



# Center for Pediatric Trauma Research

## The Research Institute at Nationwide Children's Hospital

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ACHIEVEMENTS AND ACTIVITIES HIGHLIGHTS | 2017



# A Year to Remember and Reflect

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Dear Colleagues and Friends,

As the Director of the Center for Pediatric Trauma Research (CPTR) in The Research Institute at Nationwide Children's Hospital, I am honored to share with you the "CPTR Achievements and Activities Highlights 2017."

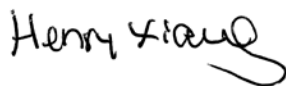
Four years ago, with great support from Nationwide Children's Hospital and colleagues like you, the Center for Pediatric Trauma Research was created. Our vision is to lead evidence-based trauma care and policy research to achieve the best outcomes for pediatric trauma patients around the world.

For CPTR, 2017 has certainly been a year to remember. The selected achievements and activities presented here are examples of our local, national, and global efforts in conducting innovative research. These activities also highlight our efforts in establishing partnerships to fulfill our vision and missions. CPTR's multidisciplinary achievements would not be possible without your support and partnership. I wish to thank my excellent colleagues and team members for their commitment and great support. I am also grateful to our partners and friends around the world.

2017 is also a year to reflect. Our center has reached a milestone where we must carefully assess what we have achieved together. We must determine which strategies have been successful and which have not, analyze challenges in providing high-quality care to pediatric trauma patients and their families, and assess the current gaps in pediatric trauma research. This time of reflection and the resulting strategic planning process will allow us to identify bold new ideas to pursue over the next five years. These ideas will give rise to a research agenda through which the most promising research projects, innovative hypotheses, collaborative opportunities, and multidisciplinary perspectives will be identified and supported. They will be designed to address critical knowledge gaps, develop novel tools and resources, and improve the care and well-being of injured children.

We look forward to our continued partnerships and invite you to join us in our new adventures to achieve the best outcomes for injured children everywhere.

Sincerely,



Henry Xiang, MD, MPH, PhD  
Professor of Medicine  
Director of Center for Pediatric Trauma Research  
Director of Research Core  
Center for Injury Research and Policy

March, 2018

# Center for Pediatric Trauma Research

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## Trauma Program Affiliation

The Nationwide Children's Hospital Trauma Program provides clinical care for injured children, a robust quality-improvement program to ensure that the highest quality of care is provided, and research through the Center for Pediatric Trauma Research to improve outcomes. This multidisciplinary, collaborative approach allows us to provide trauma patients with exceptional care. The center serves as a resource for injury prevention and education for our primary service area and beyond.

## CPTR Vision

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

## CPTR 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.



## Faculty

Henry Xiang MD, MPH, PhD  
Renata Fabia, MD, PhD  
Jonathan Groner, MD  
Brian Kenney, MD, MPH  
Jeffrey Leonard, MD  
Julie Leonard MD, MPH  
Eric Sribnick, MD, PhD  
Rachel Stanley, MD  
Rajan Thakkar, MD  
Jingzhen Ginger Yang, PhD, MPH  
Keith Yeates, PhD (international)

## Affiliate Faculty

Allan C. Beebe, MD  
Mark Hall, MD, FAAP, FCCM  
Bo Lu, PhD, The Ohio State University  
Jennifer Lundine, PhD, CCC-SLP,  
BC-ANCDS  
Xiuquan Shi, MD, PhD (international)  
Huiping Zhu, MD, PhD (international)

## Nurse Researchers

Carla Coffey, BSN, RN  
Kathy Haley, MS, RN  
Sheila Giles, BSN, RN  
Dana Noffsinger, CPNP-AC  
LeeAnn Wurster, MS, RN, CPNP

# Center for Pediatric Trauma Research Achievements

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- Researchers in the Center for Pediatric Trauma Research collaborated with 23 physicians and nurses at Nationwide Children's Hospital on 49 different clinical research projects.
- Dr. Henry Xiang's team worked on a total of six research projects funded by the Ohio Department of Public Safety, Centers for Disease Control and Prevention, National Institutes of Health, Agency for Healthcare Research and Quality, Health Resources and Services Administration, and the National Natural Science Foundation of China.
- Dr. Julie Leonard submitted an R01 application for a 15-site study to fully develop and test a Pediatric Cervical Spine Injury Risk Assessment Tool after her successful NIH R21 study, and continued to collaborate on two NIH-funded studies evaluating the treatment of life-threatening hemorrhage in children.
- Dr. Jingzhen Ginger Yang's team collaborated with Nationwide Children's Thomas Pommering, DO, Section Chief of Sports Medicine, and James MacDonald, MD, MPH, a sports medicine physician, on an NIH-funded study examining the optimal level of physical and cognitive rest after sports-related concussions among youth aged 11 to 17 years.

