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On the cover
Sammy Curry, age 6, spent several weeks at Riley to treat an infection near his heart. As part of his recovery, the young boy, who has epilepsy and cerebral palsy, met with physical therapist Jacob Copeland for therapy, disguised as play, in Riley’s Child Life Zone outdoor area. “Mainly what I’m doing with him is trying to build strength,” Copeland said. “We’re working on sitting to standing, a lot of squats, and building up endurance and hip strength so that Sammy can get back to being independent.” Every activity, every movement is closely watched and supported by Copeland to help his young patient become stronger. Sammy didn’t know he was in therapy. For him, it’s playtime, and that’s just fine with Copeland.

Exceptional patients, exceptional care: stories of Riley kids
Thousands of children are treated by physicians and care teams at Riley Children’s Health each year. Read some of their stories on pages 3, 54 and 59.

Welcome to Riley Children’s Health
We are pleased to present this overview of the medical specialties* offered at Riley Children’s Health. As one of the nation’s leading healthcare networks specifically for children, we are passionate about the care we deliver and committed to making advanced, evidence-based treatment available to children and families in Indiana and beyond.

Riley Children’s Health is the only hospital in Indiana to be ranked among the best children’s hospitals in the country by U.S. News & World Report, and we are proud that nine of our pediatric specialties are recognized among the nation’s premier programs for 2019–20. Eight Riley specialties are ranked in the top 25, with two programs—cardiology and heart surgery, and urology—honored with top 10 rankings. Additionally, the Riley Heart Center, ranked ninth in the nation by U.S. News, is one of just 10 pediatric heart programs to earn The Society of Thoracic Surgeons’ highest, three-star rating. This achievement places our cardiology program among the top 8.5% of heart programs nationwide.

For the treatment of children and adolescents with aggressive cancer, we are excited to share that our nationally ranked hematology/oncology program has recently joined CureWorks, a unique collaboration among elite academic children’s hospitals that aims to improve access to leading-edge immunotherapy trials. As one of our oncologists noted, Riley’s partnership in CureWorks is a “game changer” for cancer patients and families who have run out of options to treat life-threatening cancers. (For more on CureWorks, refer to page 28.)

Other notable features of our children’s health system:

- One of the few pediatric hospitals nationally—and the only one in Indiana—to be verified by the American College of Surgeons as a Level I Pediatric Trauma Center
- Recognized by the American Heart Association as a Gold award winner for resuscitation
- A partner in the Children’s Hospital Association and the Solutions for Patient Safety, a network of more than 130 hospitals throughout North America that share best practices to improve the safety and quality of pediatric care

This report is designed to help you learn more about the breadth and depth of our services—from routine primary care to the specialized expertise needed to treat the most complex conditions. Through clinical care and research, Riley physicians and team members work every day with an unmatched commitment to the long-term health and well-being of every child who comes through our doors.

The only pediatric research hospital in Indiana, Riley Hospital for Children at IU Health—our flagship hospital—is the eighth-ranked children’s hospital in the nation for research funding.

*The surgical specialties of Riley Children’s Health are highlighted in a separate annual report. Visit rileychildrens.org/surgeryannualreport or request print copies from rileychildrens@iuh.org. This annual report is also available online at rileychildrens.org/medicalannualreport.

Elaine G. Cox, MD
Chief Medical Officer

Brian E. Wagers, MD
Physician Director of Pediatric and Maternal Quality and Safety
About Riley Children’s Health

Treatng more than 300,000 inpatients and outpatients each year, Riley Children’s Health is the state’s largest and most skilled pediatric health network, providing care in communities across Indiana. 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. We are also the sixth-ranked children’s hospital in the U.S. for research funding, and 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.

Additionally, Riley Hospital for Children at IU Health North Hospital, located in Carmel, Indiana, 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

Among fewer than 500 hospitals nationwide to earn Magnet® status from the American Nurses Credentialing Center, Riley Hospital is recognized for 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 U.S., 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

NATIONALLY RANKED IN 9 PEDIATRIC SPECIALTIES

Cancer
Cardiology and Heart Surgery
Diabetes and Endocrinology
Gastroenterology and GI Surgery
Nephrology
Neurology and Neurosurgery
Orthopedics
Pulmonology
Urology

Nationally Ranked in Pediatric Specialties

Best Children's Hospitals

One child’s Riley story: Elliot Preddie, age 11

Transplant gives hope to family battling sickle cell disease.

