



# SURGERY ANNUAL REPORT 2020



Riley Children's Health  
Indiana University Health





Cancer

Cardiology & Heart Surgery

Diabetes & Endocrinology

Gastroenterology & GI Surgery

Neonatology

Nephrology

Neurology & Neurosurgery

Pulmonology & Lung Surgery

Urology

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Interventional Radiology

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Ophthalmology

Orthopedic Surgery

Otolaryngology – Head & Neck Surgery

Pediatric Surgery

Plastic Surgery

Transplant Surgery

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# WELCOME TO SURGERY AT RILEY CHILDREN'S HEALTH

For the pediatric surgeons and perioperative surgical teams at Riley Children's Health, helping children live long, healthy lives is our most important goal. We're proud to be part of a **nationally ranked pediatric hospital** that uses expertise, innovation and the latest advancements to deliver the highest level of patient care to children and families in Indiana and across the nation.

Underscoring our long history of excellence in pediatric surgery, Riley Hospital for Children at IU Health was recently verified as a Level I Children's Surgery Center by the American College of Surgeons (ACS). Our hospital is the only ACS-verified pediatric surgery center in Indiana and one of the few in the Midwest. This latest edition of our surgery annual report provides an overview of our 13 surgical specialties, highlighting some of the key outcomes, quality improvement measures and multidisciplinary care programs that contribute to our leadership in pediatric surgery.



Dr. Frederick Rescorla (left) and Dr. Cartland Burns

In partnership with Indiana University School of Medicine, many of our specialists are engaged in robust research and scholarly activity aimed at improving clinical outcomes and advancing the field of pediatric surgery. In this report, you'll find details about some of these programs, as well as links to papers published by Riley physicians.

While 2020 was a challenging year, our surgery team members continued to deliver leading-edge care, supplemented by an expansion in telehealth that allowed families to complete important preoperative and follow-up visits from the comfort of home. For many of our surgical specialties, this virtual care is ongoing, contributing to Riley at IU Health's focus on patient-centered care and offering a way for more children and families to benefit from our surgical expertise.

We hope this report is a helpful resource in learning more about the dedicated surgical teams at Riley Children's Health. If you have questions, we invite you to contact us or reach out to our program leaders through the Doximity links and contact information included in this report. Thank you for your interest in pediatric surgery at Riley Children's Health.

**R. Cartland Burns, MD**

Medical Director, Children's Surgery, Riley Children's Health  
Associate Professor of Clinical Surgery, IU School of Medicine  
[Connect with Dr. Burns on Doximity.](#)

**Frederick J. Rescorla, MD**

Surgeon-in-Chief, Riley Children's Health  
Professor Emeritus of Surgery, IU School of Medicine  
[Connect with Dr. Rescorla on Doximity.](#)

*\* The medical specialties of Riley Children's Health are highlighted in a separate annual report.*



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# RILEY CHILDREN'S HEALTH WELCOMES NEW PRESIDENT

Gil Peri is the new president of Riley Children's Health, assuming the leadership role of Indiana's largest pediatric health system in June 2021. An accomplished pediatric healthcare executive, Peri most recently served as president and chief operating officer of Connecticut Children's Medical Center in Hartford, Connecticut. He has held

leadership positions at other top children's hospitals, including Children's Hospital Colorado in Aurora and Nationwide Children's Hospital in Columbus, Ohio.

With more than 20 years of success creating and executing strategy differentiation, leading complex operations and partnering to achieve the best outcomes for children and adults, Peri is recognized as an inspiring leader committed to value, innovation and continual improvement.

Peri holds master's degrees in business administration and public health from the University of South Florida, where he also earned his bachelor's degree in biology. He is active within the healthcare industry and is continuing his work as an advocate for children and families.



**"Our talented team is poised to take the next step to increase our impact as one of the nation's premier children's health systems recognized worldwide for delivering excellence in patient care, education and research."**

**– Gil Peri**  
President,  
Riley Children's Health



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# ABOUT RILEY CHILDREN'S HEALTH

Riley Children's Health, Indiana's largest and most skilled pediatric health system, provides care in more than **50** locations in communities across Indiana.

More than **300,000**  
**PATIENTS TREATED ANNUALLY**



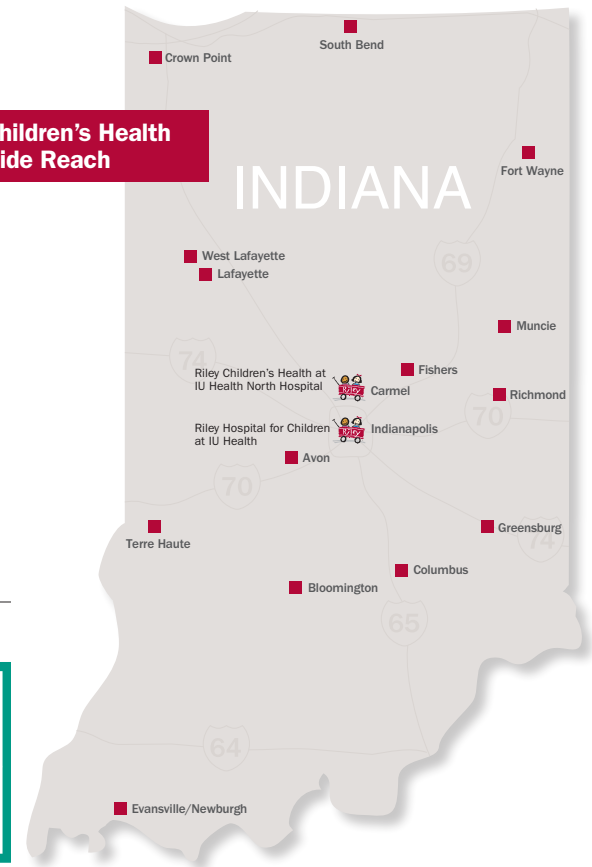
**200** PRIMARY CARE + **400** SPECIALTY CARE  
physicians across 40 specialties



Two pediatric hospital locations in central Indiana:

- Riley Hospital for Children at IU Health – Indianapolis
- Riley Children's Health at IU Health North Hospital – Carmel

## Riley Children's Health Statewide Reach



AFFILIATED WITH



- One of the largest medical schools in the U.S.
- One of the busiest locations for pediatric research funded by the National Institutes of Health and other sponsors

Riley Children's Health and IU School of Medicine are committed to providing excellent healthcare for children through prominence in education, training and research.

Riley Hospital for Children at IU Health is a Magnet® hospital, recognized for nursing excellence and high-quality clinical outcomes



## Leader in research and innovation

- Indiana's **only pediatric** research hospital
- **Sixth-ranked children's hospital** in the U.S. for research funding
- Home to the Herman B Wells Center for Pediatric Research, the Children's Clinical Research Center and the Center for Children's Health Services Research



See how **neurofibromatosis type 1** research at Riley is advancing the field.

COMPREHENSIVE CHILDREN'S HOSPITAL AND HEALTH SYSTEM OF



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# RILEY SURGERY AT A GLANCE

DEDICATED TEAMS IN 13 PEDIATRIC SURGICAL SPECIALTIES COMPRISE RILEY SURGERY:

- Cardiothoracic Surgery
- Interventional Cardiology and Electrophysiology
- Interventional Radiology
- Maternal Fetal Medicine
- Neurosurgery
- Neurointerventional Radiology
- Ophthalmology
- Orthopedic Surgery
- Otolaryngology – Head & Neck Surgery
- Pediatric Surgery
- Plastic Surgery
- Transplant Surgery
- Urology

More than **90**  
SURGEONS AND  
ANESTHESIOLOGISTS

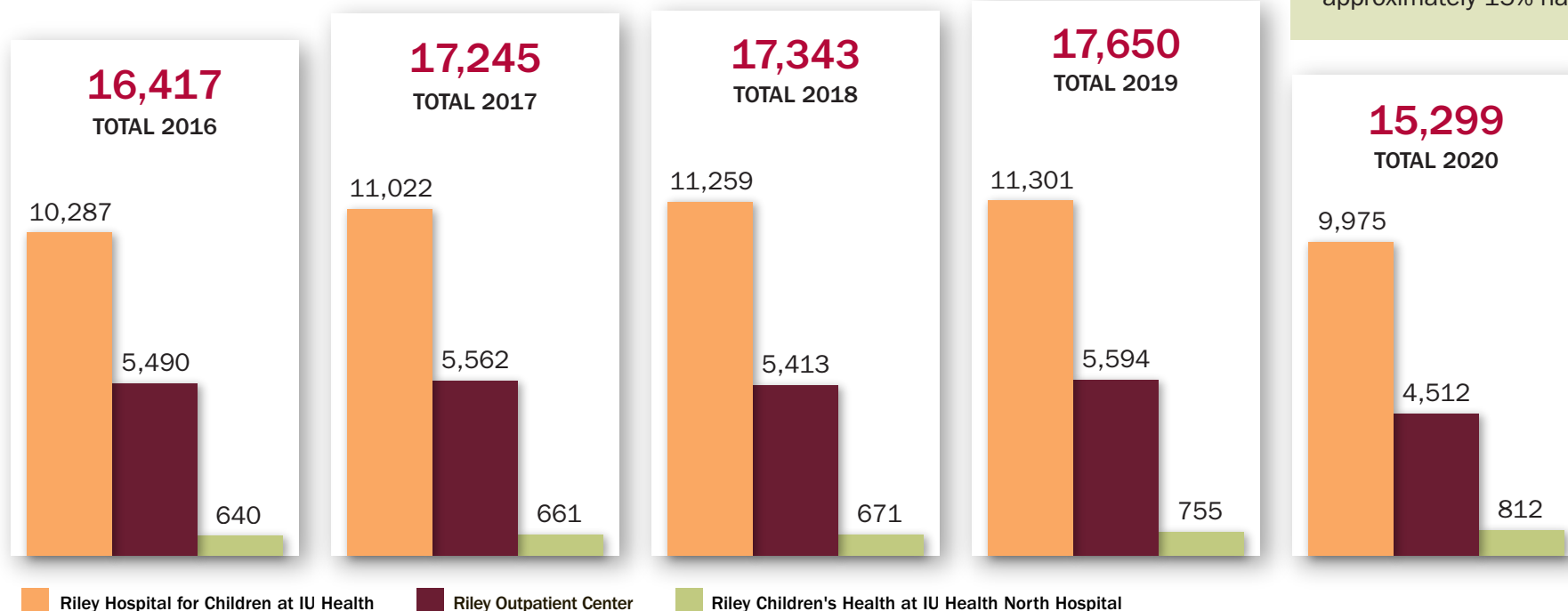
More than **250**  
SURGICAL TEAM  
MEMBERS



## Impact of COVID-19

According to the Children's Hospital Association's 2020 financial comparison report, the COVID-19 pandemic impacted pediatric hospital volumes by approximately 15% nationwide.

Riley Children's Health Surgical Volume



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# THE NEW MATERNITY TOWER AT RILEY HOSPITAL FOR CHILDREN FEATURES A FULLY INTEGRATED CARE MODEL

The Maternity Tower at Riley Hospital for Children at IU Health features a new coordinated care model anchored by the long-standing reputation of Riley at IU Health for delivering expert care for complicated pregnancies and at-risk newborns. Our highly skilled pediatric and adult care teams offer comprehensive, multidisciplinary services that surround patients experiencing low-risk to high-risk pregnancies with exceptional medical support. The new tower contains four floors of inpatient hospital services to house a labor and delivery and antepartum unit, including birthing suites.



From Indiana's only OB ICU to our midwifery program, the tower provides the highest level of care for each pregnant woman and newborn.

With 119 total NICU beds, Riley at IU Health houses the state's largest NICU providing the highest level of care.



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The Maternity Tower at Riley at IU Health is unmatched in Indiana.

[rileychildrens.org/maternity](https://rileychildrens.org/maternity)

## What is in the new space?

### Atrium

- Original entrance to Riley Hospital for Children at IU Health when it opened in 1924



### 2nd floor: OB ED, Labor, Delivery and Recovery

- 24/7 in-house ICU physicians, OB ICU nurses, OB anesthesiologists, OB laborists and maternal fetal medicine coverage



### 3rd floor: NICU

- New Ronald McDonald Family Room
- 45 private rooms

### 4th and 5th floors: Mother and Baby

- 38 private rooms for mother and baby
- Gathering Room to provide a special place for families and care team





# HELPING TO BUILD STRONG COMMUNITIES



As one of the Midwest's largest and most comprehensive healthcare systems for children, Riley Children's Health is committed to using our expertise and resources to support populations and communities in Indiana and around the world.

## Advancing care globally

**Global HOPE (Hematology-Oncology Pediatric Excellence)** – Riley Hematology/Oncology collaborates with Texas Children's Hospital's **Global HOPE** to treat and significantly improve the prognosis of children with cancer and blood disorders in sub-Saharan Africa.

**International medical missions** – Through partnerships in the Middle East, Asia and Africa, Riley Heart Center team members have traveled the globe, **volunteering their time** to treat more than 400 patients since 2006 and train local clinical teams in advanced heart care.