## Grants Awarded July 1, 2016 To June 30, 2017

Trauma-related research funding spans multiple centers, including Emergency Medicine, Critical Care, Center for Injury Research and Policy, and Center for Biobehavioral Health. Total: \$1,668,226

## Number of Peer-reviewed Journal Publications by Core Faculty in 2017: 56

## Number of Trainees Trained By Core Faculty

- The Ohio State University College of Medicine medical students: 4
- Nationwide Children's residents and fellows: 28
- International scholars: 8
- Other students and trainees: 28



Henry Xiang, MD, MPH, PhD



Jonathan I. Groner, MD  
Medical Director



Julie Leonard, MD, MPH  
Associate Director

# The Pediatric Trauma Society 4th Annual Scientific Meeting Held in Charleston, S.C., Nov. 2-4, 2017

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## **Presidential Remarks and Presentations**

Several members affiliated with the Center for Pediatric Trauma Research and Nationwide Children's Trauma Team made significant contributions to the Pediatric Trauma Society 4th Annual conference. Jonathan Groner, MD, medical director of the Center for Pediatric Trauma Research, delivered the presidential address. Other members of CPTR made three poster and 11 oral abstract presentations.

Included in the oral presentations was the winner of the Tepas award in the non-physician category: "Why Do Children With Traumatic Brain Injuries Miss Follow-up Appointments? Caregiver-perceived Barriers To Return For Follow-up." The study is by Nationwide Children's Jin Peng, Kimberly Lever, Sarah Caupp, Krista Wheeler and Henry Xiang.

The Tepas is a competitive national award that recognizes individuals who demonstrate excellence in pediatric trauma research.

## **A Thank You From PTS**

We would like to acknowledge Dr. Groner and LeeAnn Wurster, MS, RN, CPNP, Nationwide Children's trauma coordinator, for their contributions to the Pediatric Trauma Society. Dr. Groner served as the 2017 PTS president and Ms. Wurster steps down from serving as the PTS treasurer. Ms. Wurster continues to serve as editor of the PTS newsletter and Dr. Groner will serve as immediate past president in 2018. Our congratulations and thanks to them for their service.



*Sarah Caupp, Dr. Jiabin Shen, Dr. Henry Xiang, Krista Wheeler, Dr. Jin Peng*

# International Engagement and Outreach

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## **CPTR International Affiliate Faculty Awarded Grant to Study Self-injury and Suicide Ideation in Children With Disabilities in China**

Huiping Zhu, MD, PhD is an international affiliate faculty member of the Center for Pediatric Trauma Research (CPTR) and the Center for Injury Research and Policy (CIRP). She is an Associate Professor at Capital Medical University in Beijing, the People's Republic of China. She recently received a research grant from the Beijing Natural Science Foundation to investigate the epidemiology and risk factors for self-injury and suicide ideation among children with disabilities. Dr. Zhu's goal is to provide a scientific basis to formulate preventive intervention strategies. Dr. Henry Xiang, CPTR director, and his team provided technical guidance on the research design and statistical analysis plan.

## **Pediatric Surgery Rotating Observation in Columbus for Excellent Student Scholars (PROCESS)**

PROCESS is an international student program organized by Renata Fabia, MD, PhD, a principal investigator at CPTR; and carried out in cooperation with surgical academic faculty in Poland (including the former minister of health). The program selects students competing from 12 medical universities in Poland to participate in a one-month observership at Nationwide Children's. Applicants are ranked based on their academic performance, research, involvement in humanitarian programs and other achievements.

This rotation introduces international students to the philosophy of patient- and family-centered care; highly organized medical training, education and research; and state-of-the-art approaches to medical problems at Nationwide Children's, the United States' largest provider of inpatient pediatric surgeries. Recipients are exposed to surgical operations, dressings and other procedures, clinics and training on a da Vinci robot, and participate in meetings and academic conferences. They also have the opportunity to be involved in clinical research.



