Welcome to Surgery at Riley Children’s Health

We are proud to share with you the Riley Children’s Health Surgery Annual Report. Serving patients and families in Indiana and beyond, Riley Children’s Health pediatric surgical teams performed more than 18,600 operating room procedures in 2017. This report is designed to provide our colleagues, care partners and the community an overview of our surgical specialties and how our team contributes to the best-in-class care for which Riley at IU Health is known worldwide.

A leader in improving patient care

In today’s evolving healthcare environment, data transparency has become not only an expectation, but also a powerful factor in changing the behavior of health providers and caregivers, as we strive to achieve the best outcomes. As healthcare innovators striving to continually improve care, our multidisciplinary teams of nurses, anesthesiologists and surgeons have developed several perioperative surgical homes and enhanced recovery after surgery (ERAS) pathways. Standardization, adoption of best practices and a team approach to patient care promise to improve patient satisfaction, minimize complications, reduce length of stay and control healthcare costs.

Statewide access to specialty care

To keep pace with the growing number of children in need of specialized surgical care, Riley surgeons and advanced practice providers see patients in outpatient and surgical centers across the state. In addition, several of our surgical services offer same-day appointments and expanded office hours to improve access to our surgery specialists.

Commitment to advance surgical practice

In 2017, Riley Surgery renewed its focus on research and the role of the physician-scientist and nurse-scientist. Celebrating achievement in academic medicine, our first annual Riley Surgical Research Day featured inspiring clinical and scientific presentations.

The future of Riley Surgery

Riley Hospital for Children at Indiana University Health is currently undergoing verification as a Level I Children’s Surgical Center by the American College of Surgeons. Level I designation is the highest recognition that can be achieved by a children’s hospital, certifying that healthcare resources and staff are available to provide top-tier surgical quality and patient safety.

In addition, a comprehensive maternity and newborn health center is scheduled to open in 2020 at our Riley Hospital campus in Indianapolis. Representing the next phase of surgery at Riley Children’s Health, the center ushers in the era of fetal intervention. We are excited about this new endeavor and look forward to being an integral partner in providing this leading-edge care to patients and families.

We hope this report is a valuable resource in learning more about our surgical specialties. We are privileged to work with the talented medical and surgical professionals at Riley at IU Health. Their commitment and passion for children’s health are unparalleled.

With best regards,

Andrew Jea, MD, MHA
Surgical Director of Quality and Patient Safety

Frederick J. Rescorla, MD
Surgeon-in-Chief

Riley at IU Health welcomed these new surgery team members in 2017

Anesthesia
Senthilkumar Sadhasivam, MD, MPH
Tanna Boyer, DO
Gabe Krause, MD

Interventional Radiology
Sean J. Pfaff, MD

Neurosurgery
Jeffrey S. Raskin, MD, MS

Orthopedic Surgery
Ryan Fitzgerald, MD

Otolaryngology – Head & Neck Surgery
Ryan M. Mitchell, MD, PhD
About Riley Children’s Health

Providing care in communities across Indiana, Riley Children’s Health is the state’s largest and most skilled pediatric health network. We are part of Indiana University Health, a nationally ranked health system offering expert primary and specialty care to adults and children in hospitals and healthcare facilities throughout the state.

As one of the nation’s leading healthcare networks specifically for children, Riley Children’s Health has 200 primary care and 400 specialty care physicians across 40 specialties who deliver and coordinate healthcare for children of all ages. Located in downtown Indianapolis and part of the IU Health Academic Health Center, our flagship hospital—Riley Hospital for Children at Indiana University Health—is the only pediatric research hospital in the state and is among the few children’s hospitals in the nation to be ranked in multiple pediatric specialties. The eighth-ranked children’s hospital for research funding, Riley Hospital for Children at IU Health is 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.

In Carmel, Indiana, Riley Hospital for Children at IU Health North Hospital serves rapidly growing communities on the north side of Indianapolis. This location offers specialty pediatric care, including acute care and critical care beds, pediatric emergency services, surgical suites and subspecialty centers.

CHILDREN’S HEALTH SYSTEM OF

Indiana University Health

Riley Hospital is among fewer than 500 hospitals nationwide to earn Magnet® status from the American Nurses Credentialing Center, which recognizes nursing excellence and high-quality clinical outcomes.

Indiana University School of Medicine

Riley Children’s Health is affiliated with Indiana University School of Medicine, one of the largest medical schools in the United States and one of the busiest locations for pediatric research funded by the National Institutes of Health and other sponsors. Our collaboration with IU School of Medicine attracts thousands of families to Riley at IU Health for clinical trials and to improve upon standard care options. With a desire for rapid innovation in children’s health, Riley at IU Health and IU School of Medicine are committed to providing excellent healthcare for children through prominence in education, training and research.

AFFILIATED WITH

Coming in 2020:
Maternity and newborn health center

Construction is underway for a comprehensive maternity and newborn health center that centralizes all obstetric services and neonatal care offered at the three downtown Indianapolis hospitals of IU Health. The $142 million building project includes renovation of one existing section of Riley Hospital for Children at IU Health, located adjacent to the original hospital lobby, as well as the fourth floor of the Riley Outpatient Center. The project is targeted for completion in summer 2020.

Four floors at Riley at IU Health will be renovated to house inpatient services, including a labor and delivery (plus antepartum) unit, a Level III neonatal intensive care unit, and a postpartum unit. This will replace the existing inpatient labor and delivery, neonatal intensive care unit (NICU), and postpartum spaces at IU Health Methodist Hospital.

The existing Level IV NICU at Riley at IU Health will stay in place, allowing mothers and babies who need the highest level of care to remain in the same building after birth. The combined 45-bed Level III NICU and 60-bed Level IV NICU will make Riley at IU Health home to the largest NICU in Indiana and among the largest in the country.

The project will also relocate the existing outpatient maternal fetal medicine clinics from both IU Health University Hospital and IU Health Methodist Hospital to the Riley campus. The outpatient space will also house the Fetal Center, which provides coordinated care for expectant mothers carrying a fetus with a suspected birth defect. The center is staffed by maternal fetal medicine physicians, neonatologists and pediatric subspecialists.
Riley Surgery Annual Report 2017

Recognizing achievement at first Riley Surgical Research Day

The first annual Surgical Research Day at Riley Hospital for Children was held on May 24, 2017. With nearly 200 perioperative team members in attendance, the event featured 66 abstracts representing the entire spectrum of perioperative services at Riley at IU Health. All surgical specialties, anesthesiology and nursing were represented.


The highlight of Riley Surgical Research Day was a presentation by keynote speaker Jeffrey Blount, MD, who addressed transitional care of adult patients with spina bifida. Dr. Blount is professor and chief of pediatric neurosurgery at Children’s Hospital of Alabama and the University of Alabama – Birmingham Department of Neurosurgery.

American College of Surgeons verification underway at Riley Hospital

Riley Hospital for Children has participated in the American College of Surgeons (ACS) National Surgical Quality Improvement Program (NSQIP) since 2012. Our hospital is currently in the process of ACS Level I Children’s Surgery Center verification.

In collaboration with the Task Force for Children’s Surgical Care, the ACS has developed standards to improve care for pediatric surgical patients. These standards, the nation’s first and only multispecialty standards for children’s surgical care, are supported by the American Pediatric Surgical Association and the Society for Pediatric Anesthesia.

ACS launched its pilot verification program in the first quarter of 2015. Pilot sites consisted of diverse organizations that expressed an early interest in undergoing this process. Pilot site visits were conducted by members of the ACS verification committee, with surveyor teams initially comprised of at least two children’s surgeons and a pediatric anesthesiologist. Following the site visit, surveyors provided a report to the verification committee. Five pilot sites were verified as Level I Surgery Centers following the completion of the pilot phase, which concluded in 2016.