**Pediatric surgery training overseas** – Riley at IU Health is one of the few institutions in the U.S. to sponsor a surgeon to provide on-site pediatric surgery training in Africa. **Britney L. Grayson, MD, PhD**, is fulfilling a two-year commitment as a consultant pediatric surgeon and educator in Kenya.



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## Improving health and well-being close to home

**Be Happy program** – Riley at IU Health implements the **Indiana Behavioral Health Access Program for Youth** (Be Happy)—the first and only child psychiatry access program in the state. This program supports pediatric physicians and advanced practice providers in caring for youth with mental health and substance use disorders.

**Kidney Camp** – For nearly 20 years, Riley Nephrology has partnered with the National Kidney Foundation of Indiana to host a **summer camp** for children with kidney disease and survivors of kidney transplant. The camp was held virtually in 2020 and limited to just one day in 2021 due to COVID-19.

**Project ADAM** – Riley at IU Health is the first healthcare facility in Indiana to assist schools in becoming certified as “Heart Safe” through **Project ADAM**. With affiliates nationwide, the sudden cardiac arrest program is designed to promote awareness, AED training and emergency response. Riley helped certify **Indiana’s first Heart Safe school** in May 2021.

**Project ECHO** – Riley experts participate in **Project ECHO** (Extension for Community Healthcare Outcomes), a program that connects local primary care teams with interdisciplinary specialists to improve treatment for chronic and complex health conditions. Our pediatric physicians facilitate ECHO programming on a variety of topics, including opioid use disorder, teen vaping, and opioids and pregnancy.

**Pediatric Community Outreach Mobile Education (PCOME)** – Riley pediatric intensivists provide **on-site simulation training** and education to community hospital healthcare providers for the initial stabilization and management of pediatric patients.

**Sudden Death in the Young Registry** – Partnering with the Centers for Disease Control and Prevention and the Indiana State Department of Health, Riley at IU Health formed **this registry in Indiana** to identify causes of childhood deaths and related risk factors. The program, facilitated by the Riley cardiovascular genetics team, is a clinical service to families who have experienced a childhood death that may be attributable to heritable or genetic causes. This service also connects qualifying families to free bereavement and grief counseling services through the Riley Hope in Healing Program.





## Supporting diversity, inclusion and equity in healthcare

**Wee Ones program** – Riley primary care providers and IU School of Medicine General and Community Pediatrics established an on-site health center for infants and children in the Indiana Women's Prison maternal and child health unit. In addition to providing medical care, the program partners with community organizations to offer educational programming for mothers.



**Maternal health in Indiana** – Riley maternal fetal medicine physicians work with the American College of Obstetricians and Gynecologists to address issues related to disparities in maternal health outcomes. In addition, our specialists serve on the **Indiana Maternal Mortality Review Committee** to raise awareness of issues causing pregnancy-related deaths and recommend interventions.



**COVID-19 research studies** – Riley infectious diseases specialists led the **TACTIC (Tracking Asymptomatic COVID-19 Through Indianapolis Communities)** and DISCOVER (evaluating the immune response to COVID-19) studies. Both projects were specifically designed to include underrepresented minority populations who were hit hardest by COVID-19 but not well represented in research studies. With specific outreach to Black and Hispanic communities, both studies had strong representation by these population groups.



### Meeting the needs of diverse populations



- Audiologists with the Riley Cochlear Implant Program have implemented speech perception testing in Spanish to more accurately diagnose and treat Spanish-speaking patients with hearing loss.
- The Riley critical care team is evaluating communication between the medical team and culturally diverse families of critically ill children, specifically addressing the delivery of end-of-life care. The team is planning a quality improvement study and targeted interventions aimed at providing equitable, compassionate care to all patients and families.
- Research is underway in Riley Otolaryngology – Head & Neck Surgery to study the roles that race, ethnicity, gender and socioeconomic status have on health outcomes for children with mastoiditis.



# CARDIOTHORACIC SURGERY

With a long history of achieving exceptional outcomes, cardiovascular surgeons at Riley Hospital for Children at IU Health treat and manage the entire spectrum of heart defects—from the most common to the most rare and complex. Our heart surgeons, practicing at the highest level of board certification, offer a degree of expertise found only in the most advanced pediatric hospitals.

**RANKED 5TH  
IN THE NATION**



## Program distinctions



Ranked among the top five pediatric heart programs in the nation by *U.S. News & World Report*



National leader in patient outcomes with mortality rates below benchmark\*



Indiana's only pediatric and adult congenital transplant program\*\*

The Riley Heart Center is among the **top 6%** of congenital heart programs nationwide based on the Society of Thoracic Surgeons' (STS) last published report (2015 – 2019).



DIVISION CHIEF

**Mark W. Turrentine, MD**  
John W. Brown Professor of Cardiothoracic Surgery, IU School of Medicine  
UNOS primary surgeon\*\*

*Connect with Dr. Turrentine on Doximity.*



**3**  
board certified  
physicians

**>**  
See full team  
member list

## Specialized programs

### Heart Transplant/Mechanical Circulatory Support Program

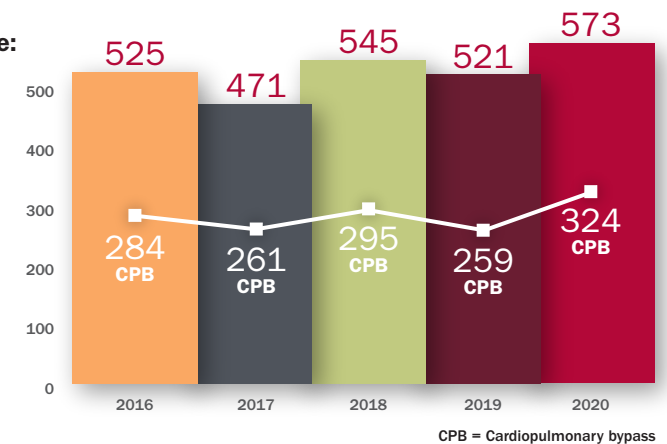
- Riley cardiovascular surgeons have performed more than 170 pediatric heart transplants since 1989. We are one of only 13 programs nationally—and the only program in Indiana—capable of implanting total artificial hearts in children. We have also pursued advanced surgical therapies to limit the need for heart transplant in children.

### Aortopathy Program

- Our surgeons are a partner in providing comprehensive, fully integrated specialty care for disorders of the aorta from the time of diagnosis through adulthood; only program of its kind in Indiana.

\* Source: Society of Thoracic Surgeons (STS) | Congenital Heart Surgery Data Summary, Table 16 July 2015 – June 2019. Most recent data available as of Aug. 1, 2021. \*\* **IU Health Transplant** is the only transplant center in Indiana with a United Network for Organ Sharing (UNOS)-approved **pediatric program** for all organs. This designation is based on the level of training and experience of IU Health Transplant's surgical and medical directors.

### Riley Heart Center Cardiothoracic Surgery Volume: 2016 – 2020



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(heart)  
**317.944.7150**  
(lung or throat)  
**317.944.2394**



## A leader in pediatric heart surgery

### Ross procedure

- Riley at IU Health is internationally recognized for performing this surgery, which uses a patient's pulmonary valve to replace the aortic valve.

### Mechanical circulatory support in children

- Riley was the first in North America to implant the Berlin Heart in infants; led to expanded use of the device in the U.S.

### R&D highlight: Pulmonary assist device for failing Fontan patients

- Mark D. Rodefeld, MD**, has developed the Fontan Blood Pump to extend the life of the Fontan repair; preclinical testing is underway to evaluate the pump's ability to delay or eliminate the need for heart transplant.

### Data analysis highlights superior patient outcomes

**Tetralogy of fallot:** Our rate of preserving the pulmonary valve is significantly higher than other published results with potential long-term benefits for patients.

**Rastelli procedure:** Riley surgeons have published and presented excellent outcomes for patients with D-transposition of the great arteries, ventricular septal defect and pulmonary stenosis.

### Operative and Adjusted Operative Mortality\*

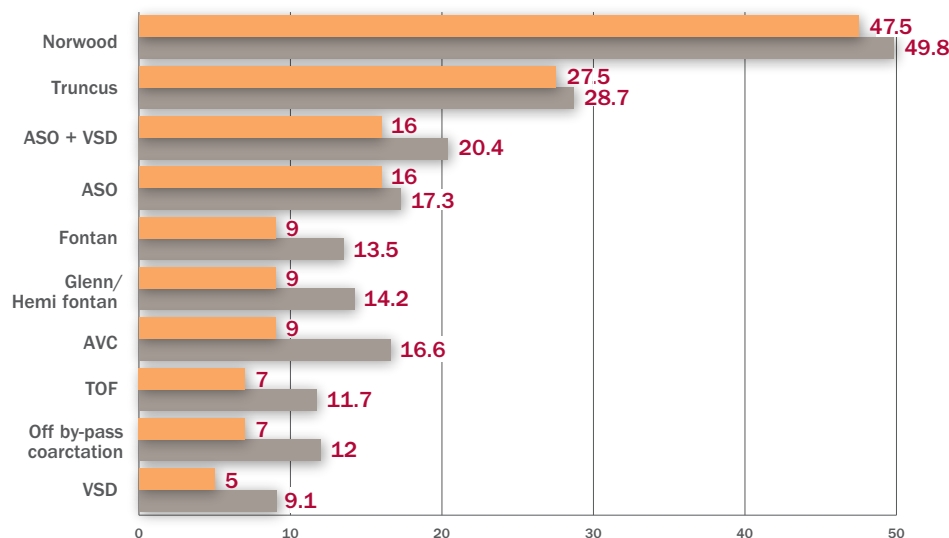
Riley at IU Health has some of the **lowest mortality rates** in the nation for complex heart procedures.

NEONATES/INFANTS/CHILDREN/ADULTS	# DEATHS/ELIGIBLE RILEY	OBSERVED MORTALITY RILEY	EXPECTED MORTALITY RILEY	STS OVERALL
All STAT Mortality Categories	30/1,380	2.2%	3.7%	2.7%
STAT Category 1 (Least complex)	4/424	0.9%	0.4%	0.4%
STAT Category 2	6/374	1.6%	1.8%	1.4%
STAT Category 3	2/195	1.0%	1.6%	2.2%
STAT Category 4	17/329	5.2%	9.1%	6.1%
STAT Category 5 (Most complex)	1/58	1.7%	15.8%	13.3%

### Postoperative Length of Stay\*\*

Riley STS hospitals

Riley patients return home an average of **four days** sooner than the STS national median across 10 procedures, with accordingly better overall mortality.



### Postoperative Overall Complications, Adjusted: 2019

Riley  
20.1%

All PC4<sup>†</sup> facilities (Aggregate all)

31.8%

<sup>†</sup> Pediatric Cardiac Critical Care Consortium

Riley had the lowest percentage of postop complications of any PC4 facility in 2019.

### 30-day Survival: 2019 – 2020

<sup>††</sup> The first operation of a hospitalization that has an operation type of "CPB" or "No CPB Cardiovascular."

	Index operations <sup>††</sup>	All operations
2019	98%	97%
2020	99%	95%



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(heart)  
317.944.7150  
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317.944.2394

\* Source: Society of Thoracic Surgeons (STS) | Congenital Heart Surgery Data Summary, Table 16 July 2015 – June 2019. \*\* Source: STS Benchmark Operations Table 18 for STS Data Harvest | July 2015 – June 2019. Most recent data available as of Aug. 1, 2021.

# INTERVENTIONAL CARDIOLOGY AND ELECTROPHYSIOLOGY

Part of an elite cardiology program, interventional cardiologists at Riley Hospital for Children at IU Health have expertise in using the latest minimally invasive, catheter-based procedures to diagnose and treat congenital heart conditions. Our skilled physicians provide essential anatomic evidence during diagnostic procedures to direct cardiovascular surgical interventions. They also repair heart conditions, such as patent ductus arteriosus (PDA), atrial septal defect and ventricular septal defect that allow both children and adults to avoid open-heart surgery.

**RANKED 5TH  
IN THE NATION**



**13**

research  
publications  
in 2020



DIRECTOR

**> Mark H. Hoyer, MD**

Professor of Clinical Pediatrics and Medicine,  
IU School of Medicine

Connect with Dr. Hoyer on Doximity.