## International Engagement and Outreach

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Dr. Henry Xiang, Center for Pediatric Trauma Research director, received the 2017 Distinguished International Engagement Award. The honor is awarded by The Ohio State University's Office of International Affairs in collaboration with the Office of Outreach and Engagement.

For the past 13 years, Dr. Xiang has worked diligently to build outreach scholarship and engagement partnerships with collaborators in the United States and China. Comprehensive training has been provided to over 200 mid-level and senior researchers in China, where this program has profoundly impacted pediatric violence and injury prevention and research. The research focuses on pedestrian, agricultural and traumatic brain injuries; drowning, child-abuse and burns.

Ongoing and future efforts:

- Supporting colleagues in China to seek grants from diverse funding agencies
- Connecting U.S. scholars with Chinese colleagues to publish violence and injury research
- Hosting Chinese scholars at Nationwide Children's for research training
- Providing opportunities for OSU residents, fellows, and physicians to travel and experience pediatric medical care in China
- Submitting grant applications to support this program



*Dr. Henry Xiang speaking to attendees at an injury training session in China. Dr. Junxin Shi came to the Center for Injury Research and Policy and Center for Pediatric Trauma Research by way of a 2006 workshop.*

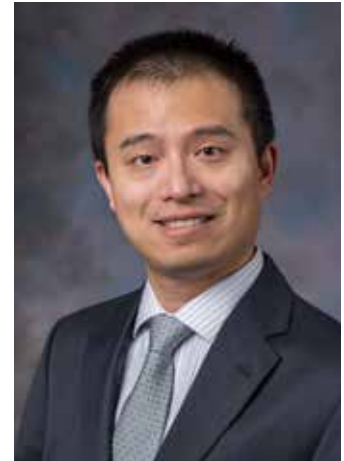
## Career Achievements

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### **Jiabin Shen Elected Representative to the Society for Advancement of Violence and Injury Research Board**

Jiabin Shen, PhD, postdoctoral fellow for the Patient-Centered Pediatric Research Program in the Center for Pediatric Trauma Research (CPTR) and the Center for Injury Research and Policy in The Research Institute at Nationwide Children's Hospital, was recently elected Transitional Representative to the Society for Advancement of Violence and Injury Research (SAVIR) Board of Directors.

SAVIR is a professional organization that provides leadership and fosters excellence in the science of preventing and treating injury and violence. The SAVIR Board comprises 13 members: four from the Executive Committee, six elected by and drawn from the general membership, and the remaining three appointed by the Executive Committee. Dr. Shen is a developmental psychologist and injury researcher who received his PhD in Lifespan Developmental Psychology from the University of Alabama at Birmingham in 2015. He received extensive training in pediatric unintentional-injury-prevention research and virtual reality from an interdisciplinary and global perspective during his doctoral program. Currently, Dr. Shen works with Henry Xiang, MD, MPH, PhD, CPTR director, in developing innovative psycho-behavioral interventions for care and rehabilitation, using virtual reality technology to improve the outcomes of pediatric trauma patients.



### **Rajan Thakkar Awarded Pediatric Critical Care and Trauma Scientist Development Program National Award**

Rajan Thakkar, MD, associate medical director of Nationwide Children's Burn Program, has been selected as a Scholar in the Pediatric Critical Care and Trauma Scientist Development Program (PCCTSDP) that began January 1, 2018. This is the second PCCTSDP award earned by a Nationwide Children's Hospital faculty member. Applicants from across the United States compete for this national K12 program. They are judged by a review panel of senior academic pediatric intensivists and surgeons and the process uniquely includes an in-person oral defense of the proposal by each candidate. This process is highly competitive and perhaps more scientifically rigorous than some institutional K12 programs. Dr. Thakkar was one of two award-winners out of 21 applicants this year.





## Career Achievements

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### **Krista Wheeler Promoted**

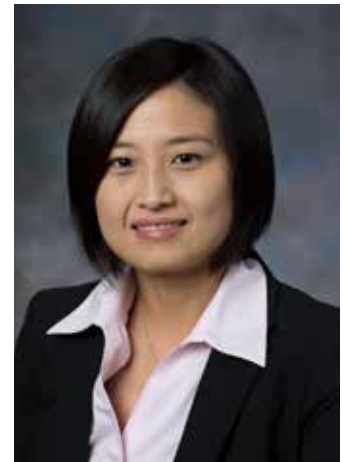
Krista Wheeler, MS, has been promoted to a manager (Project Development Specialist) at the Center for Pediatric Trauma Research and Center for Injury Research and Policy. In this position, Ms. Wheeler will lead our efforts to collaborate with the Trauma and Burn programs, Nationwide Children's physicians, nurses, and other clinical researchers to strategically plan and develop new research projects and grants that promote the missions and goals of Nationwide Children's, The Research Institute, Trauma/Burn Program and the CPTR/CIRP.