The standards document, Optimal Resources for Children’s Surgical Care, was finalized based on the pilot phase. The document details principles regarding resource standards, quality improvement and safety processes, data collection, and a verification process. The program evaluates three levels of care, aligned to the standards and expected scope of practice at the pediatric hospital.

Riley Surgery: An at-a-glance summary

Riley Surgery comprises dedicated teams of pediatric-focused surgeons across 10 surgical sections:

- Cardiothoracic Surgery
- Dentistry
- Interventional Radiology
- Neurosurgery
- Ophthalmology
- Orthopedic Surgery
- Otolaryngology – Head & Neck Surgery
- Pediatric Surgery
- Plastic Surgery
- Urology

Riley at IU Health has more than 90 surgeons and anesthesiologists who are faculty of Indiana University School of Medicine and Indiana University School of Dentistry. In addition, more than 250 Riley at IU Health and IU Health employees are focused on ensuring children get the surgical care they need. Our team’s significant efforts are evident, completing over 18,600 operating room cases in 2017. We are dedicated to fulfilling our mission and vision with two Riley Children’s Health inpatient hospitals and multiple outreach locations in Indiana. We take great pride in caring for children locally, regionally and nationally.
Cardiothoracic Surgery

As one of the nation’s busiest pediatric heart centers, Riley Hospital for Children at IU Health provides the expertise, experience and resources to care for infants, children and adults with acquired or congenital heart disease. Board certified surgeons in our cardiovascular and cardiothoracic surgery program treat and manage the entire spectrum of heart defects—from the most common to the most rare and complex. Skilled at meeting the highly specialized needs of even the most vulnerable patients, our cardiovascular surgery team is responsible for developing many novel techniques that improve survival rates and quality of life for patients with heart defects that were once untreatable.

Multidisciplinary care

Attracting patients from Indiana, the United States and many parts of the world, Riley at IU Health offers a fully integrated program to care for children and adults with congenital heart disease. With a variety of resources, we are organized and ready to provide a rare level of coordinated care at one of the nation’s top destinations for acute care.

Our team is comprised of world-renowned specialists trained in cardiovascular and cardiothoracic surgery, cardiac anesthesiologists, imaging technicians, congenital cardiologists, cardiovascular intensive care specialists, dedicated cardiovascular nurses and many others who specialize in working with heart defects and thoracic conditions. As part of a comprehensive pediatric healthcare system for advanced care, our team collaborates with other highly skilled specialists to deliver the right care at the right time.

Our Adults with Congenital Heart Disease Program manages a child’s condition into adulthood to promote optimal health through every stage of life. In addition, families affected by congenital heart disease linked to their genetic traits can also seek guidance from our Cardiovascular Genetics program to determine whether future children or other family members may be at risk for the same disorder.

Innovative treatment

Riley at IU Health is nationally known as a high-volume center for the Ross procedure, a surgery that uses a patient’s pulmonary valve to replace the aortic valve. Our specialists are recognized nationally and internationally as respected leaders committed to excellence.

Recognized leaders committed to excellence

Riley at IU Health heart surgeons have an extra tier of training that promotes children’s heart health.

Meet the clinical leader

Mark W. Turrentine, MD, director of pediatric cardiothoracic surgery at Riley Children’s Health and professor of surgery at IU School of Medicine, is board certified in thoracic surgery and congenital cardiac surgery. His areas of expertise include repair of complex congenital heart defects, heart transplantation and mechanical circulatory support.

Dr. Turrentine completed both his medical degree and residency at the University of Kansas before coming to Riley at IU Health and IU School of Medicine for fellowship training. He was appointed to the faculty in 1991. An author or coauthor of more than 170 peer-reviewed journals and nine book chapters, Dr. Turrentine leads international mission work through the Palestinian Children’s Relief Organization, Gift of Life International and Rotary International.

Riley at IU Health is among the top 15 high-volume heart programs in the nation for effective outcomes.

Cardiothoracic Surgery team members

Mark W. Turrentine, MD
John W. Brown, MD
Jeremy L. Hermann, MD
Mark D. Rodefeld, MD

CLINICAL INTERESTS

Adult congenital cardiac surgery
Cardiovascular cell therapy research
Pediatric cardiac surgery
Pediatric cardiac transplantation

An elite program for congenital heart surgery

Riley at IU Health is one of just 11 institutions in 2017 to earn the Society of Thoracic Surgeons (STS) three-star rating, the highest category of quality. With data from 118 programs and more than 450,000 surgeries, the Society of Thoracic Surgeons hosts the largest pediatric and congenital heart database in North America. Its star rating system, based on five operative mortality categories, is one of the most sophisticated and highly regarded overall measures of quality in healthcare in the U.S. and Canada.

Three-star rating from the Society of Thoracic Surgeons

Cardiothoracic Surgery

Surgery Annual Report 2017
Dentistry

The pediatric dentists at Riley at IU Health have years of experience helping children of all ages, including those with special healthcare needs. As faculty members of Indiana University School of Dentistry, our dentists provide the comprehensive care children need for healthy teeth and gums. In our advanced, 12-chair dental facility, we offer a full range of pediatric dental services, including sealants, restorations, fluoride and limited orthodontics for children and adolescents. Our skilled dental team and expert pediatric anesthesiologists from Riley at IU Health administer sedation and general anesthesia for children, including those with special needs such as developmental, emotional, behavioral or cognitive impairments.

We collaborate with many Riley at IU Health specialists such as otolaryngologists, ophthalmologists, oral surgeons and plastic surgeons to manage conditions and improve children’s health.

Prevention
Children should see a dentist when their first tooth erupts into the mouth or by the age of one year. Though this may seem early, we see the best outcomes for dental health when children receive dental care at this age. With early intervention, pediatric dentists are able to identify and diagnose any dental development issues before they become serious problems. We also teach parents how to care for their child’s teeth and offer guidance about foods to avoid, brushing and general dental care. These early childhood visits can prevent dental problems or complicated surgeries later in a child’s life.

Riley dentists are dedicated to improving pediatric dentistry through compassionate care, education and research. In addition to conducting research to advance children’s dental health, our dentists teach dental students and pediatric residents how to care for children’s unique health needs. Residents receive hands-on training in our practice, working with patients under the supervision of IU School of Dentistry faculty.

Trauma care
Riley at IU Health dentists provide 24/7 emergency coverage for children who suffer dental trauma or other emergencies.
Interventional Radiology

Interventional Radiology at Riley at IU Health includes a variety of minimally invasive procedures to diagnose and treat many pediatric conditions. By minimizing the physical trauma associated with open surgery, our program contributes to decreased infection rates, faster recoveries and shorter hospital stays. Pediatric patients benefit greatly from this approach to treatment, which often results in less pain than standard procedures.

Riley Interventional Radiology provides an environment suited specifically to treating pediatric conditions and caring for emotional needs. We use procedural sedation and surgical anesthesia to control pain. If needed, a trained child life specialist is available to support and calm children before procedures. We also use tools made especially for children (smaller in size and length).

Our highly advanced interventional radiology suites offer low-dose technology to minimize risk and maximize the benefit to our pediatric patients. All preparation, procedure and recovery rooms are together in one location. In addition to our pre- and post-procedure rooms, the suite has an anesthesia induction room and a family consultation area.

Effective methods for diagnosis and treatment

Specially trained Riley interventional radiologists use X-ray, computed tomography or ultrasound to see inside the body and guide tools such as catheters, stents and needles to:

- Diagnose conditions
- Obtain biopsies
- Treat:
  - Joint pain
  - Tumors
  - Blocked or damaged arteries or veins
  - Bile ducts that are blocked and damaged
  - Blockages in the urinary tract
- Stop internal bleeding caused by organ trauma or pelvis fractures
- Stop intestinal bleeding

Juvenile idiopathic arthritis, varicoceles, osteoid osteomas and liver tumors are some of the specific conditions our team treats. Additionally, the Interventional Radiology Program works with the Vascular Anomalies Program to treat vascular malformations through sclerotherapy and embolization. Our team also places catheters for children who require long-term use of intravenous medicines or fluids.