## Program distinctions



Ranked among the top five pediatric heart programs in the nation by *U.S. News & World Report*; ranked in the top 25 for eight of the past 11 years



One of the first programs in the nation to treat PDA in premature infants through cardiac catheterization; now performing up to 30 procedures per year in babies as small as 700 grams



Partner in performing “hybrid” procedures to address complex heart conditions

**5**

board certified  
physicians

**>**

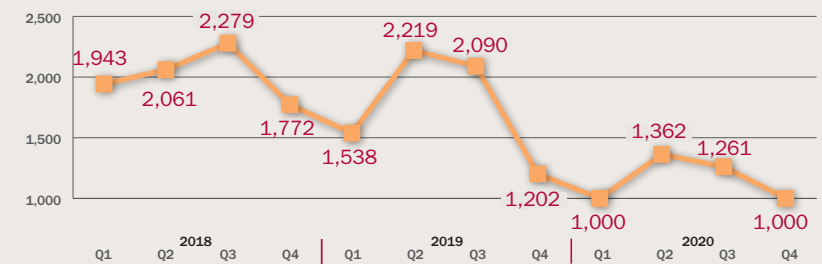
See full team  
member list

## Improving patient safety

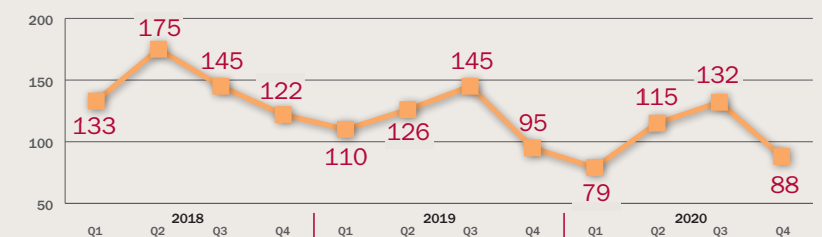
Riley Interventional Cardiology demonstrates a commitment to reducing radiation use. Between 2018 and 2020, **our team reduced dose area product (mean) by 42% and cumulative air kerma (mean) by 28%.**



**Dose Area Product uGy-M2 (Mean): 2018 – 2020**



**Cumulative Air Kerma mGy (Mean): 2018 – 2020**



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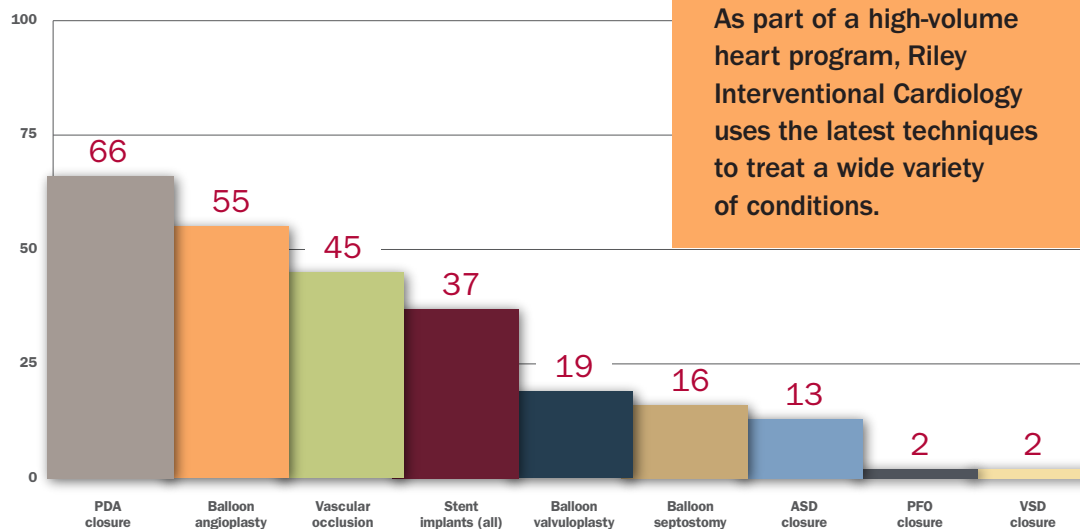
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317.944.8906



Interventions by Type: 2020



As part of a high-volume heart program, Riley Interventional Cardiology uses the latest techniques to treat a wide variety of conditions.

## Professional organization affiliations

CPT CODING WORKGROUP

**American College of Cardiology**

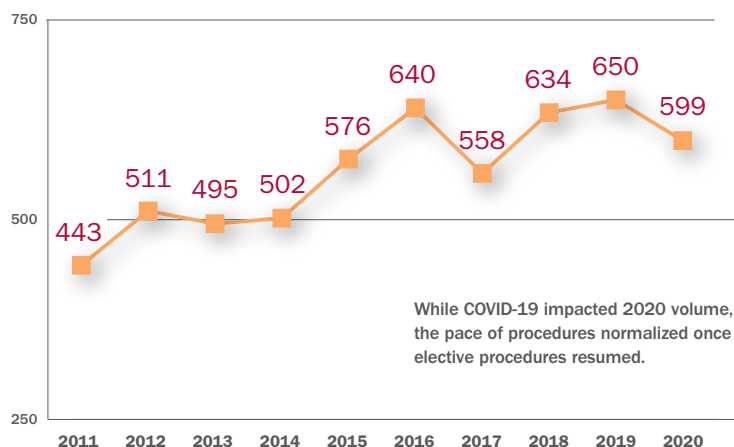
**Mark H. Hoyer, MD**

CONGENITAL INTERVENTIONAL  
CARDIOLOGY CODING WORKGROUP

**Society of Cardiac  
Angiography and  
Interventions**

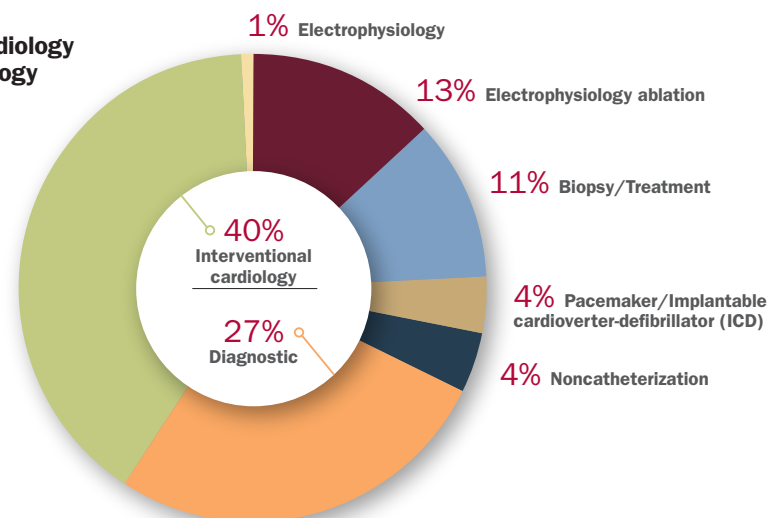
**Mark H. Hoyer, MD**

Cardiac Catheterization Volume: 2011 – 2020



While COVID-19 impacted 2020 volume, the pace of procedures normalized once elective procedures resumed.

Interventional Cardiology  
and Electrophysiology  
Procedures: 2020



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317.944.8906

# INTERVENTIONAL RADIOLOGY

Experienced interventional radiologists at Riley Children's Health offer a wide range of minimally invasive procedures to diagnose and treat many pediatric conditions. Our program reduces the physical trauma associated with open surgery and contributes to decreased infection rates, shorter hospital stays and faster overall recoveries.

## Program distinctions



Only pediatric interventional radiology (IR) program in Indiana offering the full complement of IR procedures



Advanced IR suites provide low-dose technology, minimizing risk and maximizing benefit to pediatric patients

## Riley Interventional Radiology is affiliated with:

Society of Pediatric Interventional Radiology

Society of Interventional Radiology

International Society of Vascular Anomalies

Minimally invasive guided therapy delivers treatment with high standards of quality and safety.



DIRECTOR

> **Francis E. Marshalleck, MD**  
Assistant Professor of Clinical Radiology and Imaging Sciences, IU School of Medicine  
*Connect with Dr. Marshalleck on Doximity.*

**2**  
board certified  
physicians

>  
See full team  
member list

## Specialized programs

### Vascular Anomalies Program

- Our team collaborates with other Riley specialists to treat vascular malformations with leading-edge sclerotherapy and embolization.

### Leading-edge IR treatments for complex conditions

- Percutaneous radiofrequency ablation and cryoablation of tumors
- Angiography with intervention (angioplasty, stent placement, embolization)
- Pulmonary embolism and DVT thrombectomies (only Indiana facility to perform these procedures in children)

Riley Hospital for Children at IU Health is the **only** facility in Indiana to offer percutaneous management of vascular malformations.



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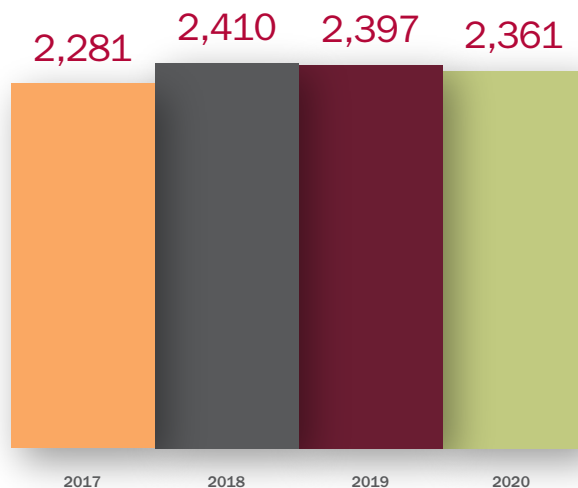
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317.948.6328



**Interventional Radiology Volume:  
2017 – 2020**



**Professional organization  
affiliations**

GUIDELINES COMMITTEE FOR  
PEDIATRIC IR PROCEDURES

**Society of Interventional Radiology**

**Francis E. Marshalleck, MD**

TREASURER

**Society of Pediatric Interventional  
Radiology**

**Francis E. Marshalleck, MD**



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317.948.6328

# MATERNAL FETAL MEDICINE

Maternal fetal medicine (MFM) specialists at Riley Children's Health offer comprehensive high-risk pregnancy consultation for women with medical and obstetrical issues, including preexisting diabetes, chronic high blood pressure, preeclampsia, preterm labor and other complex medical conditions that affect pregnancy.

## Program distinctions



Comprehensive care of pregnancies complicated by maternal medical conditions



Partner in the Riley Fetal Center, which supports management of high-risk or complex fetal conditions



Maternal Recovery Program provides opioid replacement therapy, counseling and group prenatal care

## Specialized programs

### Riley Fetal Center

- Multidisciplinary team supports preeminent management of a wide range of complex or high-risk fetal conditions.

### Maternal Cardiac Care Program

- MFM specialists collaborate with cardiologists to provide the latest evidence-based recommendations for care of pregnant women with complex cardiac conditions.

### Diabetes in Pregnancy Program

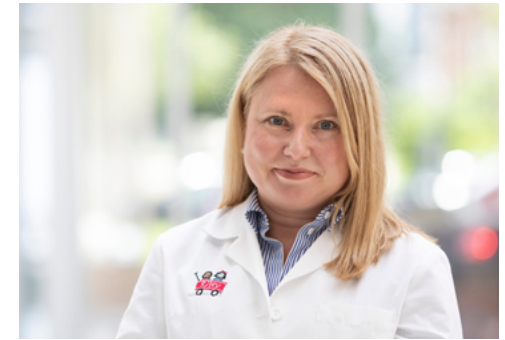
- Our physicians provide comprehensive care for women with diabetes, including on-site diabetes education.

### Maternal Recovery Program

- Unique treatment program offers mental healthcare and counseling, opiate replacement therapy and social work services.

Riley MFM specialists serve on the **Indiana Maternal Mortality Review Committee**. Primary goals:

- Raise awareness of issues causing pregnancy-related deaths
- Recommend interventions to reduce Indiana's maternal mortality rate



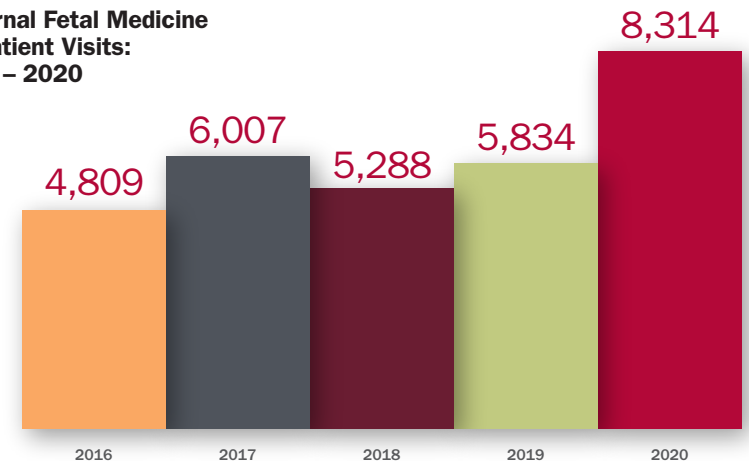
DIRECTOR

> **Christina M. Scifres, MD**  
Associate Professor of Obstetrics and Gynecology, IU School of Medicine  
*Connect with Dr. Scifres on Doximity.*

**9**  
board certified  
physicians

>  
See full team  
member list

Maternal Fetal Medicine  
Outpatient Visits:  
2016 – 2020



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317.944.7010



## Leading-edge diagnosis and treatment

- Percutaneous umbilical cord blood sampling and intrauterine transfusion for pregnancies impacted by anemia
- Specialized care for complex abnormal pregnancies, including cervical, cornual and cesarean scar ectopic pregnancies
- Collaboration with gynecologic oncologists to safely deliver women with morbidly adherent placenta

## Supporting diversity, equity and inclusion

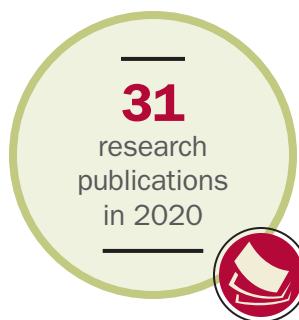
- Riley MFM specialists work with the American College of Obstetricians and Gynecologists to address issues related to disparities in maternal health outcomes.