Ms. Wheeler joined CPTR in 2006. Since then, she has made significant contributions toward the center's success in seeking federal grants as well as in developing patient-centered clinical projects at Nationwide Children's. She has served as both a research coordinator and grant writer for Dr. Henry Xiang's research team. Ms. Wheeler has been actively involved in decision-making for the Xiang research team in hiring and training, grant writing, managing research projects, and disseminating the team's study results. She previously worked as an epidemiologist and health administrator at the Ohio Department of Health, focusing on HIV surveillance and patient care.



### **A Significant Percentage of Severely Injured U.S. Children Are Treated at Nontrauma Centers**

The Health Resources Service Administration (HRSA) highlighted a CPTR investigation on the front page of its website: <https://mchb.hrsa.gov/research/news.asp>. The study is just one of a number produced with funding from a Maternal and Child Health Bureau grant. Regionalized trauma systems have been developed and promoted to improve patient outcomes and optimize the use of hospital resources in the United States. Severely injured children should receive the highest level of trauma care available, found at a level I or level II trauma center. But one of every five severely injured American children is treated at level III trauma centers or non-trauma center without transfer to a higher level trauma center, according to a new study led by Henry Xiang, director of the Center for Pediatric Trauma Research at Nationwide Children's Hospital, and Jin Peng, MD, MS, and a PhD candidate at The Ohio State University who received her degree in 2018. Children living in rural areas are particularly likely to be undertriaged. Severely injured patients have a significantly higher risk of death or adverse outcomes when treated at level III or nontrauma centers without transfer to level I or level II trauma centers. These findings highlight the importance of developing innovative service delivery models, including telemedicine and a trauma triage mobile app, to facilitate proper triage and improve outcomes for severely injured children.



MCHB Grant R40MC29448, Emergency Medical Care of Severely Injured US Children. Publication: Peng J, Wheeler K, Groner JI, Haley KJ, Xiang H. Undertriage of pediatric major trauma patients in the United States. *Clinical Pediatrics*. 2017;56(9):845-853. doi: 10.1177/0009922817709553.

# Trainee Conference Presentations

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## **CPTR Affiliated Faculty Presented Studies at a Number of Conferences in 2017.**

**Andrew Nordin, MD**, surgical critical care fellow at Nationwide Children's, and his coauthors utilized the National Trauma Data Bank to compare trends in unintentional and intentional firearm injuries. Dr. Nordin gave an oral presentation of the findings to the Canadian Association of Paediatric Surgeons, in Banff, Alberta, Oct. 5-7, 2017.

“In Harm's Way: Unintentional Firearm Injuries in Young Children.” Authors: Andrew Nordin MD, Alan Coleman MD, Junxin Shi MD, PhD, Krista Wheeler MS, Henry Xiang MD, MPH, PhD, Brian Kenney MD, MPH.

**Lorraine Kelley-Quon, MD, MSHS**, pediatric surgery fellow, used our hospital's trauma registry to identify local shooting hot spots. While the firearm-injured patients came from 62 zip codes, 51 percent of the Nationwide Children's cohort was from only nine zip codes. Dr. Kelley-Quon presented a poster at AAST and Clinical Congress of Acute Care Surgery, in Baltimore, Md., Sept. 13 - 16, 2017.

“Influence of Concealed Carry Legislation and Socioeconomic Status on Pediatric Firearm Injuries.” Authors: Lorraine I. Kelley-Quon MD, MSHS, Kelsey Pringle BS, Junxin Shi PhD, Krista K. Wheeler MS, Henry Xiang MD, MPH, PhD, Jonathan I. Groner MD.

**Joseph Drews, MD**, general surgery resident, gave presentations contrasting Glasgow Coma Scores by pre-hospital providers to those of the Nationwide Children's trauma team at two conferences:

2017 American Academy of Pediatrics (AAP) National Conference & Exhibition. Chicago, IL Sept. 16-19 (poster). “Variability in Prehospital and Trauma Center Glasgow Coma Scale Scores in Pediatric Traumatic Brain Injury Patients.” Authors: Joseph Drews MD, Junxin Shi PhD, Krista Wheeler MS, Eric Sribnick MD, PhD, Rajan Thakkar MD.