Interventional Radiology procedures

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of procedures</th>
</tr>
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<tbody>
<tr>
<td>2016</td>
<td>4,828</td>
</tr>
<tr>
<td>2017</td>
<td>4,888</td>
</tr>
</tbody>
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RILEY INTERVENTIONAL RADIOLOGY SERVICES*

- Angiography and angioplasty
- Biliary drainage
- Biliary endoscopic laser lithotripsy
- Biliary stent insertion
- Chest tube insertion
- Cholecystostomy
- Cryoablation of venous malformations
- Dialysis angioplasty
- Dialysis catheter
- Dialysis fistulagram
- Dialysis stent
- Double J ureteral stent
- Embolization gastrointestinal bleeding
- Embolization of varicocele
- Embolization organ trauma and tumors
- Gastrostomy tube, gastrojejunostomy tube and cecostomy tube placement
- Joint injection and aspiration
- Lymphangiography and embolization
- Nephrostomy tube
- Nephroureterectomy tube
- Paracentesis
- Percutaneous biopsy of solid organs, bone and masses
- Percutaneous drainage of abscesses and fluid collections
- Percutaneous stone retrieval
- Peripherally inserted central catheter (PICC)
- Port-a-cath
- Radiofrequency ablation of osteoid osteomas
- Sclerotherapy and embolization of vascular malformations
- Suprapubic catheter
- Thoracentesis
- Triple lumen catheter
- Transhepatic and translumbar central venous catheter
- Tunneled central venous catheter

*Not an all-inclusive list of interventional radiology services

Meet the clinical leader

Francis E. Marshalleck, MD, is the director of pediatric interventional radiology at Riley Children’s Health and assistant professor of clinical radiology & imaging sciences at IU School of Medicine. A graduate of Regis University in Denver and the University of the West Indies, Dr. Marshalleck practiced emergency medicine in Belize for two years following medical school. In 2002, he was selected for a radiology fellowship at the University of Texas at Houston. After a transitional year in pediatrics at University of Miami’s Jackson Memorial Hospital, Dr. Marshalleck completed his residency in Houston, followed by interventional radiology fellowships in adult and pediatric subspecialties at IU School of Medicine and at University of Toronto’s Hospital for Sick Children, respectively.

Refer a patient: 317.948.6328
Neurosurgery

Riley at IU Health is home to a leading pediatric neurosurgery team skilled at managing complex brain, spine and nervous system conditions in children of all ages, from infants to young adults. As one of the largest and most experienced pediatric neurosurgery teams in the United States, we see patients from all over the world. Our surgeons routinely treat the most complicated issues, including intractable epilepsy, skull and spine deformities, traumatic injuries, congenital conditions, such as spina bifida, and benign and malignant tumors.

Because we are committed to treating any neurological need, our team works side by side with the neurology team and other colleagues at Riley at IU Health, including departmental specialists in oncology and hematology, neuroradiology, neuro- oncology, cleft and craniofacial anomalies, otolaryngology, developmental pediatrics, adolescent medicine, interventional neuroradiology, and physical therapy and rehabilitation. Together, our teams have developed a number of programs and centers of excellence (such as the comprehensive Epilepsy Program) that focus on providing specialized treatment for neurologic disorders.

Riley at IU Health neurosurgeons perform approximately 1,000 procedures each year. With specialized training, our team provides:

Superior high-level care. We are one of a limited number of hospitals nationally to offer superior tertiary and quaternary care for children with severe neurologic injuries or illnesses. These services require highly specialized equipment and access to rare procedures and clinical trials.

Neurosurgery advancements. Our team is developing new pediatric neurosurgery programs in neuro-oncology. We offer clinical trials, minimally invasive epilepsy surgery (featuring laser ablation of seizure foci) and fetal surgery for the repair of myelomeningocoele/spina bifida.

Extensive research. We look for ways to improve brain, spine and peripheral nerve surgery while making these procedures safer for children. In operating rooms and laboratories, we develop and refine safe, minimally invasive techniques as alternatives to traditional, more invasive spine and spinal cord surgeries.

Pedi atric neurosurgery is at the center of many multidisciplinary clinics and perioperative surgical homes at Riley:

- Adult spina bifida
- Brachial plexus injuries/peripheral nerve disorders
- Complex spine/scoliosis
- Craniosynostosis/craniofacial deformities
- Epilepsy
- Movement disorders/spasticity
- Neuro-oncology
- Pain management
- Traumatic brain injury/concussion
- Vascular/stroke/moyamoya

By adopting this framework for quality improvement in pediatric neurosurgery, we meet or exceed national benchmarks for post-operative complications, such as CSF leaks, shunt infections, baclofen pump infections, other surgical site infections and readmissions within 90 days of surgery.

2016 – 2017 NEUROSURGERY CASE VOLUME

| 264 | Shunt surgery |
| 83 | Spinal dysraphism repair |
| 78 | Chiari malformation decompression |
| 72 | Craniosynostosis surgery |
| 64 | Brain tumor surgery |
| 61 | Spinal instrumentation (by pediatric neurosurgery) |
| 44 | Epilepsy surgery |
| 31 | Vagus nerve stimulator placement/revision |
| 29 | Neuroendoscopic procedure |
| 27 | Spasticity surgery |
| 14 | Vascular (including endovascular procedures) |
| 7 | Brachial plexus/peripheral nerve surgery |
| 143 | Other neurosurgery procedures |
| 886 | TOTAL |

July 1, 2016 – June 30, 2017

Meet the clinical leader

Andrew Jea, MD, MHA, joined Riley Children’s Health as director of pediatric neurosurgery in 2016. A professor of neurological surgery at IU School of Medicine, Dr. Jea is committed to working collaboratively with his colleagues to provide high-quality, patient-centered surgical care to children and families.

Dr. Jea attended the University of Florida in Gainesville, Florida, where he earned a bachelor of science in electrical engineering. He studied medicine at the University of Miami School of Medicine, graduating with Alpha Omega Alpha honors. After completing his residency at the University of Miami/Jackson Memorial Hospital, Dr. Jea completed two fellowships—a pediatric neurosurgery fellowship at the Hospital for Sick Children in Toronto, Ontario, Canada, and a spine fellowship at the University of Miami.

Refer a patient: 317.396.1401

Neurosurgery team members

Andrew Jea, MD, MHA
Denise Ash, NP
Laurie L. Ackerman, MD
Gloria Fitzs, NP
Daniel H. Fulker son, MD
Natalie Hauser, NP
Jeffrey S. Raskin, MD, MS
Kimberly Minsick, NP
Jodi L. Smith, PhD, MD
Linda Beaton, RN

CLINICAL INTERESTS

Adult spina bifida
Baclofen pump surgery
Brachial plexus injury
Brain and spine tumors
Chiari malformations
Concussion
Craniofacial surgery
Craniosynostosis
Deep brain stimulation
Dystonia
Endoscopic craniosynostosis surgery
Endoscopy
Epilepsy
Epilepsy surgery
Inpatient acute care
Hydrocephalus
Laser interstitial thermal therapy
Minimally invasive brain surgery
Movement disorders
Moyamoya syndrome
Pediatric neurosurgery care coordination
Peripheral nerve surgery
Scoliosis
Selective dorsal rhizotomy
Skin base surgery
Spasticity
Spina bifida
Spinal cord injury
Spine and spinal cord tumors
Spine surgery
Spine trauma
Spondylolisthesis
Stereotactic electrodecocephalogram placement
Transitional adult patients
Traumatic brain injury
Vascular malformations

Number equals occurrences in each category.
Ophthalmology
Riley at IU Health Ophthalmology offers comprehensive care and early detection for children with all types of eye conditions and visual impairments, from sight problems that are easily treated with glasses to complex conditions that require sophisticated surgical procedures. Our nationally ranked pediatric ophthalmology program is the only one of its kind in Indiana and is staffed by a team of technicians, optometrists and board certified, fellowship-trained pediatric ophthalmologists—physicians who bring advanced eye care to children through an extra tier of intensive training that goes well beyond a standard medical education.