## Research highlights

**Intensive glycemic targets in overweight and obese women with gestational diabetes mellitus: A multicenter randomized trial (iGDM trial):** National Institutes of Health (NIH)-funded study evaluating the impact of standard versus intensive glucose targets in overweight/obese women with GDM at four clinical sites in U.S.; **Christina M. Scifres, MD**, is principal investigator

**MOMPOD clinical trial:** Indiana University School of Medicine is a site for this NIH-funded, multicenter study evaluating the impact of adding metformin to insulin therapy in women with Type 2 diabetes



# NEUROINTERVENTIONAL RADIOLOGY

Riley Neurointerventional Radiology (NIR) provides nonsurgical alternatives for the diagnosis and treatment of neurovascular conditions that affect blood vessels and the flow of blood in the head, neck, brain and spine, and treatments for head and neck cancers. Riley NIR specialists work closely with colleagues in neurology, neurosurgery, ophthalmology, otolaryngology, orthopedic surgery, plastic surgery, dermatology, hematology and pediatric interventional radiology.

## Program distinctions



Indiana's first and only intra-arterial chemotherapy (IAC) program for retinoblastoma



Home to the only pediatric neurointerventional radiologist in the state



First pediatric institution in the Midwest—and the only in Indiana—to offer endovascular treatment for idiopathic intracranial hypertension/pseudotumor cerebri

**1** OF ONLY **2**  
pediatric stroke  
programs in  
Indiana

Our team is part of a national partnership among medical professionals to advance knowledge, share best practices and ultimately provide the safest care for children.



DIRECTOR



**Mesha L. Martinez, MD**

Assistant Professor of Clinical Radiology and Imaging Sciences, IU School of Medicine  
*Connect with Dr. Martinez on Doximity.*

**3**  
board certified  
physicians



See full team  
member list

## Specialized programs

### Multidisciplinary Neurovascular Clinic

- For children with cerebrovascular disease, this multidisciplinary clinic includes experts in neurosurgery, neurology and neurointerventional radiology/pediatric radiology.

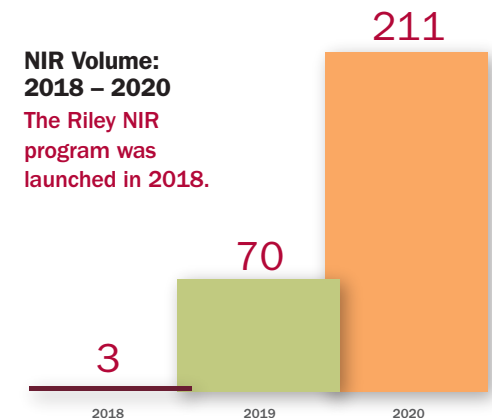
### Pediatric Neuroendovascular Program

- Our program treats patients with cerebrovascular diseases across the lifespan from newborn through adulthood.



**NIR Volume:  
2018 – 2020**

The Riley NIR  
program was  
launched in 2018.



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317.650.6654



## Leading-edge technologies and procedures

### Spinal angiography and embolization

One of the few centers in the nation to offer comprehensive pediatric spinal angiography for diagnosis and treatment planning for patients with spinal tumors, vascular malformations and spinal cord stroke/infarctions.

### Dural sinus stenting for idiopathic intracranial hypertension (pseudotumor cerebri)

Now being offered to pediatric patients, this procedure saves vision and avoids ventriculoperitoneal shunting.

### Spine tumor ablations, head/neck and spine nerve rhizotomies and spine steroid injections

Full scope of pain interventions and bone tumor treatments available for children with spinal tumors or competitive athletes.

### Intra-arterial thrombectomy for acute ischemic stroke

Endovascular procedure removes clot from the vessel to immediately restore blood flow; saves brain tissue and reverses stroke symptoms.

### Intravenous thrombectomy for acute sinovenous thrombosis

Clot can be removed to restore venous outflow; immediately improves symptoms.



## Research highlights

### Intra-arterial chemotherapy (IAC) for retinoblastoma

#### Study topics:

- Genetic mutation versus somatic mutation in response to therapy
- Optimizing the IAC treatment process
- Socioeconomic impact on children of having IAC treatment available locally
- Comparison of the IAC treatment experience at small and large health centers
- Differences in quality of life and social interactions of children receiving IAC versus those treated with enucleation or systemic chemotherapy

## Professional organization affiliations

**International Pediatric Stroke Study:** Only pediatric neurointerventionalist serving on this committee, which outlines worldwide standards for pediatric stroke imaging | **Mesha L. Martinez, MD**

**International Pediatric Stroke Organization:** Involved in ischemic, hemorrhagic and interventional neuroradiology working groups to define international standards for pediatric stroke | **Mesha L. Martinez, MD**

**Society of Neurointerventional Surgery, Pediatric Committee:** Develops standards for pediatric neurointerventional radiology | **Mesha L. Martinez, MD**



## Vascular malformations and multiparametric ultrasound imaging

#### Study topics:

- Contrast-enhanced ultrasound for the diagnosis of vascular malformations
- Elastography for vascular malformation diagnosis



# NEUROSURGERY

Skilled neurosurgeons at Riley Hospital for Children at IU Health manage complex brain, spine and nervous system conditions in children of all ages, from infants to young adults. We routinely treat the most complicated issues, including intractable epilepsy, skull and spine deformities, traumatic injuries, spina bifida, benign and malignant tumors, and blood vessel abnormalities in the brain. Our neurosurgery team is a partner in the only Level I Pediatric Trauma Center in Indiana verified by the American College of Surgeons.



## Program distinctions



Ranked among the top 25 pediatric neurology and neurosurgery programs by *U.S. News & World Report*



Indiana's only:

- Laser interstitial thermal therapy program for epilepsy and neuro-oncology
- Precision genomics program for neuro-oncology
- Level 4 Comprehensive Epilepsy Center (National Association of Epilepsy Centers)
- Facility with a cranial robot
- Program to perform endoscopic craniosynostosis surgery

## Specialized programs

### Epilepsy Program

Surgical capabilities include: Robot-assisted stereo EEG lead placement, laser interstitial thermal therapy, neuromodulatory procedures (responsive neurostimulator (RNS) and vagus nerve stimulator (VNS) insertions), and resective or disconnection surgeries such as lobectomies, hemispherotomies and corpus callosotomies.

### Movement Disorders Program

Our program offers: Baclofen pump program, deep brain stimulation for dystonia, and selective and nonselective cervical and lumbosacral rhizotomy.

**BACLOFEN PUMP PROGRAM**

**4% INFECTION RATE**

—one of the lowest in the nation

**0 INFECTIONS**

in 2020

### Neuro-oncology Program

We offer the only laser ablation program in Indiana for children with epilepsy and brain tumors. Our multidisciplinary approach includes collaboration with oncology, radiation oncology, neurology and other disciplines to provide holistic and leading-edge therapies, both surgical and nonsurgical.

### Neurovascular Disorders Program

We provide diagnostic and therapeutic options for vascular malformations and injuries of the nervous system, including endovascular approaches and surgical resection.

### Peripheral Nerve Program

Our multidisciplinary approaches to neurofibromatosis and birth injuries to the brachial plexus are unique in the region.

DEPARTMENT CHAIR

> **Shelly D. Timmons, MD, PhD, FACS, FAANS**

Professor and Betsey Barton Chair of Neurological Surgery, IU School of Medicine  
*Connect with Dr. Timmons on Doximity.*

**3**

board certified  
pediatric neurosurgeons



See full team  
member list



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317.944.6201



### Leading-edge technologies and procedures

- Stereo EEG
- Laser interstitial thermal therapy
- RNS placement **Meet a Riley patient: Addison, age 16**
- Endoscopic repair of craniosynostosis
- Advanced ICU monitoring technologies for patients with traumatic brain injury and other conditions resulting in intracranial pressure or brain perfusion problems
- Peripheral nerve grafts and transfers



### Advancing treatment through research

**34** open research studies

#### Select topics:

**MRI-guided laser interstitial thermal therapy registry:** International registry comparing the effectiveness of this therapy to epilepsy surgery in children with medically intractable epilepsy

**Predicting seizure responsiveness to neuromodulation using connectomic profiling:** Part of a North American network that is establishing a database to identify ideal surgical candidates for VNS

**Role of inflammatory mediators in tumor-induced hydrocephalus:** Study unique to Riley quantifying the presence and levels of cytokines compared to those found in animal models with hydrocephalus



- A member of the **Cerebral Palsy Research Network**, Riley Neurosurgery contributes prospective registry data to multicenter trials to study and improve care for hypertonic patients.
- Riley neurosurgeons also participate in research related to the genetic underpinnings of arteriovenous malformations.



# OPHTHALMOLOGY

Experienced ophthalmologists and optometrists at Riley Children's Health treat a wide range of vision concerns from problems remedied only with eyeglasses to complex conditions that require sophisticated surgical procedures. Collaborating with certified ophthalmic technicians, our physicians offer the most advanced eye care available to children, as well as adults with strabismus.

## Program distinctions



One of the largest pediatric ophthalmology groups in the United States



Indiana's only multidisciplinary programs for retinoblastoma treatment, inherited retinal diseases and ocular genetics; only Indiana center to offer intra-arterial chemotherapy for retinoblastoma



Only group of board certified, fellowship-trained pediatric ophthalmologists in Indiana



DIVISION CHIEF

> **David A. Plager, MD**

Professor of Ophthalmology,  
IU School of Medicine

*Connect with Dr. Plager on Doximity.*

**11**  
board certified  
specialists

>  
See full team  
member list



### Infant Aphakia Treatment Study: 2004 – 2020

One of four steering committee sites, Riley Hospital for Children at IU Health participated in a national multicenter study, funded by the National Institutes of Health, to assess intraocular lens use in infants after cataract surgery. The study has resulted in 67 refereed publications to date with more in the pipeline from the 10-year follow-up exams that concluded in 2019.

**17**

publications  
in 2020

Advancing care through research  
**12** clinical trials currently underway



### Select research publications

JAMA Ophthalmology: June 2020

**Short-Term Outcomes After Very Low-Dose Intravitreal Bevacizumab for Retinopathy of Prematurity**

Ophthalmology: April 2020

**Outcomes of Bilateral Cataracts Removed in Infants 1 to 7 Months of Age Using the Toddler Aphakia and Pseudophakia Treatment Study Registry**

American Journal of Ophthalmology: April 2020

**The Relationship of Age and Other Baseline Factors to Outcome of Initial Surgery for Intermittent Exotropia**



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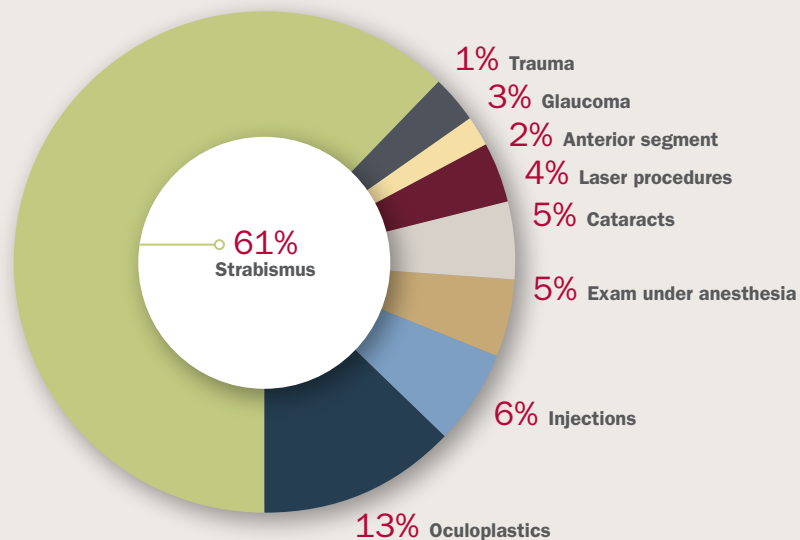
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317.944.8103

## Ophthalmology Procedures: 2020



## Riley ophthalmologists serve in leadership positions with:

International Strabismus Association | David A. Plager, MD

American Association for Pediatric Ophthalmology and Strabismus (AAPOS)