2017 Clinical Congress. San Diego, CA Oct. 16-20 (e-Poster). “Prehospital and Trauma Center Glasgow Coma Scale Scores Are Frequently Discordant in Pediatric Traumatic Brain Injury Patients.” Authors: Joseph Drews MD, Junxin Shi PhD, Krista Wheeler MS, Eric Sribnick MD, PhD, Rajan Thakkar, MD.



## Trainee Conference Presentations

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**Zac Hodosevich**, a medical student intern developed a manuscript this summer using the 2013-2014 National Readmission Database. Mr. Hodosevich delineated his project in an oral presentation “U.S. Adult Burn Patient Unplanned 30-Day Readmissions” at the Eastern Great Lakes Burn Conference in October and will also present at the 2018 American Burn Association Conference. He has submitted the manuscript of his study for publication in 2018.

The Nationwide Readmissions Database (NRD) is a new dataset created as part of the Agency for Healthcare Research and Quality’s Healthcare Cost and Utilization Project. It includes discharge information for patients with and without repeat hospital visits and only uses information from states with reliable, verified patient linkage numbers.

Two recent studies from CPTR take advantage of this new national dataset.

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. doi: 10.1016/j.jpedsurg.2017.08.003.

Wheeler KK, Shi J, Nordin AB, Xiang H, Groner JI, Fabia R, Thakkar RK. U.S. pediatric burn patient 30-day readmissions. *Journal of Burn Care and Research*. 2017 Aug 18. doi: 10.1097/BCR.0000000000000596. [Epub ahead of print]



## Highlighted Research

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### **Rates of Initial and Subsequent Football Injuries Using Athletic Exposures**

Research has shown that athletes with a history of injury are more likely to experience another injury. But estimating the risk of these subsequent injuries has been challenging due to difficulties in documenting and tracking athletes who are at risk.

In a recent study published in the *American Journal of Sports Medicine*, researchers in the Center for Injury Research and Policy and the Center for Pediatric Trauma Research utilized a unique methodology to calculate rates of initial and subsequent injury among collegiate football athletes from two Division I universities (2007-2011). Specifically, they distinguished between athletes who are at risk for initial injuries and those who are at risk for subsequent injuries. The findings showed that the overall rate of subsequent injuries was nearly 1½ times the rate of initial injuries, with the risk of injury increasing with each successive injury. While running backs had a higher rate of initial injuries, wide receivers and defensive linemen had higher rates of subsequent injury. Additionally, the rate of subsequent injuries to the head, neck and face was almost double the rate of initial injuries. The methodology used in this study allowed for more accurate determinations of injury risk among football players who have already been injured at least once. The results highlight the need to increase efforts to prevent both initial and subsequent injuries among collegiate athletes.



For more information, please see Williams JZ, Singichetti B, Li H, Xiang H, Klingele KE, Yang J. Epidemiological patterns of initial and subsequent injuries in collegiate football athletes. *The American Journal of Sports Medicine*. 2017 Apr;45(5):1171-1178. DOI: 10.1177/0363546516685317.

### **New Project Awarded Funding From the Discovery Theme Initiative in Chronic Brain Injury Program**

Collaborators from Nationwide Children's Hospital's Center for Injury Research and Policy, Center for Pediatric Trauma Research (CPTR) and Section of Sports Medicine; and The Ohio State University Driving Simulation Laboratory, Sports Medicine program, and Department of Physical Medicine and Rehabilitation; recently received a pilot award from the OSU Chronic Brain Injury program. Led by CPTR Principal Investigator Jingzhen Ginger Yang, PhD, MPH, the long-term goal of this project is to assess the effect of concussion on driving performance among teen drivers, and to determine whether it is safe to return to drive immediately after concussion. The results of this study will help provide critical information to develop evidence-based guidelines regarding fitness to drive after concussion. No specific guidelines currently exist in the United States.



Teen drivers with physician-confirmed concussion, along with matched healthy controls, will be recruited from high schools that contract with Nationwide Children's and members of OSU sports clubs. Participants will complete driving performance assessments on a Realtime Technologies Inc. (RTI) driving simulation platform. Concussed participants will complete their first assessment within 72 hours of injury.