Our eye specialists have detailed knowledge of children's developing visual systems and can objectively evaluate children of all ages and developmental stages, regardless of their ability to communicate what they see. We bring intricate skills to every child's evaluation, diagnosis and treatment—all of which require an approach that is different from adult care.

Experienced leaders in pediatric ophthalmology
Our ophthalmologists train the next generation of pediatric eye specialists and hold national and international leadership roles in pediatric ophthalmology through professional associations such as the American Academy of Ophthalmology, the American Association for Pediatric Ophthalmology and Strabismus, and the International Pediatric Ophthalmology and Strabismus Council. Our team is also active in clinical trials that study new methods of treatment and diagnosis and is widely published in peer-reviewed medical journals and texts that are used to train medical students, residents and fellows.

Leading-edge treatment for eye disorders
With nearly 30,000 outpatient visits and more than 1,760 surgeries performed in 2017, our team of skilled ophthalmologists treats a variety of eye conditions, some of which require surgical intervention.

- Amblyopia ("lazy eye")
- Cataract
- Eyelid lesions
- Pediatric glaucoma
- Ocular trauma
- Optic nerve diseases
- Refractive error
- Retinoblastoma
- Retinopathy of prematurity
- Strabismus (eye muscle disorders)

Additionally, our eye specialists provide multidisciplinary care with other departments, such as neurosurgery, neurology, rheumatology and developmental pediatrics to evaluate and address the variety of ocular manifestations of many systemic conditions, including Down syndrome, juvenile idiopathic arthritis, idiopathic intracranial hypertension and neurofibromatosis.

Innovative care that includes adults
Riley ophthalmologists provide care for adults with strabismus or double vision. Many adults do not realize that there are options for repairing eye muscle imbalances and other conditions that were once untreatable. As part of a healthcare system that is steeped in research and innovation, our pediatric ophthalmologists offer advanced treatment options not available elsewhere—for children and adults.

The Riley at IU Health ophthalmology team includes physicians recognized by U.S. News & World Report in the nation’s top 1 percent of ophthalmologists.

As part of a larger multidisciplinary team at Riley at IU Health, our eye specialists are trained to distinguish vision problems from learning problems, so children can be directed to proper care and treatment.

Meet the clinical leader
David A. Plager, MD

David A. Plager, MD, is director of pediatric ophthalmology at Riley Children's Health and professor of ophthalmology at IU School of Medicine. A graduate of Stanford University, Dr. Plager completed medical school and residency at IU School of Medicine and a fellowship in pediatric ophthalmology and strabismus at Children’s Hospital National Medical Center in Washington, DC.

Dr. Plager has delivered more than 225 lectures nationally and internationally on a wide range of pediatric ophthalmologic conditions, including cataracts, glaucoma, vascular malformations and a variety of topics related to strabismus. He has published or coauthored over 50 scientific articles in peer-reviewed journals, 15 book chapters and was editor and coauthor of the textbook “Strabismus Surgery: Basic and Advanced Strategies.”

Refer a patient: 317.944.8103
Pediatric orthopedic conditions and sports injuries require delicate, tailored care. Ranked by U.S. News & World Report in five of the past six years, Riley at IU Health pediatric orthopedic specialists provide leading-edge treatment and personalized, thorough, child-friendly care for babies and children of all ages. We provide consultation, diagnosis and treatment for a variety of conditions and injuries:

- **Skeletal malformations and congenital conditions.** We care for children with a wide range of skeletal malformations and congenital conditions, including leg length discrepancies, clubfoot and post-traumatic deformities. Riley physicians use a variety of treatment methods, including guided-growth procedures, external fixation devices and multiple-level osteotomies (the cutting of bones). The methods used depend on the level of complexity of each individual case. Long bone lengthening is also possible for patients with leg length discrepancies.

- **Neuromuscular conditions.** Our physicians diagnose and treat a variety of orthopedic complications related to neuromuscular conditions—such as spinal deformities and gait abnormalities—in collaboration with doctors from Riley Neurology. These conditions include any syndrome or disorder that impairs the functions of the nervous system or muscles, such as cerebral palsy or muscular dystrophy.

- **Scoliosis and other pediatric spine conditions.** We provide treatment for a variety of spinal malformations in patients from infancy to adolescence, especially surgical treatment for idiopathic scoliosis and kyphosis. Riley at IU Health is also the only center in Indiana to provide casting for infantile or early onset scoliosis.

In 2017, our orthopedics team provided surgical care to more than 1,235 patients and consulted patients during more than 14,300 outpatient visits for conditions such as:

- **Blount’s disease**
- **Bone disease**
- **Bowlegs and knock knees**
- **Clubfoot**
- **Developmental dysplasia of the hip**
- **Flatfoot**
- **Intoeing**
- **Leg length discrepancy**
- **Muscular dystrophy**
- **Perthes**
- **Spina bifida**

Riley orthopedic specialists treated more than 1,290 patients with fractures and musculoskeletal injuries in our Level I Pediatric Trauma Center in 2017. More than 1,430 orthopedic patients received outpatient trauma care.

**EOS imaging.** Our pediatric orthopedic team uses Indiana’s only EOS imaging machine for most patients who have conditions such as scoliosis, leg deformities or differences in leg lengths. It provides patients with up to 10 times less radiation than other imaging services, an especially important value to patients who require many radiographic studies as part of their care plan. Primary care doctors can request use of the EOS imaging machine whether or not the child is a patient at Riley at IU Health.

**Sports injuries.** Riley at IU Health orthopedic specialists team up with skilled physical therapists to treat a variety of sports-related conditions and injuries, including:

- Ankle and foot injuries
- Dislocations
- Fractures
- Knee injuries
- Low back injuries or pain
- Overuse injuries
- Shin splints
- Shoulder injuries
- Stress fractures

Riley at IU Health orthopedic surgeons performed over 145 surgical spine procedures in 2017. Our innovative surgical techniques include the use of growing spine constructs such as the MAGEC rod, which minimizes spinal fusion, resulting in better patient outcomes.

**CLINICAL INTERESTS**

- General pediatric orthopedics
- Back injury
- Bone dysplasia
- Cerebral palsy
- Clubfoot
- Hip problems
- Limb deficiency/Limb deformity
- Leg length discrepancy
- Kyphosis
- Neck problems
- Scoliosis
- Spinal deformity
- Spine surgery
- Spondylolisthesis
- Sports injuries
- Trauma

Randall T. Loder, MD, is the director of pediatric orthopedic surgery at Riley Children’s Health and the George J. Garceau Professor of Orthopedic Surgery at IU School of Medicine. Dr. Loder is internationally recognized for his work on slipped capital femoral epiphysis in children. A prolific clinical author and lecturer, Dr. Loder received his undergraduate degree in chemistry from the University of Colorado in Boulder and earned his medical degree at Washington University School of Medicine in St. Louis. Dr. Loder’s postdoctoral training includes an internship and residency at the Medical College of Ohio and a fellowship in pediatric orthopedics and scoliosis at Texas Scottish Rite Hospital for Crippled Children.

Meet the clinical leader

Refer a patient: 317.948.2550
Our specialists evaluate and treat a variety of conditions, including:

- Acute airway obstruction
- Chronic ear disease
- Cleft lip and palate
- Congenital ear anomalies
- Head and neck masses
- Hearing loss
- Salivary gland conditions
- Sinusitis
- Sleep apnea
- Vascular anomalies
- Voice and speech conditions

In addition, our skilled ENT surgeons routinely perform thyroid surgeries and surgical interventions for disorders involving the tonsils and adenoids.