Kathryn M. Haider, MD | David K. Wallace, MD

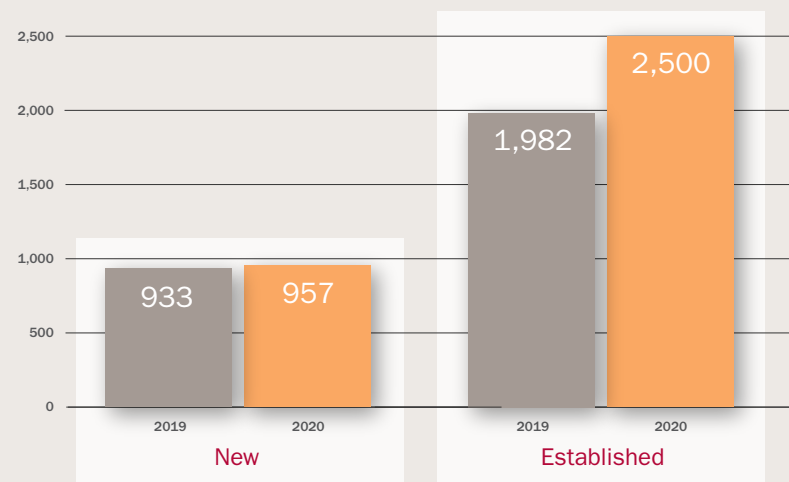
Children's Eye Foundation of AAPOS Advisory Board

Derek T. Sprunger, MD

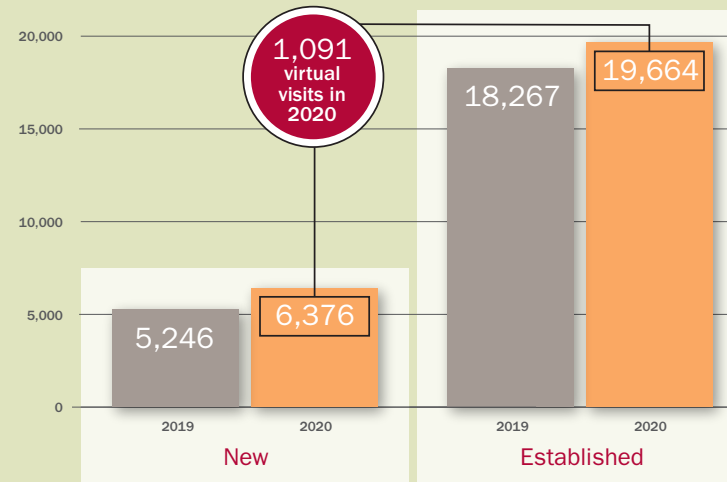
Orbis Flying Eye Hospital | Daniel E. Neely, MD

**7** ophthalmologists associated with Riley at IU Health (faculty members or fellowship alumni) have served as president of the AAPOS (more than any other program in the nation).

## Ophthalmology Inpatient Visits: 2019 – 2020



## Ophthalmology Outpatient Visits: 2019 – 2020





# ORTHOPEDIC SURGERY

Riley Children's Health is a major regional referral center for orthopedic surgery. Our fellowship-trained surgeons, internationally recognized as clinical experts, provide consultation, diagnosis and treatment for a variety of orthopedic concerns.

## Program distinctions



Length of stay following scoliosis surgery lower than national benchmark\*



Partner in Indiana's only Level I Pediatric Trauma Center verified by the American College of Surgeons

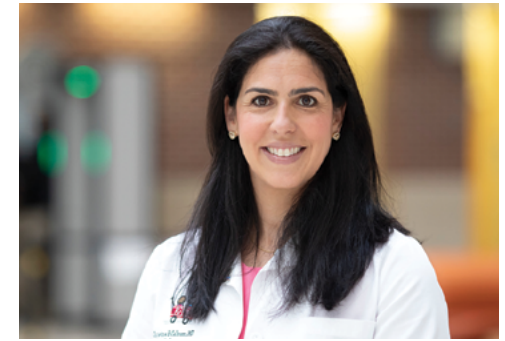


Use of O-arm with navigated placement of pedicle screws in scoliosis surgery

Quality care and patient safety

**1.63%** SURGICAL SITE INFECTION RATE following spinal fusion for scoliosis

**90% OF PATIENTS** undergoing operative reduction and fixation of supracondylar humerus fracture received their care within **18 HOURS** of Emergency Department check-in



DIVISION CHIEF

> **Christine B. Caltoun, MD**  
Assistant Professor of Clinical Orthopedic Surgery, IU School of Medicine  
*Connect with Dr. Caltoun on Doximity.*

**7**  
board certified surgeons

>  
See full team member list

## Specialized programs

### Spinal Deformity Program

- Holistic treatment is supported by a dedicated team of pediatric anesthesiologists; features the latest advancements in technology and postoperative care.

### Cerebral Palsy Program

- Only comprehensive center of its kind in Indiana provides multidisciplinary pediatric expertise, including physical medicine and rehabilitation.

### Pediatric Orthopedic Oncology Program

- Two fellowship-trained orthopedic oncologists diagnose and treat benign and malignant musculoskeletal tumors.

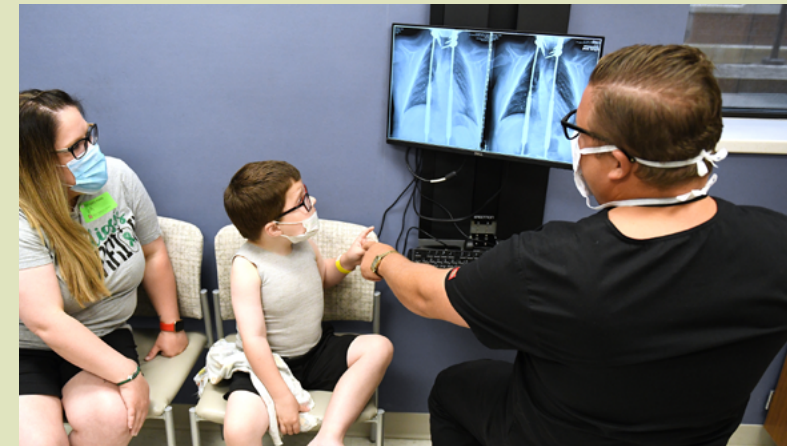
\* American College of Surgeons NSQIP Pediatric 2020 data report

## Leading-edge treatment for scoliosis

Our innovative surgical techniques include the use of growing spine constructs such as the MAGnetic Expansion Control (MAGEC) rod to minimize spinal fusion, preserve spine motion and achieve better patient outcomes.

Riley Hospital for Children at IU Health is the only location in Indiana to provide casting for infantile or early-onset scoliosis.

**Meet a Riley patient: Lucas, age 8**



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317.948.2550



### Active in research to advance care

- Post-approval registry study to evaluate safety, benefit of MID-C system spine disorder correction device.
- Data collection and evaluation of patients receiving treatment for idiopathic scoliosis.
- Research investigating casting versus bracing in idiopathic early-onset scoliosis.

14

research  
publications  
in 2020



### Experts in using the latest technologies: EOS imaging and intraoperative O-arm

- Riley at IU Health is the only hospital in Indiana to offer EOS; fewer than 40 machines in United States.
- EOS yields marked reduction in radiation (up to four times less).
- O-arm produces high-quality 2D and 3D anatomical images for use in orthopedic and spine surgeries.

Leading-edge  
EOS imaging  
for patients  
with scoliosis,  
leg deformities  
or leg length  
discrepancies  
minimizes  
radiation  
exposure.



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317.948.2550



# OTOLARYNGOLOGY – HEAD & NECK SURGERY

Fellowship-trained otolaryngologists at Riley Children's Health provide the full range of pediatric ear, nose and throat care from common issues to more complex disorders. Our experienced team uses leading-edge technology to perform extensive diagnostic evaluations and deliver individualized treatment.

## Program distinctions



First program in Indiana with fellowship-trained pediatric otolaryngologists



Cochlear implant program internationally recognized for clinical care and research



First in the state to perform endoscopic skull base surgery in children



Partner in providing multidisciplinary care and support to children who are deaf or hard of hearing



DIVISION CHIEF

> **Bruce H. Matt, MD, MSc, FAAP, FACS**

Associate Professor of Otolaryngology – Head & Neck Surgery and Associate Professor of Clinical Pediatrics, IU School of Medicine

*Connect with Dr. Matt on Doximity.*

9

board certified  
physicians

>

See full team  
member list

## Specialized programs

### Vascular Anomalies Program

- Advanced, high-quality care for children with these conditions helps restore function and a more normal appearance.

### Cleft and Craniofacial Anomalies Program

- Riley at IU Health has one of the nation's most comprehensive programs for treating children with cleft lip and/or cleft palate; approved by the American Cleft Palate-Craniofacial Association.

### Aerodigestive Program

- Partnership with Riley gastroenterologists provides multidisciplinary care for children with structural airway and functional gastroenterology disorders.

## Leading-edge technologies and procedures

- Computer-aided, image-guided navigation for sinus surgery
- Laser surgery
- Laryngotracheal reconstruction
- Cochlear implantation



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317.944.6467



## Supporting diversity, equity and inclusion

- Audiologists with the Riley Cochlear Implant Program have implemented speech perception testing in Spanish to more accurately diagnose and treat Spanish-speaking patients with hearing loss.
- **Sarah J. Burgin, MD**, partners with an Indiana Clinical and Translational Sciences Institute research team to study the roles that race, ethnicity, gender and socioeconomic status have on health outcomes for children with mastoiditis.



## COVID-19-related publications: Selected titles from 2020

### Otolaryngology – Head & Neck Surgery

**Reverse Surge Planning During the COVID-19 Pandemic:  
A Cautionary Ramp-up for the Otolaryngologist**

**Cadaveric Simulation of Otologic Procedures: An Analysis of  
Droplet Splatter Patterns During the COVID-19 Pandemic**

**Telehealth Opportunities for the Otolaryngologist: A Silver Lining  
During the COVID-19 Pandemic**

## Riley otolaryngologists are leading clinical studies related to:

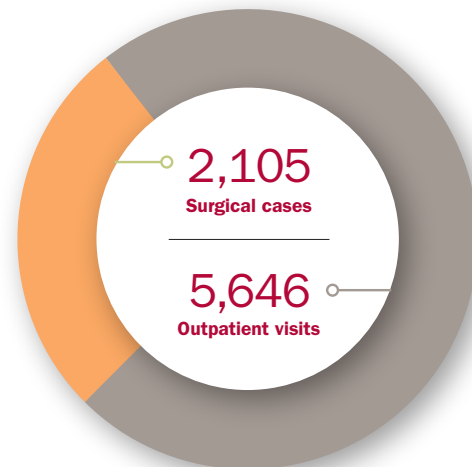
- Juvenile-onset recurrent respiratory papillomatosis
- Temporal bone infections
- Obstructive sleep apnea and laryngomalacia

**36**

publications  
in 2020



## Otolaryngology – Head & Neck Surgery Volume: 2020



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317.944.6467

# PEDIATRIC SURGERY

Skilled surgeons at Riley Children's Health perform the full spectrum of pediatric general surgery and lead the hospital's Level I Pediatric Trauma Center. Riley Pediatric Surgery continues to expand the use of minimally invasive surgical techniques, including thoracoscopy, laparoscopy, and robotic surgery, and therapeutic interventions such as extracorporeal membrane oxygenation (ECMO).

## Program distinctions



First surgeons in Indiana to use robotic surgery in pediatric care



Home to the state's only pediatric surgery fellowships, hosting programs in general surgery and surgery research



24/7, on-site surgical coverage for timely evaluation of children with emergent/urgent conditions

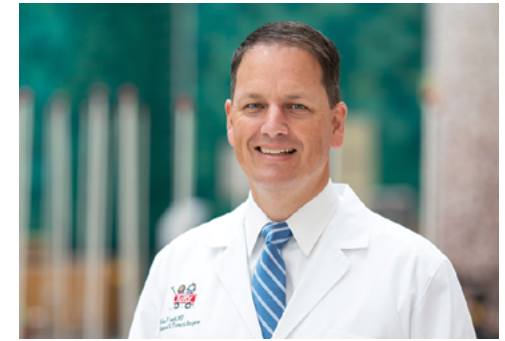
## Advancing research in pediatric surgery

Member of multicenter **Midwest Pediatric Surgery Consortium** to improve standard of care, with

**MORE THAN 10**  
OPEN CLINICAL STUDIES

**39**

research publications in 2020



DIVISION CHIEF

> **Alan P. Ladd, MD, MBA**

Anna Olivia Healey Professor of Pediatric Surgery, IU School of Medicine

Connect with Dr. Ladd on Doximity.

**11**

board certified surgeons



See full team member list

## Specialized programs

### Parenteral Support and Intestinal Rehabilitation (PAIR) Team

- Multidisciplinary team optimizes intestinal adaptation and improves outcomes for children with intestinal failure and short bowel syndrome.

### Chest Wall Program

- Team of specialists focuses on diagnosis and treatment of congenital and acquired chest wall conditions.

