

**Research:** Conduct high quality research to address significant problems at every stage of pediatric trauma care from pre-hospital emergency medical services through acute care, rehabilitation, and reintegration into the community.

**Policy:** Contribute to state and national efforts to assess and improve regional trauma care systems.

**Workforce Development:** Provide trauma-related research training and mentoring for nurses, researchers, medical and graduate students, residents, fellows, and junior faculty members.

**Partnership:** Collaborate with pediatric trauma care professionals, researchers, and educators around the world to promote excellence in pediatric trauma research, trauma care, and education.



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## 2018 achievements:

- Dr. Julie Leonard was awarded an NIH grant to develop and implement a Pediatric Cervical Spine Injury Risk Assessment Tool that can be used by both prehospital and emergency department providers
- Dr. Jonathan Groner is serving as the site PI for a trial evaluating the accuracy of contrast-enhanced ultrasound in diagnosing abdominal solid organ injuries in pediatric patients. Ultrasound and contrast-enhanced ultrasound results will be compared to the CT scan results
- Dr. Henry Xiang's team hosted the first Global Symposium of Innovation in Trauma Research Methods in June 2018
- Dr. Ginger Yang's team collaborated with Drs. Motao Zhu (CIRP) and Yungui Huang (RISI) on a CDC-funded study examining the impact of Ohio's concussion law on changes in the patterns of healthcare utilization among children with diagnosed concussions
- The Kate Granger Compassionate Care Award was awarded to Dr. Henry Xiang. The Healthcare Information and Management Systems Society (HIMSS) North America presented this award for the research team's work using virtual reality for pain distraction and for cognitive rehabilitation

## Grants Awarded

### July 1, 2017 – June 30, 2018

Trauma-related research funding spans multiple centers which include Emergency Medicine, Critical Care, Pediatric Surgery, Center for Injury Research and Policy, and Center for Biobehavioral Health.

\$1,981,203

## Research/Publications Highlights

Bushroe KM, Hade EM, McCarthy TA, Bridge JA, Leonard JC. Mental health after unintentional injury in a pediatric managed-Medicaid population. *The Journal of Pediatrics*. 2018 Aug; 199:29-34.

Caupp S, Steffan J, Shi J, Wheeler KK, Spiller HA, Casavant MJ, Xiang H. Opioid drug poisonings in Ohio adolescents and young adults, 2002-2014. *Clinical Toxicology*. 2018 Aug; 56(8):765-772.

Chen C, Peng J, Sribnick EA, Zhu M, Xiang H. Trend of age-adjusted rates of pediatric traumatic brain injury in U.S. emergency departments from 2006 to 2013. *International Journal of Environmental Research and Public Health*. 2018 Jun 5; 15(6).

Coxe K, Hamilton K, Harvey HH, Xiang J, Ramirez MR, Yang J. Consistency and variation in school-level youth sports traumatic brain injury policy content. *Journal of Adolescent Health*. 2018 Mar; 62(3), 255-264.

Lever K, Peng J, Lundine JP, Caupp S, Wheeler KK, Sribnick EA, Xiang H. Attending follow-up appointments after pediatric traumatic brain injury: caregiver-perceived barriers and facilitators. *Journal of Head Trauma Rehabilitation*. 2018 Aug 30. [Epub ahead of print]



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- Lu B, Cai D, Tong X. Testing causal effects in observational survival data using propensity score matching design. *Statistics in Medicine*. 2018 May 20; 37(11):1846-1858.
- Matsa E, Shi J, Wheeler KK, McCarthy T, McGregor ML, Leonard JC. Trends in US emergency department visits for pediatric acute ocular injury. *JAMA Ophthalmology*. 2018 Aug 1;136(8):895-903.
- Mooney SJ, Magee C, Dang K, Leonard JC, Yang J, Rivara FP, Ebel BE, Rowhani-Rahbar A, Quistberg DA. “Complete streets” and adult bicyclist fatalities: applying G-computation to evaluate an intervention that affects the size of a population at risk. *American Journal of Epidemiology*. 2018 Sep; 187(9):2038-2045.
- Nattino G, Lu B. Model assisted sensitivity analyses for hidden bias with binary outcomes. *Biometrics*. 2018 Dec;74(4):1141-1149.
- Nordin A, Coleman A, Shi J, Wheeler K, Xiang H, Kenney B. In harm’s way: unintentional firearm injuries in young children. *Journal of Pediatric Surgery*. 2018 May; 53(5):1020-1023.
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**NATIONWIDE  
CHILDREN'S**

*When your child needs a hospital, everything matters.<sup>SM</sup>*