**Cleft & Craniofacial Anomalies Program**
One of the largest and most experienced programs of its kind in the nation, the Cleft & Craniofacial Anomalies Program cares for more children with cleft lip and/or cleft palate than any other hospital in Indiana.

**Aerodigestive Program**
This program provides multidisciplinary care to children with structural airway and functional gastroenterology disorders. The program strives to improve clinical outcomes by coordinating outpatient evaluations and diagnostic and operative procedures, while conveying timely feedback to referring physicians and families for ongoing care.

**Deaf and Hard of Hearing Clinic**
This specialized program is designed to support children through medical, social and educational care related to hearing loss.

**Cochlear Implant Program**
A leader in cochlear implants and related research, the Riley at IU Health Cochlear Implant Program includes surgeons and audiologists specially trained to treat all patients with cochlear implants. The program is internationally recognized both as a clinical center and research resource for children with severe to profound hearing loss.

Meet the clinical leader
**Bruce H. Matt, MD, MSc**, director of pediatric otolaryngology at Riley Children’s Health and associate professor of otolaryngology – head & neck surgery, joined IU School of Medicine in 1989 as the first fellowship-trained pediatric otolaryngologist in Indiana. Dr. Matt’s interest in pediatric otolaryngology began in medical school at the University of Pittsburgh and through experience at Children’s Hospital of Pittsburgh, where he studied under world-renowned leaders in pediatric otolaryngology, Drs. Charles Bluestone and Sylvan Stool.

After his residency at the University of Iowa, where he also earned a master’s degree in otolaryngology, Dr. Matt completed his pediatric otolaryngology – head & neck surgery fellowship at Cincinnati Children’s Hospital under the direction of Dr. Robin Cotton, an internationally acknowledged leader in airway reconstruction.

Refer a patient: 317.278.1212
Pediatric Surgery

Experienced in performing the full spectrum of pediatric surgery, Riley at IU Health has eight board certified pediatric surgeons who provide 24/7, on-site surgical coverage, allowing for the timely evaluation of children with emergent and urgent surgical conditions. As the surgery team for Indiana’s only Pediatric Level I Trauma Center, Riley surgeons perform many evening and nighttime surgical procedures for conditions such as acute appendicitis, pyloric stenosis and subcutaneous abscesses.

Caring for children of all ages, our surgeons, anesthesiologists and clinical team members have developed opioid-sparing techniques and Enhanced Recovery After Surgery (ERAS) pathways for many conditions, including chest wall reconstruction, colorectal conditions and appendicitis, that offer a multimodal approach to pain management, while minimizing the use of opioids.

Through a variety of research programs, Riley surgeons participate in quality improvement and outcomes studies to drive shorter lengths of stay and better surgical outcomes. In addition, our surgical team participates in a multi-institutional consortium that shares clinical resources to allow wider investigation among larger patient populations. Our surgeons are also active in designing new clinical care pathways and conducting research to continually advance pediatric surgery at Riley Children’s Health and pediatric hospitals nationwide.

Riley at IU Health Pediatric Surgery performed more than 3,200 operative procedures in 2017.

Pediatric robotic surgery

Riley Hospital for Children at IU Health is one of the few children’s hospitals in the country with the highly advanced da Vinci Xi® robotic surgical system. The enhanced visibility of the system and wristed instruments allow for numerous surgical applications. Additionally, single-site surgery is supported. In the appropriately sized patient, any and all laparoscopic procedures can be performed using this technology with a focus on improving patient outcomes.

In 2017, Riley completed 33 robotic-assisted, minimally invasive general surgery procedures using the da Vinci Xi® robotic surgical system—15 more than in 2016.

Our board certified pediatric surgeons treat a variety of conditions, including:

- Appendicitis
- Chest wall conditions
  - Pectus excavatum
  - Pectus carinatum
  - Poland syndrome
  - Slipping rib syndrome
- Colon and rectal surgery
  - Imperforate anus
  - Hirschsprung’s disease
  - Anorectal abscess/fistula
  - Ulcerative colitis
  - Crohn’s disease
- Gastroesophageal reflux
- Gastrostomy tube placement
- Hypertrophic pyloric stenosis
- Incisional hernias, hydroceles and undescended testes
- Neonatal surgical conditions
  - Intestinal obstructions
  - Congenital diaphragmatic hernia
  - Esophageal atresia and tracheoesophageal fistula
  - Omphalocele
  - Gastrochisis
  - Necrotizing enterocolitis
- Venous access devices
- Trauma

Riley at IU Health Children’s Health

Riley surgeons are integral members of the multidisciplinary care team at the Fetal Center at Riley Children’s Health. Playing active roles in prenatal consultation, multidisciplinary care management conferences and bedside neonatal care, our surgeons are experts in performing a wide range of operations for complex congenital conditions.

Riley at IU Health Center for Chest Wall Anomalies

With decades of experience in both non-operative and operative correction of chest wall anomalies in children, the Riley at IU Health pediatric surgery team formed a center exclusively for the diagnosis and treatment of pectus excavatum, pectus carinatum, Poland syndrome and slipped rib syndrome.

Center for Colorectal and Urogenital Health

Riley Hospital for Children at IU Health recently launched a multidisciplinary center to serve children with complex colorectal and urogenital anomalies. The program expands our ability to provide comprehensive care, coordinating multiple disciplines into a single visit to offer a more patient- and family-centered care experience for patients with anorectal malformations, Hirschsprung’s disease, cloaca and extrophy of the cloaca, idiopathic constipation, colonic motility disorders and other colorectal and urogenital conditions.

2017 Surgical procedures and outpatient visits

Selected pediatric surgical procedures 2017

Meet the clinical leader

Frederick J. Rescorla, MD, is the surgeon-in-chief and director of pediatric surgery at Riley Children’s Health and the Anna O. Healey Chair in Pediatric Surgery at IU School of Medicine. Dr. Rescorla received his general surgery and pediatric surgery training at Indiana University School of Medicine and Riley at IU Health. His primary clinical interests are colorectal disorders and oncology. Author of more than 230 articles and book chapters on various topics in pediatric surgery, he has completed visiting professorships at several institutions in the United States, Europe and Africa.

Dr. Rescorla is a member of the Pediatric Surgery Board of the American Board of Surgery and is a past chair and executive committee member of the Section of Surgery of the American Academy of Pediatrics and past governor of the American Pediatric Surgical Association.

Refer a patient: 317.274.4682

Surgical centers provide specialized care

Fetal Center at Riley Children’s Health

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Dr. Rescorla is a member of the Pediatric Surgery Board of the American Board of Surgery and is a past chair and executive committee member of the Section of Surgery of the American Academy of Pediatrics and past governor of the American Pediatric Surgical Association.

Refer a patient: 317.274.4682
Plastic Surgery

Skilled pediatric plastic surgeons at Riley Children’s Health provide a wide array of reconstructive surgical care for Indiana’s children. Led by board certified plastic surgeons with additional subspecialty fellowship training, our team is committed to providing leading-edge, compassionate care to restore our patients to their best selves.