### Center for Colorectal and Urogenital Health

- Children with complex colorectal and urogenital anomalies benefit from comprehensive care from Riley surgeons and medical specialists.

### Biliary Atresia Program

- Partnership with gastroenterologists enhances treatment and outcomes.



## Riley pediatric surgeons improve care through leading-edge procedures:

- Nerve cryoablation pain control for pectus surgery
- Robotic surgery
- Egg/sperm preservation in partnership with Riley Hematology/Oncology



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317.944.4681

## Quality and safety initiatives

- Use of evidence-based care guidelines in treatment of children with congenital diaphragmatic hernias results in better patient outcomes and more thorough counseling for families—prenatally during assessment and pre- and postsurgery.
- Work underway to develop a pathway for earlier return of intestinal function and earlier discharge of colorectal patients.
- Quality program related to emergent ECMO practices and simulation training improves patient outcomes.



## NIH-funded basic science research

Directed by **Troy A. Markel, MD**, the **Riley at IU Health Pediatric Surgery Basic Science Research Laboratory** focuses on defining diagnostic tools and therapies for neonatal intestinal disorders such as necrotizing enterocolitis and intestinal ischemia. Markel is the only pediatric surgeon in Indiana with a National Institutes of Health-funded research lab.

Riley Pediatric Surgery participates in the **Congenital Diaphragmatic Hernia (CDH) Study Group**, a voluntary international registry that collects data to evaluate therapies and improve outcomes for infants with CDH.



## Shaping the future of pediatric surgery research, Riley surgeons serve on:

MEMBERSHIP COMMITTEE

**American Pediatric Surgical Association**

**Troy A. Markel, MD**

BASIC AND TRANSLATIONAL  
SCIENCE COMMITTEE

**Association for Academic Surgery**

**Troy A. Markel, MD**

## Postoperative Length of Stay for Select Procedures: Comparison to Peer Hospitals\*

Source: Children's Hospital Association, Pediatric Health Information System (PHIS) | Jan. 1 – Dec. 31, 2020

\* Peer hospitals include 20 children's hospitals of similar size nationwide.

\*\* Inpatient procedures; does not include observational or outpatient procedures

Surgical procedure**	Number of cases	Average length of stay	Avoid days/case
Acute appendectomy with perforation	81	3.83	-0.64
Appendectomy-complex	102	4.26	-0.77
Digestive/abdominal	14	3.29	-3.38
Hepatobiliary	24	4.75	-1.37
Major large bowel	22	3.55	-3.08
Major upper GI procedures	9	8.33	-12.8
Pyloric stenosis	44	1.93	-0.97
Splenectomy	5	3.6	-0.63



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# PLASTIC SURGERY

Led by board certified plastic surgeons with fellowship training, Riley Plastic Surgery provides a wide range of reconstructive surgical care to pediatric patients. Treating children across Indiana and regionally, our surgeons are committed to providing advanced and compassionate care to restore patients to their best selves.

## Program distinctions



First in Indiana to perform:  
corneal neurotization; electrical  
stimulation of injured nerves  
to promote nerve regeneration;  
cross-C7 nerve transfer  
for brachial plexus injury



One of the  
few centers  
nationally to use  
“spray skin”  
burn coverage  
technology



Largest cleft and  
craniofacial care team  
in Indiana and the only  
program approved by the  
American Cleft Palate-  
Craniofacial Association



DIVISION CHIEF

> **Gregory H. Borschel, MD,  
FAAP, FACS, FAAPS**

James Joseph Harbaugh, Jr. Professor of  
Plastic Surgery, IU School of Medicine

*Connect with Dr. Borschel on Doximity.*

5

board certified  
physicians



See full team  
member list

## Specialized programs

### Cleft and Craniofacial Anomalies Program

- Providing ongoing care for nearly 2,000 children, this Riley program is the most comprehensive program of its kind in Indiana and the only program offering complex craniofacial reconstruction.

### Pediatric Burn Center

- With inpatient and outpatient units, our comprehensive burn program provides critical care, surgery, wound management and rehabilitation.

### Facial Paralysis Program

- Riley at IU Health delivers leading-edge treatment to children with all forms of congenital and developmental facial paralysis, including acquired facial paralysis from tumors, trauma or other causes.

### Corneal Neurotization Program

- Collaborating with Riley Ophthalmology, our team treats pediatric neurotrophic keratopathy using nerve transfers and nerve grafts to provide new sensation to insensate corneas to reverse blindness.

### Brachial Plexus Program

- Our multidisciplinary program provides total care for injuries to the brachial plexus that present significant surgical challenges to reconstruction; treatment methods include nerve surgery, rehabilitation, and joint and tendon rebalancing.

### Hand Program

- We provide operative solutions and treatment for all types of congenital and developmental hand conditions, as well as disabilities caused by trauma and other causes.



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317.948.0345



## Notable research and publications

Hand: December 2020

### Barriers to upper extremity reconstruction for patients with cerebral palsy

Plastic and Reconstructive Surgery: May 2020

### Patient-reported outcomes after syndactyly reconstruction

Burns – Journal for the International Society of Burn Injuries: March 2020

### A prospective analysis describing the innovative use of liposomal bupivacaine in burn patients

Experimental Neurology: January 2020

### A single session of brief electrical stimulation enhances axon regeneration through nerve autografts

The Journal of Craniofacial Surgery: May/June 2020

### Evaluation of a pediatric facial paralysis education and family support day

Plastic and Reconstructive Surgery: November 2020

### Tranexamic acid in infantile craniosynostosis surgery: friend or foe?

The Journal of Surgical Research: February 2020

### An epidemiological analysis of pediatric dog bite injuries over a decade

23

peer-reviewed  
publications  
in 2020



## Riley plastic surgeons serve in leadership positions with the following professional organizations:

PRESIDENT

**American Society for Peripheral Nerve**  
**Gregory H. Borschel, MD**

PRESIDENT-ELECT

**Plastic Surgery Research Council**  
**Gregory H. Borschel, MD**

CHAIR, RECONSTRUCTIVE COMMITTEE

**American Burn Association**  
**Brett C. Hartman, DO**

CHAIR, YOUNG MEMBERS COMMITTEE

**American Society for Surgery of the Hand**  
**Joshua M. Adkinson, MD**



Riley at IU Health has the only pediatric burn center in Indiana certified by the American Burn Association.



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# TRANSPLANT SURGERY

The Pediatric Transplant Program at Riley Children's Health is part of IU Health Transplant, a nationally recognized organ transplant center that ranks among the top transplant centers in the U.S. by volume and is the largest, most comprehensive center in Indiana. Our multidisciplinary team works together to support our pediatric patients and their families before, during and after transplant. The level of experience, dedication and expert clinical care translates to better outcomes for our patients.

## Program distinctions



Only center in Indiana approved to perform all pediatric organ transplants



One of only eight centers in the nation to perform pediatric intestine or multivisceral transplants in 2020



Dedicated organ transplant unit staffed by nurses specially trained to care for pediatric transplant recipients



Eight surgeons dedicated solely to abdominal transplantation

## Specialized programs

### Intestine Transplant Program

- Multidisciplinary collaboration determines the best course of treatment for each child—use of total parenteral nutrition, other medical management, surgical intervention or transplant.
- When transplant is necessary, our team has the expertise to facilitate both routine and complex cases with excellent outcomes.

Our program's  
top 25 rankings<sup>†</sup>

Total abdominal  
transplant volume

**18<sup>TH</sup> IN THE NATION**

Intestine transplant volume

**8<sup>TH</sup> IN THE NATION**

Liver transplant volume

**20<sup>TH</sup> IN THE NATION**

Kidney transplant volume

**21<sup>ST</sup> IN THE NATION**

<sup>†</sup> Rankings based on the 100 transplant centers in the U.S. to perform pediatric abdominal transplants in 2020.

Our pediatric  
transplant surgeons  
have transplanted  
**MORE THAN 800**  
abdominal organs  
since 1969.

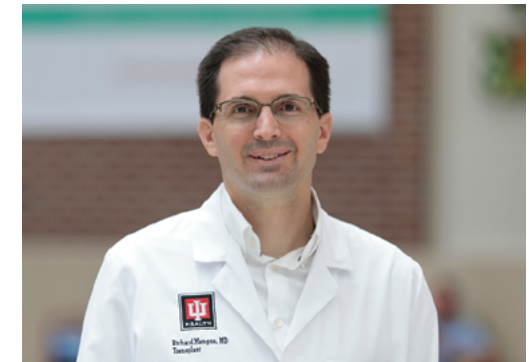


DIRECTOR | PEDIATRIC KIDNEY  
TRANSPLANT SURGERY

> **William C. Goggins, MD**

Associate Professor of Surgery,  
IU School of Medicine  
UNOS primary surgeon\*

Connect with Dr. Goggins on Doximity.



DIRECTOR | PEDIATRIC INTESTINE AND LIVER  
TRANSPLANT SURGERY

> **Richard S. Mangus, MD, MS**

Professor of Surgery, IU School of Medicine  
UNOS primary surgeon\*

Connect with Dr. Mangus on Doximity.

**8**

board certified  
physicians

>

See full team  
member list



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317.944.4370

\* IU Health Transplant is the only transplant center in Indiana with a United Network for Organ Sharing (UNOS)-approved **pediatric program** for all organs. This designation is based on the level of training and experience of IU Health Transplant's surgical and medical directors.



### Three-year Pediatric Patient Survival\*

#### Kidney transplant

Riley Children's Health	<b>100%</b>	National average	98.99%
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#### Liver transplant

Riley Children's Health	<b>100%</b>	National average	92.78%
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#### Intestine transplant

Riley Children's Health	<b>100%</b>	National average	74.12%
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\* Three-year transplant period: July 1, 2015 – Dec. 31, 2017. Data source: srtr.org; center: IU Health



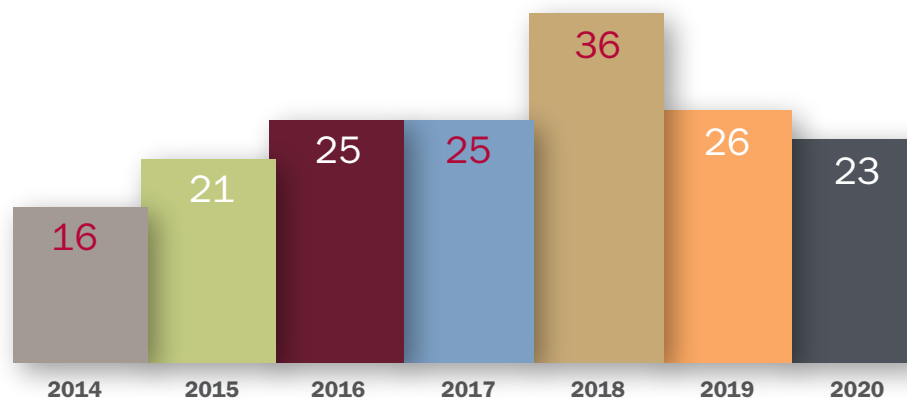
### Research leads to clinical advancements

**Critical care management study** to determine new ways to optimize protocols to manage newly transplanted patients: published in *Pediatric Transplantation*

Partnership with radiology specialists offers leading-edge, contrast-enhanced, real-time **ultrasound to assess blood flow in newly transplanted livers**: published in *Pediatric Radiology*

Impact study of donor **pre-procurement cardiac arrest on clinical outcomes** in pediatric deceased donor liver transplantation: published in *Pediatric Transplantation*

Total Organs Transplanted at IU Health Transplant at Riley Children's Health: 2014 – 2020



\* Includes pediatric kidney, pancreas, liver and intestine



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# UROLOGY

**RANKED 3RD  
IN THE NATION**

The fellowship-trained urology surgeons at Riley Hospital for Children at IU Health are skilled in complex open, endoscopic and robotic urologic surgery. As many of the conditions in pediatric urology have serious implications for children's health and emotional well-being, Riley at IU Health has organized multidisciplinary clinics with specialists to assist in managing the multifaceted needs of our patients. Riley Urology is internationally recognized for our transitional program, ensuring that children's urologic needs are cared for appropriately as they become adults.