## Highlighted Research

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### **Lifetime History of Traumatic Brain Injury is Associated with Current Disability in Ohio Adults**

There is growing recognition that traumatic brain injury (TBI) is not just a single, momentary event but, in some cases, creates vulnerability to disease and disability later in a person's life. Researchers in the Center for Injury Research and Policy collaborated with partners at the Ohio State University and Ohio Department of Health to examine the association between lifetime history of TBI with a loss of consciousness (LOC) and current disability.



The study, accepted by *The Journal of Head Trauma Rehabilitation*, utilized a statewide population-based survey among adult, non-institutionalized residents of Ohio. The survey included the number and severity of TBIs with LOC, age at first TBI, as well as the number and type of current disabilities.

Over one-third of Ohioans who had a history of TBI with LOC in their lifetime reported one or more types of current disability. Adults with a history of TBI with LOC were at greater risk of having any and each type of current disability when compared with adults with no history of TBI with LOC. The likelihood of having any and each type of disability increased as the number of TBIs or the severity of the worst TBI increased, regardless of suffering the first TBI before or after the age of 15.

This study, presented at the 11th Annual International Scholar Research Exposition at The Ohio State University, highlights the importance of understanding the frequency and severity of TBI at any age as contributing factors to current disability status. The knowledge gained from this study will be vital for healthcare and rehabilitation providers in projecting future demands on health care systems and specific disability programs.

For more information, please see Yi HG, Corrigan J, Singichetti B, Bogner J, Manchester K, Guo JH, Yang J. Lifetime history of traumatic brain injury and current disability among Ohio adults. *Journal of Head Trauma Rehabilitation*. 2017 Oct 27. doi: 10.1097/HTR.0000000000000352.

## Highlighted Research

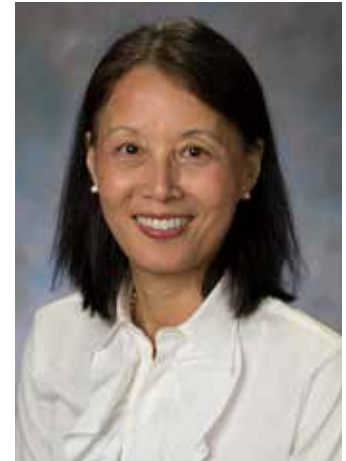
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### **The Robert Wood Johnson Foundation Funded Two Studies to Evaluate TBI Laws**

#### **Laws are Effective at Reducing Rate of Recurrent Concussions in High School Athletes**

Since 2014, all 50 states and the District of Columbia have enacted one or more traumatic brain injury (TBI) laws, more commonly known as concussion laws. A recent study conducted by researchers from Nationwide Children's, the University of Colorado and Temple University, used data from a large, national sports injury surveillance system to determine the effect of state-level TBI laws on trends of new and recurrent concussions among high school athletes in the United States.

The study showed that rates of new and recurrent concussions initially increase after a law goes into effect. But approximately two and a half years after the law is in place, the rate of recurrent concussions shows a significant decline. This demonstrates that the laws are having an impact. "This is what we want to see, an initial increase in concussion rates because more people become aware of the symptoms and signs of concussion," said Jingzhen Ginger Yang, PhD, MPH, senior author of the study and principal investigator in the Center for Injury Research and Policy at Nationwide Children's.



Yang J, Comstock RD, Yi H, Harvey HH, Xun P. New and recurrent concussions in high school athletes before and after traumatic brain injury laws, 2005-2016. *American Journal of Public Health*. 2017 Dec;107(12):1916-1922. doi: 10.2105/AJPH.2017.304056.

#### **Best Strategies**

The research team has continued to study schools' implementation of concussion laws by analyzing school concussion policy contents and policy implementation strategies to better understand the most successful ways to keep young athletes healthy. As a result of this study and future research, they hope to recommend ways states can strengthen their concussion laws.

Coxe K, Hamilton K, Harvery HH, Xiang J, Ramirez MR, Yang J. Consistency and variation in the policy content of youth sports TBI laws. *Journal of Adolescent Health*. 2018 Mar;62(3):255-264. doi: 10.1016/j.jado-health.2017.07.003



THE RESEARCH INSTITUTE AT NATIONWIDE CHILDREN'S HOSPITAL



*Seeking answers on behalf of children everywhere*



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**NATIONWIDE  
CHILDREN'S**

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