Riley at IU Health Craniofacial Anomalies Program

Treating nearly 2,000 children each year, the Riley at IU Health Craniofacial Anomalies Program is Indiana’s only comprehensive, multidisciplinary cleft and craniofacial clinic and is accredited by the American Cleft Palate Association. Patients are able to see nine specialists in the fields of plastic surgery, dentistry, speech pathology, craniofacial orthodontics, oral and maxillofacial surgery, developmental pediatrics, nutrition, audiology, and ear, nose and throat (ENT). Expert treatment is available for many craniofacial conditions, including:

- Cleft lip
- Cleft palate
- Veolopharyngeal dysfunction
- Palatal fistulas
- Hemifacial microsomia
- Craniosynostosis
- Acrocephalosyndactyly
- Pierre Robin sequence
- Midface hypoplasia and other jaw abnormalities
- Craniofacial syndromes (Apert, Crouzon, Pfeiffer, Saethre-Chotzen, Muenke, Goldenhar, 22q11.2 deletion syndrome, Treacher Collins)

The program is managed by fellowship-trained specialists certified by the American Board of Plastic Surgery. Authors of peer-reviewed scientific literature on craniofacial surgery, Riley at IU Health plastic surgeons have contributed to research in craniofacial surgery in the areas of Pierre Robin sequence, mandibular distraction, cleft lip and palate, and many other topics.

Riley at IU Health plastic and reconstructive surgeons specialize in the microvascular transfer of skin, muscle and bone flaps to reconstruct the scalp, oral cavity, limbs and other areas.

Riley at IU Health Burn Center

Our comprehensive pediatric burn center provides care for children with burns to all parts of the body. The inpatient unit provides critical care, wound management and rehabilitation for children who have been burned. Outpatient care helps patients transition back to normal life with the help of nursing, occupational therapy, physical therapy, wound care and reconstructive plastic surgery.

Hand surgery: Congenital hand differences and trauma

Skilled in treating children born with hand and upper extremity abnormalities, we specialize in the management of:

- Polydactyly
- Syndactyly (hands and feet)
- Apert finger and thumb anomalies
- Thumb duplication
- Thumb hypoplasia/aplasia
- Clinodactyly/Camptodactyly
- Cleft hand
- Amniotic band
- Arthrogryposis
- Radial club hand
- Brachial plexus palsies (part of a multidisciplinary team)
- Cerebral palsy (part of a multidisciplinary team)
- Traumatic bony and soft tissue injuries
- Nerve and tendon reconstruction

Pediatric burn center: 2017

- 111 admissions
- 782 patient consultations
- 2,644 outpatient visits
- 77 burn surgeries (for acute burns)
- 195 outpatient reconstructive surgeries (for post-burn recoveries)

Pediatric plastic surgery

Riley at IU Health offers a broad range of plastic surgery services. Using the latest techniques, we treat these and other conditions:

- Breast abnormalities (macromastia, Poland syndrome, constricted breasts, tuberous breasts, breast asymmetry, gynecomastia)
- Ear anomalies (prominent ears, cryptotia, microtia, constricted ears)
- Skin conditions (nevi, giant congenital nevi, melanoma, tissue expansion, serial excision)
- Vascular anomalies (hemangiommas, port wine stains, venous and lymphatic malformations)
- Keloids and hypertrophic scars
- Traumatic scar revisions
- Laser therapy for scars

Meet the clinical leader

**Patrick A. Gerety, MD**

Director of Pediatric Plastic Surgery

Patrick A. Gerety, MD, director of pediatric plastic surgery at Riley Children’s Health and assistant professor of surgery at IU School of Medicine, earned his medical degree at the University of Texas Southwestern. His passion for plastic surgery led him to be trained at the prestigious University of Pennsylvania Health System, where he also completed his craniofacial fellowship at the renowned Children’s Hospital of Philadelphia. His desire to serve children and the disadvantaged led him to live and work in India assisting Operation Smile in the corrective treatment of children with lip and palatal clefts. Dr. Gerety has published more than 25 peer-reviewed papers, eight book chapters and has presented his research at many national and international meetings.

Riley at IU Health plastic and reconstructive surgeons performed 572 cleft and craniofacial surgeries in 2017. Collaborating with partners in neurosurgery, our team completes 100 craniosynostosis surgical procedures each year.

Hand and upper extremity abnormalities: 2017

- 134 surgeries
- 562 patients evaluated

**Plastic Surgery team members**

**Patrick A. Gerety, MD**
**Joshua M. Adkinson, MD**
**Brett Hartman, DO**
**Sunil S. Tholpady, MD, PhD, MS**

**Clinical Interests**

- Acute burn surgery
- Brachial plexus reconstruction
- Cleft palate repair
- Craniofacial reconstruction
- Neonatal mandibular distraction
- Pediatric hand surgery
- Pierre Robin sequence
- Pigmented nevi/melanoma
- Tendon and muscle reconstruction

**Surgery Annual Report 2017 | 23 | Refer a patient: 317.948.0345**
Urology

Riley at IU Health Urology is historically ranked by U.S. News & World Report as one of the top five pediatric urology programs in the nation. Our medical and surgical experts specialize in treating conditions of the pediatric urinary tract (kidneys, ureter, bladder) and genitalia. These conditions come in many forms—from common pediatric and adolescent urologic problems to the most complex genital abnormalities. All our surgeons are fellowship trained and board certified in pediatric urology surgery and are recognized leaders in the field.

Riley Urology is considered an international leader in complex surgical reconstruction for urinary incontinence in children with spina bifida. In addition, we also maintain the largest database in the world for complex urinary tract reconstruction, including bladder augmentation with intestine, Mitrofanoff/Monti bladder channels and MACE procedures. Our research is supported by two National Institutes of Health grants and by the Riley Children’s Foundation.

Also known for expertise in complex genital reconstruction, Riley is one of only four centers in the nation designated as a Center of Surgical Excellence for surgical reconstruction for children born with congenital adrenal hyperplasia.

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 complex patients. Our goal is to develop a treatment plan that addresses every aspect of the child’s health, personal development and quality of life, supported by experts from other medical disciplines who are part of our team. Because we specialize in working with children, our child life professionals are also ready to help children understand and cope with difficult procedures or simply calm them during routine tests they may find frightening.

For patients requiring lifelong care and follow-up after surgery, Riley at IU Health has established the Transitional Urology Clinic, one of the few such facilities in the country based in a children’s hospital.

Based on surgical case volume, Riley Hospital for Children at IU Health performs more pediatric urologic surgeries than any single children’s hospital in North America.

A multidisciplinary approach to care

Riley at IU Health urologists and nurse practitioners are actively involved in numerous multidisciplinary clinics to provide a wide range of unique services in collaboration with other physicians. Each of these clinics is unique, representing the only opportunity in the state to receive coordinated care for these complex medical problems.

- Spina Bifida Clinic
- Transitional Spina Bifida Clinic
- Complex Voiding Dysfunction Clinic
- Refractory Bowel and Bladder Dysfunction Clinic (Sacral Nerve Modulation Clinic)
- Congenital Adrenal Hyperplasia Clinic
- Disorder of Sexual Differentiation Clinic
- Maternal Fetal Medicine Program
- Urology-Nephrology Stone Clinic
- Center for Urogenital and Colorectal Health

In addition to these multidisciplinary centers, the division provides care in numerous multidisciplinary clinics to provide a wide range of unique services in collaboration with other physicians. Each of these clinics is unique, representing the only opportunity in the state to receive coordinated care for these complex medical problems.

Meet the clinical leader

Mark P. Cain, MD
Mark P. Cain, MD, director of pediatric urology at Riley Children’s Health, is the Robert Garrett Professor of Urology at IU School of Medicine. Dr. Cain’s primary clinical interests are surgical reconstruction of congenital anomalies of the genitalia, complex lower urinary tract reconstruction, management of prenatal urologic abnormalities and surgical management of urinary tract obstruction. Fellowship trained at the Mayo Clinic, Dr. Cain has published more than 230 articles and book chapters about various topics in pediatric urology and has been an invited lecturer and visiting professor in multiple countries throughout North America, Europe, India, Africa, South America and Asia.

Dr. Cain is the chair of the pediatric urology exam committee for the American Board of Urology and an oral exam committee member. He is currently the assistant editor for pediatric urology for the Journal of Urology. Dr. Cain also is a past member of the executive committee of the Society for Pediatric Urology and section on urology of the American Academy of Pediatrics, and past chair for the section on urology of the American Academy of Pediatric Urology. In addition, he is past president and an executive committee member of the Society for Fetal Urology.