## Program distinctions



Third leading pediatric urology program in the nation as ranked by *U.S. News & World Report*



One of seven Congenital Adrenal Hyperplasia (CAH) Comprehensive Care Centers in the U.S. (designated by the CARES Foundation)



Partner in Indiana's only multidisciplinary programs for children with spina bifida, nephrologic disease, anorectal malformations and gender health



Only urology group in Indiana to offer robotic surgery and complete program for adults with congenital urologic conditions

**Urology Surgery  
Outcomes: 2020**

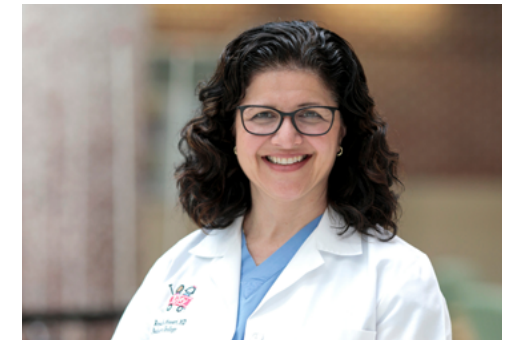
**0.2%** readmission rate

**0** harm events in 2020

## Recognized leader in treatment of bladder exstrophy

One of 10 U.S. Centers of Excellence, as designated by the Association for the Bladder Exstrophy Community

Founding member of  
**Pediatric Urology  
Midwest Alliance**



DIVISION CHIEF

**> Rosalia Misseri, MD**

Robert A. Garrett Professor of Pediatric Urological Research, IU School of Medicine

*Connect with Dr. Misseri on Doximity.*

**6**

board certified  
physicians

**>**

See full team  
member list

## Specialized programs for complex needs

- Refractory Bladder and Bowel Dysfunction Clinic (Sacral Neuromodulation Clinic)
- Congenital Adrenal Hyperplasia Clinic
- Complex Voiding Dysfunction Center
- Spina Bifida Clinic/Transitional Spina Bifida Clinic
- Maternal Fetal Medicine Program
- Urology-Nephrology Stone Clinic
- Riley Urology Gender Health Program
- Disorder of Sexual Differentiation Clinic
- Onco-fertility Program

In addition, Riley Urology partners with specialists in nephrology and genetics to offer a comprehensive multidisciplinary program for congenital anomalies of the urinary tract.



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317.944.8896



### Improving care through research

**PKIDS (Pediatric Kidney Stone Care Improvement Network) site**

- National multicenter study comparing the effectiveness of renal and ureteric stone treatments using ureteroscopy, shock-wave lithotripsy and percutaneous nephrolithotripsy in children

**Riley at IU Health database: Long-term outcomes of children and adults with spina bifida**

- World's largest database of children and adults with spina bifida to allow for novel analyses of surgical and nonsurgical treatment outcomes

### Research highlight

#### Epigenetic determinants of hypospadias

Identifying an association between the severity of hypospadias and the level of herbicides/pesticides used in Indiana, Riley urologists, in collaboration with the University of Washington, are investigating epigenetic markers in 45 boys with this condition.



### Riley urologists hold leadership positions with the following organizations:

EXAMINER

**American Board of Urology**

**Rosalia Misseri, MD**

BOARD MEMBER, NORTH AMERICA

**European Society of Pediatric Urology Research Council**

**Martin Kaefer, MD**

CHAIR, PROFESSIONAL ADVISORY COUNCIL

**Spina Bifida Association**

**Konrad M. Szymanski, MD, MPH**

MEMBER

**World Professional Association for Transgender Health**

**Joshua D. Roth, MD**



### Leading-edge technologies and procedures

**Minimally invasive surgery**, including robotic surgery and mini-percutaneous nephrolithotomy

**SPY fluorescence imaging technology** to evaluate perfusion during exstrophy reconstruction

**Sacral neuromodulation therapy** for children with refractory bladder and bowel dysfunction

**Temporary refluxing ureteral reimplantation** for the treatment of the obstructed megaureter



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# ANESTHESIOLOGY

Expert pediatric anesthesiologists at Riley Children's Health deliver evidence-based, safe and compassionate care in all areas of anesthesia, perioperative medicine, and acute and chronic pain management.

## Program distinctions



Subspecialty anesthesia care for complex cardiac, neurosurgical and transplant surgeries, as well as acute and chronic pain management services



Leader in the use of infant spinal anesthesia to minimize the need for general anesthesia



Nationally recognized in pediatric anesthesia and pain medicine research



Our anesthesia team is committed to **leading innovative perioperative research, providing quality clinical education and improving health outcomes.**



DIVISION CHIEF

**> Joshua C. Uffman, MD, MBA**  
Professor of Clinical Anesthesiology,  
IU School of Medicine

*Connect with Dr. Uffman on Doximity.*

**35**  
board certified  
physicians

**>**  
See full team  
member list

## Specialized programs

### Chronic Pain Management Program

Multidisciplinary team, comprised of specialized pain physicians, psychologists, and physical and occupational therapists, tailors treatment to individual needs; therapeutic options include acupuncture and hypnosis.

### Acute Pain Management Program

Skilled anesthesiologists provide leading-edge pain management for inpatients, including regional anesthesia and pain management protocols aimed at speeding recovery while decreasing unwanted side effects.

### Cardiac Anesthesia Program

This team provides specialized anesthesia care to children with congenital and acquired cardiac disease who are undergoing diagnostic, interventional and surgical procedures.

Riley at IU Health hosts an advanced pediatric cardiac anesthesia fellowship to train the next generation of physicians in this unique subspecialty. The program—the only fellowship of its kind in Indiana—graduated its first fellow in 2020.



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Pediatric Pain  
Management Program

## Quality improvement initiatives

- **Robust perioperative simulation program:** Multidisciplinary in situ and “just in time” simulation training to ensure optimal team performance and success during clinical care.
  - First in the world to use Laerdal SimBaby™ with high-fidelity lung simulator
  - Clinical test site for IngMar and Laerdal high-fidelity simulators
- **Active participant in Wake Up Safe,** a pediatric anesthesia quality and safety collaborative comprised of the nation's top pediatric anesthesiology programs.



### Center for Anesthesia Research Excellence (CARE)

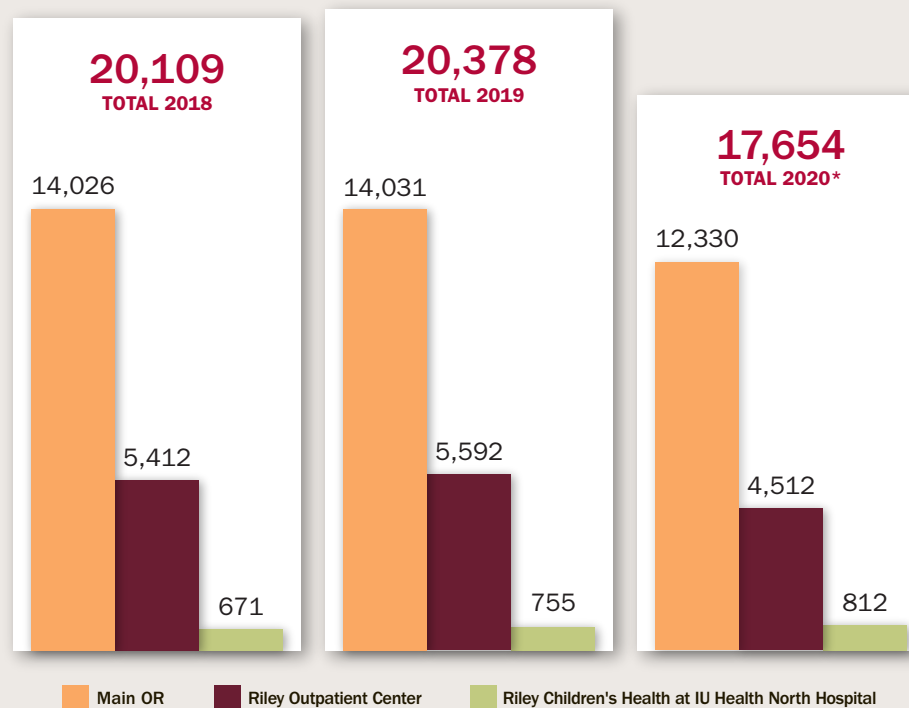
Riley Anesthesia is one of the top National Institutes of Health-funded anesthesia programs in the country aiming to improve clinical research and outcomes in children.

**MORE THAN \$1 MILLION** in external funding in 2020

### Current research focus areas

- Validation of point-of-care TEG 6s in pediatric cardiac surgical patients
- Serratus anterior plane block for management of post-thoracotomy pain and facilitation of early recovery after pediatric cardiac surgery
- Predicting perioperative adverse effects and personalizing analgesia in children
- Methadone in children undergoing major surgery: inter-child variability in pharmacokinetics and postoperative outcomes

## Anesthesia Encounters: 2018 – 2020



\* Total number of encounters in 2020 impacted by reduction in procedures during the COVID-19 pandemic.



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Pediatric Pain  
Management Program

# TRAUMA SERVICES

Verified as a Level I Pediatric Trauma Center by the American College of Surgeons (ACS) since 1993, Riley Hospital for Children at IU Health is one of a select number of children's hospitals in the nation to earn this designation. The ACS has cited the robust quality improvement process for injured children at Riley as one of the many strengths of our hospital trauma program.

## Program distinctions



Only Level I Pediatric Trauma Center in Indiana verified by the ACS



Board certified pediatric trauma surgeons, critical care physicians, anesthesiologists and radiologists available in-house, 24/7



Operating rooms staffed 24/7 by at least two on-site teams with four teams on call

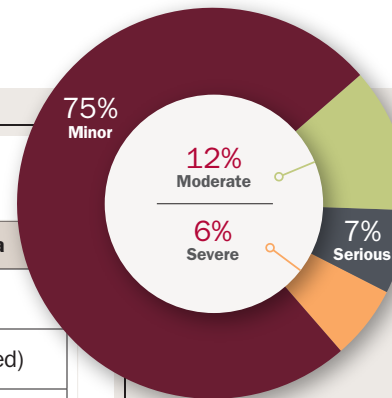


AMERICAN COLLEGE OF SURGEONS  
Verified Trauma Center

ACS-verified trauma centers provide:

- Hospital resources for trauma care
- Full spectrum of trauma services from prehospital phase through rehabilitation
- Injury prevention programs

**Injury Severity of Children Admitted to Riley at IU Health: 2020**



DIRECTOR

**Matthew P. Landman, MD, MPH**

Associate Professor of Surgery,  
IU School of Medicine

*Connect with Dr. Landman on Doximity.*



PROGRAM MANAGER

**Dawn M. Daniels, PhD, RN, PHCNS-BC**

**>** See full team member list

## Pediatric Trauma Quality Benchmarks

Indicator	Riley	National Data
Median injury severity score	5	5
Risk-adjusted mortality rate	1.4%	1.6% (Expected)
Risk-adjusted major hospital event/complication	0.6%	0.8% (Expected)
Blunt splenic injury with splenic preservation	100%	94.9%
Time to operative fixation of mid-shaft femur greater than 24 hours	<b>3.3%</b>	6.8%
Time to intracranial pressure (ICP) monitoring	<b>1.6 hours</b>	2.9 hours

**Riley at IU Health outperforms national benchmark for these indicators.**



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## Engaged in research to improve pediatric trauma care

Participant and/or site for studies related to:

- Prescription opioid misuse after traumatic injury in adolescents
- Risk factors for medical needs after pediatric trauma
- Submission of data on pedestrian crashes in Indianapolis to inform city engineering and neighborhood walkability improvements, education, and policymaking and enforcement



## Notable research publications

Journal of Pediatric Surgery: July 2020

**Traumatic abdominal wall hernias in children:  
A case for early exploration**

American Journal of Respiratory and Critical Care  
Medicine: April 2020

**PERSEVERE biomarkers predict severe acute kidney  
injury and renal recovery in pediatric septic shock**

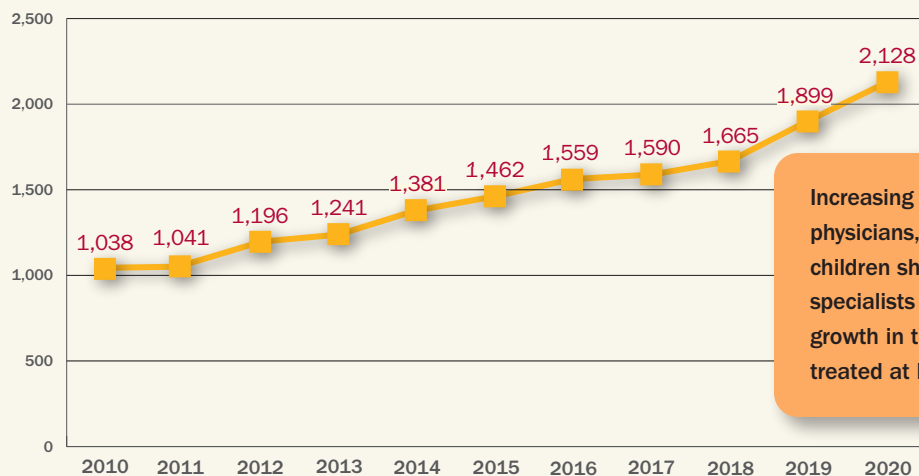
The American Surgeon: December 2020

**Operative traumatic aortic injuries at an urban  
pediatric hospital**

American Journal of Respiratory and Critical Care  
Medicine: June 2020

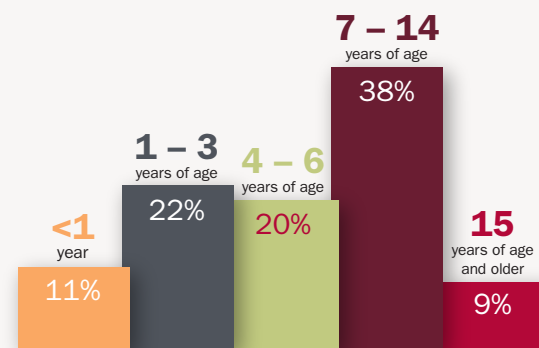
**Early use of adjunctive therapies for pediatric acute  
respiratory distress syndrome: A PARDIE study**

## Injured Children Treated at Riley at IU Health: 2010 – 2020

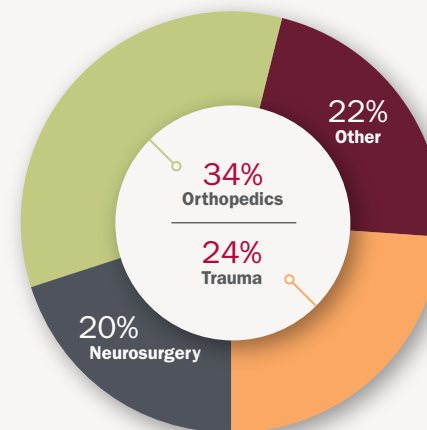


Increasing recognition by referring physicians, parents and others that children should be treated by pediatric specialists contributes to continued growth in the number of injured children treated at Riley at IU Health.

## Age of Injured Children Treated: 2020



## Admitting Service for Injured Children: 2020



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## Surgery Leadership

### R. Cartland Burns, MD

Medical Director, Children's Surgery

### Frederick J. Rescorla, MD

Surgeon-in-Chief

### Joshua C. Uffman, MD, MBA

Anesthesiologist-in-Chief

## Anesthesiology

### Joshua C. Uffman, MD, MBA

Division Chief

### Rania K. Abbasi, MD

### Michael A. Acquaviva, MD

### Jacquelyn E. Allison, MD

### Tanna Boyer, DO, MS

### Elizabeth A. Collins, MD

### Julie D. Dunlap, MD

### Brian N. Egan, MD

### John D. Emhardt, MD

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### Morton C. Green, MD

### Matthew C. Hamilton, DO

### Doris M. Hardacker, MD

### Michele Hendrickson, MD

### Nicole D. Horn, MD

### Matthew Hoyt, MD

### Gabriel Krause, MD

### Stacy M. Kritzmire, DO

### Leigh B. Latham, MD

### Juliane Lee, MD

### Xiaomin Liang, MD

### Michael S. Mazurek, MD

### William L. McNiece, MD

### Senthil Packiasabapathy, MD

### Robert G. Presson, MD

### Eugene P. Presto, DO

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### Chansamone Saysana, MD

### Alex Serafin, MD

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### Clayre Tanis-Arens, MD

### James A. Tolley, MD

### Scott G. Walker, MD

### Jian Ye, MD

### Nausheen Zia, MD

### Heather Bowling, APRN

### Kelsey Kmiecik, APRN

### Marti Michel, APRN

### Lauren Parent, APRN

### Elizabeth Schafer, APRN

### Stephanie Whittaker, APRN

### Elizabeth (Nikki) Block, CAA

### Rob Brossart, CAA

### Madison Dembinski, CAA

### Justin Ellingworth, CAA

### Samantha Evankovich, CAA

### Kendra Fullmer, CAA

### Jackie Joiner, CAA

### Daniel Lee, CAA

### Joe Navratil, CAA

### Dean Pham, CAA

### Jennifer Rush, CAA

### Leah Snyder, CAA

### Alex Steed, CAA

### Mark Wheeler, CAA

### Samantha Dugan, CRNA

### Molly Gerety, CRNA

### Patrick Haltom, CRNA

### Krysta R. Merritt, CRNA

### Kristina Vasnaik, CRNA

## Cardiothoracic Surgery

### Mark W. Turrentine, MD

Division Chief

### Jeremy L. Herrmann, MD

### Mark D. Rodefeld, MD

### Elissa Guevara, PA

### Brittany Mote, PA

### Kelly O'Neal, PA

### Monica Broo, NP

### Melinda Christian, NP

### Melissa Cleveland, NP

### Amy DeHeer, NP

### Angie Finley, NP

### Melissa Johnson, NP

### Ashley Lawrence, NP

### Sydney Rice, NP

### Jessica Riggins, NP

### Kimberly Stull, NP

### Erica Vinson, NP

## Interventional Cardiology and Electrophysiology

### Diagnostic and Interventional Cardiac Catheterization

### Mark H. Hoyer, MD

Director

### Ryan D. Alexy, MD

### Michael M. Ross, MD

## Electrophysiology

### Mark D. Ayers, MD

### Adam C. Kean, MD

## Congenital Cardiac Anesthesia Team

### Rania K. Abbasi, MD

### Thomas Feehan, MD

### Daniel R. Germeroth, MD

### Matthew C. Hamilton, DO

### Doris M. Hardacker, MD

### Gabriel Krause, MD

### Michael S. Mazurek, MD

### Chansamone Saysana, MD

### Clayre Tanis-Arens, MD

### Scott G. Walker, MD

### Krysta R. Merritt, CRNA

### Justin Ellingworth, CAA

## Catheterization Lab

### Rosemary Bland, NP

### Jennifer Grossi, NP

### Kathleen Jones, RN, BSN, CPN

### Lauren Lepper, RN, BSN, CPN

### Ellen Coates, RN, BSN, CCRN

(continued on next page)



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## Catheterization Lab *continued*

Monica Sanborn, RN, BSN, CCRN  
Lisa Bauermeister, RN, BSN  
Jennifer Dildine, RN, BSN  
Emily Heflin, RN, BSN  
Jennifer Henson, RN, BSN  
Meagan Hohlt, RN, BSN  
Helen Murdock, RN, BSN  
Sarah Ripa, RN, BSN  
Alyssa Rogers, RN, BSN  
Natalie Torres, RN, BSN

## Interventional Radiology

Francis E. Marshalleck, MD  
Director  
Sean Pfaff, MD  
Christopher Sinsabaugh, MD  
Sarah Acker, FNP

## Maternal Fetal Medicine

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Caroline Rouse, MD  
Maria Schmoll, MD  
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Anthony Shanks, MD  
Jennifer Weida, MD

## Neurointerventional Radiology

Mesha L. Martinez, MD  
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Jerry Kovoov, MD  
Juan Tejada, MD  
Kelley Wormmeester, PA-C  
Kaylie Beem, RN, BSN  
Deanna Cummings, RN, BSN  
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Kayla Morris, RN, BSN  
Carly Myers, RN, BSN  
Randi Bischoff, RT  
Rickiel Daniel, RT  
Haley Masters, RT  
Austin Matthias, RT  
Britney Payne, RT  
Robert Wager, RT

## Neurosurgery

Shelly D. Timmons, MD, PhD, FACS, FAANS  
Professor and Betsey Barton Chair of Neurological Surgery  
Laurie L. Ackerman, MD  
Karl Balsara, MD  
Jeffrey S. Raskin, MD, MS  
Amanda Saratsis, MD  
Jignesh K. Tailor, MD, PhD  
Denise Ash, MSN, RN, CPNP  
Kelsey Knight, MSN, APRN, CPNP  
Meredith Koontz, AC-PNP, MSN, CCRN, CPN  
Natasha Raman, MSN, RN, FNP-C

## Anna Schulteis, MSN, RN, FNP-C

Tony Beall, RN  
Phil Flory, RN

## Ophthalmology

David A. Plager, MD  
Division Chief  
Charline S. Boente, MD, MS  
Kathryn M. Haider, MD  
Daniel E. Neely, MD  
Gavin J. Roberts, MD  
Heather A. Smith, MD  
Derek T. Sprunger, MD  
David K. Wallace, MD, MPH  
Dana L. Donaldson, OD  
April L. Graves, OD  
April A. Jones, OD

## Orthopedic Surgery

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Emeritus Professor  
Robert J. Bielski, MD  
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Erika L. Daley, MD  
Daniel F. Drake, MD  
Ryan E. Fitzgerald, MD  
Robert G. Tysklind, MD  
Aaron G. Watters, MD  
L. Daniel Wurtz, MD

## John Doss, PA-C

Rachel Giordano, PA-C  
Andrea N. Banet, PA  
Amy L. Morton, PA  
Todd A. Osterbur, PA

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Bruce H. Matt, MD, MSc, FAAP, FACS  
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Elisa A. Illing, MD  
Rick F. Nelson, MD, PhD, FAAP  
Matthew P. Partain, MD  
Philip D. Rosen, MD  
Taha Z. Shipchandler, MD, FACS  
Lauren E. Sowa, MD  
Jonathan Y. Ting, MD, MS, MBA, FACS  
Charles W. Yates, MD, FACS  
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Allison R. Hammer, RN, MSN, CPNP  
Jessamyn R. Salter, RN, MSN, CPNP  
Kristen S. Scheffel, RN, MSN, CPNP  
Katherine A. Gray, RN, MSN, FNP-BC

## Pediatric Surgery

Alan P. Ladd, MD, MBA  
Division Chief  
Ryan M. Antiel, MD, MSME  
Deborah F. Billmire, MD  
R. Cartland Burns, MD

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## Pediatric Surgery *continued*

**Megan A. Coughlin, MD**  
**Barrett P. Cromeens, DO, PhD**  
**Brian W. Gray, MD**  
**Britney Grayson, MD, PhD**  
**Matthew P. Landman, MD, MPH**  
**Troy A. Markel, MD**  
**Frederick J. Rescorla, MD**  
**Trina Blunk, CPNP**  
**Stephanie Dunn, CPNP**  
**Lori Miller, CPNP**  
**Julie Resler, CPNP**  
**Lauren Yeagerlehner, CPNP**  
**Jill Coss, FNP**  
**Megan Effinger, FNP**  
**Anna Himes, FNP**  
**Kristine Nagle, FNP**  
**Joling Tidwell, FNP**  
**Melissa Scott, RN**

## Plastic Surgery

**Gregory H. Borschel, MD, FAAP, FACS, FAAPS**  
Division Chief  
**Joshua M. Adkinson, MD**  
**Brett Hartman, DO**  
**Sunil S. Tholpady, MD, PhD**  
**William A. Wooden, MD**  
**Ellen Randall, PA**  
**Madeline Zeiger, PA**  
**Abigail Chapman, NP**

## Transplant Surgery

**Jonathan Fridell, MD**  
Division Chief  
**William C. Goggins, MD**  
Director, Pediatric Kidney Transplant Surgery  
**Richard S. Mangus, MD, MS**  
Director, Pediatric Intestine and Liver Transplant Surgery  
**Burcin Ekser, MD, PhD**  
**Chandrashekhar A. Kubal, MD, PhD**  
**Andrew Lutz, MD**  
**Plamen Mihaylov, MD**  
**John A. Powelson, MD**  
**Kathleen A. Doan, PharmD, BCPPS**  
**Tim McAfee, FNP**  
**Pediatric Transplant Coordinators**  
**Allison Brown, RN, BSN**  
**Lisa Jobe, RN, BSN**  
**Tina Ray, RN, BSN**  
**Mary Lynn Subrin, RN, BSN, CCTC**  
**Cassie Wilbur, RN, BSN**  
**Dietitians**  
**Kelsey Herwick, MS, RD, CD**  
**Raya Mikesell, RD, LD**  
**Social Workers**  
**Kari McCarty, MSW, LSW**  
**Joshua Sumner, LCSW**

## Trauma Services

**Matthew P. Landman, MD, MPH**  
Director  
**Dawn M. Daniels, PhD, RN, PHCNS-BC**  
Program Manager

## Urology

**Rosalia Misseri, MD**  
Division Chief  
**Martin Kaefer, MD**  
**Richard C. Rink, MD**  
**Joshua D. Roth, MD**  
**Konrad M. Szymanski, MD, MPH**  
**Benjamin M. Whittam, MD, MS**  
**Shelly J. King, MSN, CPNP**  
**Laura Littlejohn, CPNP**  
**Hillary B. Risk, FNP**  
**Taylor L. Wang, CPNP**  
**Melissa A. Young, MSN, CPNP**



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# REFER A PATIENT

Riley Children's Health cares for children in Indiana, across the nation and around the world. Same-day appointments are available for some providers. To schedule an appointment or to speak with a surgical specialty administrator, please call:

SPECIALTY	PHONE NUMBER
Cardiothoracic Surgery	317.944.7150 (heart) 317.944.2394 (lung or throat)
Interventional Cardiology and Electrophysiology	317.944.8906
Interventional Radiology	317.948.6328
Maternal Fetal Medicine	317.944.7010
Neurointerventional Radiology	317.650.6654
Neurosurgery	317.944.6201
Ophthalmology	317.944.8103
Orthopedic Surgery	317.948.2550
Otolaryngology – Head & Neck Surgery	317.944.6467
Pediatric Surgery	317.944.4681
Plastic Surgery	317.948.0345
Transplant Surgery	317.944.4370
Urology	317.944.8896

Submit a referral online at  
[rileychildrens.org/refer](https://rileychildrens.org/refer).



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