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Refer a patient: 317.944.8896 | 800.993.5471 (toll free)
Trauma Services

Providing the highest level of trauma care specifically designed for children, Riley Hospital for Children at IU Health evaluates and treats the most severely injured pediatric patients. Teamwork is a critical component in providing 24/7 trauma care when rapid and decisive action is needed. That’s why we offer an experienced team of pediatric surgeons, emergency medicine physicians, anesthesiologists, trauma nurses and other medical professionals who work together effectively and seamlessly when seconds matter to save lives.

Nearly half of all trauma patients are transported to Riley Hospital for Children at IU Health from the scene, while the other half are transferred from other hospitals in the state and region. Our emergency department has four bays reserved for trauma patients, and there is always an operating room open for incoming trauma cases.

The only Level I Pediatric Trauma Center in Indiana

Verified by the American College of Surgeons (ACS) as a Level I Pediatric Trauma Center since 1992, Riley Hospital is one of a select number of children’s hospitals in the nation to earn this designation. This verification program, established by the ACS in 1987, promotes the development of trauma centers in which verified centers provide not only the hospital resources necessary for trauma care, but also the entire spectrum of care to address the needs of injured patients from the prehospital phase through rehabilitation, as well as injury prevention.

Trauma quality improvement benchmarking by the American College of Surgeons is risk based and allows for comparison of patient outcomes with other trauma centers across the United States that care for pediatric patients.

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

Our 24/7 in-house coverage by pediatric specialists is essential, as more than 80 percent of injured children arrive at our hospitals during the evening or at night.

Admitting service for injured children: 2017

Meet the clinical leader and program manager

Thomas M. Rouse, MD, is the medical director of trauma services at Riley Children’s Health and associate professor of clinical surgery at IU School of Medicine. Dr. Rouse graduated from IU School of Medicine, and then completed his internship and residency in general surgery at the Medical College of Wisconsin. He was selected for a pediatric surgery fellowship at Children’s National Medical Center in Washington, DC.

Dawn Daniels, PhD, RN, PHCNS-BC, is trauma services program manager. Dr. Daniels has a bachelor of science degree in nursing from Pensacola Christian College in Pensacola, Florida, and a master’s degree in nursing from Indiana University, where she focused on acute care pediatrics and community health nursing. Earning a doctorate in health policy and nursing from IU, Dr. Daniels studied injury prevention and public policy and also completed an adolescent health fellowship.

Traumatic Brain Injury and Concussion Program

Medical professionals continue to discover more about the complexities of concussions, including which patients are susceptible, why concussions occur, how problems develop and the role of healthcare providers in helping to ensure good outcomes. The Riley Traumatic Brain Injury and Concussion Program, the first and only program of its kind in Indiana, facilitates a multidisciplinary, team-based approach to the care of infants, children and adolescents with concussions and other traumatic brain injuries. Care is provided by specialists in:

- Neurosurgery
- Physical medicine and rehabilitation
- Neuropsychology

Riley at IU Health pediatric trauma quality improvement benchmarks

<table>
<thead>
<tr>
<th>INDICATOR</th>
<th>RILEY</th>
<th>NATIONAL DATA</th>
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<tbody>
<tr>
<td>Median injury severity score</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Blunt splenic injury with splenic preservation</td>
<td>98.0%</td>
<td>95.4%</td>
</tr>
<tr>
<td>Time to operative fixation of mid-shaft femur greater than 24 hours</td>
<td>0%</td>
<td>6.8%</td>
</tr>
<tr>
<td>Time to intracranial pressure (ICP) monitoring</td>
<td>1.9 hours</td>
<td>3.0 hours</td>
</tr>
<tr>
<td>Time to craniotomy</td>
<td>1.1 hours</td>
<td>1.8 hours</td>
</tr>
</tbody>
</table>

Our 24/7 in-house coverage by pediatric specialists is essential, as more than 80 percent of injured children arrive at our hospitals during the evening or at night.
Anesthesia

The Riley Children’s Health anesthesia team delivers safe, evidence-based, compassionate care to pediatric patients in all aspects of anesthesia, perioperative medicine, and acute and chronic pain management. In addition to offering outstanding clinical care, our team is committed to providing high-quality clinical education, leading innovative and personalized perioperative care research, and improving health outcomes. Dedicated to maximizing safety and minimizing discomfort, our multidisciplinary team of board certified pediatric anesthesiologists, physicians, and CRNAs works together to meet children’s unique needs and physiology. Our team continually improves the standard methods of clinical care based on the latest evidence and develops more effective, safe, and reliable practices for protecting a child's heart, lung, and brain function, and blood circulation during anesthesia and medical care.

Our unique blend of dedicated pediatric experience, clinical expertise, and skills enables our team to safely deliver surgical anesthesia for pediatric patients of all ages, from babies still in the womb to young adults.

Dedicated pediatric anesthesiologists at Riley at IU Health deliver anesthesia services to about 21,000 children each year.

Riley Anesthesia provides a full range of services, including:

- Surgical anesthesia for all types of common pediatric surgical procedures, including outpatient surgery at Riley Hospital for Children and IU Health North Hospital.
- Anesthesia for complex surgeries in children, such as complex urogenital reconstruction, major neurosurgery, orthopedic surgery including spine fusions, congenital heart surgery, organ transplantation, and craniofacial reconstruction.
- Anesthesia management for diagnostic and therapeutic procedures, including MRI, CT scanning, interventional radiology, gastrointestinal endoscopies, radiotherapy, vesico-urethrogram and cardiac catheterization.
- Acute postoperative pain management, including standardized protocol-driven epidural, spinal, caudal, and advanced regional analgesia, as well as patient-controlled analgesia.
- Chronic pain management in children.
- Multidisciplinary consultation with surgeons and pediatricians.
- Preadmission anesthetic evaluation and testing, including preoperative consultations and instructions.

A leading anesthesia program

- Over 40 physician faculty members and CRNAs and CAs from top programs
- Largest anesthesia service for pediatric transplant surgery in Indiana
- Largest anesthesia programs for pediatric acute and chronic pain management in the state
- Recognized National Institutes of Health and industry-funded pediatric anesthesia/pain management research programs aimed at improving clinical outcomes in children
- Leading-edge, safe, evidence-based clinical care before, during and after surgery and procedures
- Only pediatric chronic and medical pain management program in Indiana

Center for Anesthesia Research Excellence (CARE)

Our research program, CARE, has three goals specific to the services provided at Riley at IU Health:

1. To lead the research field in translating personalized anesthesia and pain management research to clinical practice, as well as pediatric anesthesia safety and outcomes research
2. To discover the mechanisms, physiologic and clinical elements of pediatric anesthesia and pain management, and to translate into clinical practice
3. To develop the next generation of clinical researchers in the field of pediatric anesthesia and pain medicine and developmental neurobiology

To refer a patient to the pediatric pain management program, call 317.944.2353.

Riley at IU Health clinical anesthesia sections

The Section of General Anesthesia provides anesthesia before, during and shortly after inpatient surgical procedures. The division operates a patient-centered, multidisciplinary system of coordinated care that strives for better health, better healthcare and reduced cost of care. These goals are met through shared decision-making and seamless continuity of care for the surgical patient, from surgery through recovery, discharge and follow up.

The Section of Cardiac Anesthesia provides anesthesia and pain management for patients undergoing cardiac, thoracic or vascular surgeries and procedures in the catheterization laboratory, imaging suites and cardiac operating rooms. The cardiac anesthesia team uses highly advanced equipment and advanced monitors, including transesophageal echocardiography (TEE), cerebral oximetry and pulmonary artery catheters.

The Section of Pain Medicine makes surgical procedures in children safe and less painful. We provide an interactive team approach to acute pain treatment and chronic pain management with consultative and outpatient clinics that tailor treatment options to individual patient needs.

Meet the clinical leader

Senthilkumar Sadhasivam, MD, MPH, is the anesthesiologist-in-chief at Riley Children’s Health and the Gopal Krishna Professor and vice chair of research at IU School of Medicine. With significant National Institutes of Health funding, Dr. Sadhasivam has conducted more than 30 clinical research studies and is the author of over 140 publications and book chapters on improving perioperative outcomes. His current research focus is opioid pharmacogenetics and personalizing surgical pain relief in children. His leadership focus is to build robust clinical, research and faculty development programs to benefit children and families at Riley Children’s Health and around the world.
Riley Surgery medical staff directory

Surgery leadership
Frederick J. Rescorla, MD
Surgeon-in-Chief
Mark P. Cain, MD
Associate Surgeon-in-Chief
Senthil Kumar Sadhasivam, MD, MPH
Anesthesiologist-in-Chief
Shara Eloms, MSN, BSN, RN
Director of Perioperative Services
Andrew Jea, MD, MHA
Surgeon-in-Chief
Senthil Kumar Sadhasivam, MD, MPH
Anesthesiologist-in-Chief
Shara Eloms, MSN, BSN, RN
Director of Perioperative Services
Andrew Jea, MD, MHA
Surgical Director of Quality and Patient Safety
Margo Regas, MSN, RN, CNOR, RN-BC
Clinical Educator of Perioperative Services

Anesthesia
Senthil Kumar Sadhasivam, MD, MPH
Director
Rania K. Abbasi, MD
Michael A. Acquaviva, MD
Jacquelyn E. Allison, MD
Tanna Boyer, DO
Elizabeth A. Collins, MD
Anne-Elsa Cosso, MD
Julie D. Dunlap, MD
Brian N. Egan, MD
John D. Emhardt, MD
Morton C. Green, MD
Matthew C. Hamilton, MD
Doris M. Hardacker, MD
Nicole D. Horn, MD
Jodie L. Johnson, MD
Brandon T. Kibby, DO
Gabe Krause, MD
Gopal Krishna, MD
Stacy M. Kritzmire, DO
Leigh B. Latham, MD
Eric Marable, MD
Michael S. Mazurek, MD
William L. McNiece, MD
Malik Nouri, MD
Robert G. Presson, MD
Eugene P. Presto, DO
Chansamone Saysana, MD
Alex Serafin, MD
Aali M. Shah, MD
George J. Sheplock, MD
Andrew F. Stasic, MD

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

Cardiothoracic Surgery
Mark W. Turrentine, MD
Director
John W. Brown, MD
Jeremy L. Herrmann, MD
Mark D. Rodefeld, MD

Dentistry
Brian J. Sanders, DDS, MS
Director
Jeffrey A. Dean, DDS, MS
James E. Jones, DMD, MS, EdD, PhD
LaQuia A. Vinson, DDS, MPH
Juan F. Yepes, DDS, DMD, MPH, MS, DPH

Interventional Radiology
Francis E. Marshall, MD
Director
Sean J. Pfaff, MD
Donna C. Cummings, PA-C

Neurosurgery
Andrew Jea, MD, MHA
Director
Laurie L. Ackerman, MD
Daniel H. Fulkerson, MD
Jeffrey S. Raskin, MD, MS
Jodi L. Smith, PhD, MD
Gloria Fritsch, NP
Allied Health Team Lead
Denise Ash, NP
Natalie Hauser, NP
Kimberly Minnick, NP
Nathasha Vrijee, NP
Linda Beatson, RN

Orthopedic Surgery
Randall T. Loder, MD
Director
Christine B. Caltoum, MD
Tyler W. Christman, DO, MS
Ryan Fitzgerald, MD
Karen S. Myung, MD, PhD, MBA

Otolaryngology – Head & Neck Surgery
Bruce H. Matt, MD, MSc
Director
Sarah J. Burgin, MD
John P. Dahl, MD, PhD, MBA
Ryan M. Mitchell, MD, PhD
Rick F. Nelson, MD, PhD
Taha Z. Shipchandler, MD
Jonathan Y. Ting, MD, MS, MBA
Charles W. Yates, MD
Abideen O. Yekinni, MD
Ashley A. Radtke, BA, CMS, SSLP
Clinic Manager
Caitlin R. Garren, PA-C
Jessamyn N. Salter, PNP, MSN

Neurology
Andrew Jea, MD, MHA
Director
Laurie L. Ackerman, MD
Daniel H. Fulkerson, MD
Jeffrey S. Raskin, MD, MS
Jodi L. Smith, PhD, MD
Gloria Fritsch, NP
Allied Health Team Lead
Denise Ash, NP
Natalie Hauser, NP
Kimberly Minnick, NP
Nathasha Vrijee, NP
Linda Beatson, RN

Pediatric Surgery
Frederick J. Rescorla, MD
Director
Deborah F. Billmire, MD
Cartland Burns, MD
Brian W. Gray, MD
Alan P. Ladd, MD
Matthew P. Landman, MD
Troy A. Markel, MD
Thomas M. Rouse, MD
Lauren Bates, CPNP

Plastic Surgery
Patrick A. Gerety, MD
Director
Joshua M. Adkinson, MD
Brett Hartman, DO
Sunil S. Tholpady, MD, PhD, MS

Urology
Mark P. Cain, MD
Director
Katherine Hubert Chan, MD, MPH
Martin Kaefer, MD
Rosalia Missieri, MD
Richard C. Rink, MD
Konrad M. Szymanski, MD, MPH
Benjamin M. Whittam, MD, MS
Shelly King, NP
Hillary Risk, NP
Taylor Wang, NP
Melissa A. Young, NP

Trauma Services
Thomas M. Rouse, MD
Medical Director
Dawn Daniels, PhD, RN, PHCNS-BC
Program Manager

Perioperative Services
Shara Eloms, RN
Director of Perioperative Services
Margo Regas, RN
Clinical Educator

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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 section administrator, please call:

<table>
<thead>
<tr>
<th>SECTION</th>
<th>PHONE NUMBER</th>
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</thead>
<tbody>
<tr>
<td>Cardiothoracic Surgery</td>
<td>317.944.7150 (heart)</td>
</tr>
<tr>
<td></td>
<td>317.944.2394 (lung or throat)</td>
</tr>
<tr>
<td>Dentistry</td>
<td>317.944.3865</td>
</tr>
<tr>
<td>Interventional Radiology</td>
<td>317.948.6328</td>
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<td>Neurosurgery</td>
<td>317.396.1401</td>
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<td>Ophthalmology</td>
<td>317.944.8103</td>
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<td>Orthopedic Surgery</td>
<td>317.948.2650</td>
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<tr>
<td>Otolaryngology – Head &amp; Neck Surgery</td>
<td>317.278.1212</td>
</tr>
<tr>
<td>Pediatric Surgery</td>
<td>317.274.4682</td>
</tr>
<tr>
<td>Plastic Surgery</td>
<td>317.948.0345</td>
</tr>
<tr>
<td>Urology</td>
<td>317.944.8896</td>
</tr>
<tr>
<td></td>
<td>800.993.5471 (toll free)</td>
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Riley Children’s at Indiana University Health

Riley Children’s Health is Indiana’s only full-service statewide pediatric health system. Riley Children’s Health offers complete, comprehensive pediatric care ranging from routine primary care checkups to the most complex acute care needs from highly skilled pediatric specialists. The system connects patients with 200 primary care and 400 specialty care physicians in 19 communities across the state of Indiana. Riley Physicians treat patients in their home communities, bringing top-notch care close to home. This statewide network is an extension of Riley Hospital for Children at Indiana University Health, one of the nation’s leading children’s hospitals.