After 37 days in the hospital, Elliot Preddie was ready to go home and jump on the trampoline with his little brother. Elliot, 11, received a bone marrow transplant to treat—and hopefully cure—his sickle cell disease, an inherited disorder that causes red blood cells to break down, resulting in serious infections, chronic pain and organ damage.

Elliot and his brother, Carter, 3, were both diagnosed with the disease at birth. Their mother, Tremesha Preddie, is blunt when she talks about the disease that has stolen part of her boys’ youth and innocence, yet manifests itself in different ways. For her youngest, that means pain in the upper body and an enlarged spleen. For Elliot, it started with “silent strokes” when he was a toddler, which led to monthly blood transfusions for five years. A scar in Elliot’s skull reveals where he had surgery for Moyamoya, a rare cerebrovascular disorder caused by blocked arteries at the base of the brain, which put Elliot at high risk for stroke despite regular blood transfusions. It was, his mom said, “a ticking time bomb.”

Bone marrow transplants have proven effective in treating sickle cell patients since about 2009, said Seethal A. Jacob, MD, MS, FAAP, director of Riley’s Pediatric Sickle Cell Program and Elliot’s care provider, along with stem cell transplant physician Joel L. Skiles, MD, MS.

“We’ve been transplanting kids with sickle cell since about that time,” Dr. Jacob said, as it’s “really the only established and accessible cure for patients with sickle cell disease.”

The results have been good, she said. In the past few years, transplants done for sickle cell at Riley have all been successful, though patients are still being monitored for long-term success.

“The goal is that this will cure Elliot of his sickle cell,” Dr. Jacob said. “It’s hard for us to grasp—for our families who have gone through this and their child is cured—the incredible sense of weight taken off their shoulders. Sickle cell is a chronic disease, but it’s still a disease with a life expectancy in the mid-40s. You can imagine it’s hard for a parent to even think that their child won’t live a full and happy life.”

New research at Riley and IU Health University Hospital focuses on the benefits of using a half-match donor, which is what Elliot’s family did. Elliot’s donor was an adult male cousin. Using half-match donors opens the door for sickle cell patients who may not have a large pool of potential donors available in the National Bone Marrow Registry.

“It’s really hard,” Tremesha said. “It’s physically hard, it’s financially hard, and then they’re your kids. So the emotional toll—there are no words. But you do what you have to do when it’s your kids.”

And for Tremesha and Terrence Preddie and their boys, being at Riley is what they have to do.

“I absolutely love this hospital. I count my blessings all the time that Riley’s here,” Tremesha said. “I’ve come to learn that especially in the hematology space, Riley is truly one of the top hospitals in the country.”

While Elliot did well through the transplant process, his physicians at Riley won’t know for sure how successful it is until the end of the first year. Ultimately, the risk remains until five years out, so the transplant team will continue to follow Elliot during that time.
Riley Maternity and Newborn Health

A comprehensive statewide program, Riley Maternity and Newborn Health includes a hospital-based center and an expanded perinatal network. The program is designed to increase access to high-quality, coordinated medical care to improve the health outcomes for at-risk pregnant women and infants throughout Indiana.

Offering obstetric, delivery, newborn and comprehensive pediatric subspecialty services, the integrated program is a new model of coordinated care that essentially treats mother and baby as one patient, surrounding them with the medical support they need.

Riley Maternity and Newborn Health includes the Maternity Center to open in 2021 at Riley Hospital for Children and the following:

Riley Fetal Center

- With a multidisciplinary approach, the center supports preeminent management of a broad range of complex, high-risk fetal conditions, while providing advanced, coordinated care for pregnant women and families during this critical time.
- The center coordinated care for 200 referral patients in 2018.

A statewide network of maternal fetal medicine specialists

- Ten maternal fetal medicine physicians currently practice in five locations across the state.
- The program serves pregnant women, with specialists completing more than 11,000 patient visits annually.

Maternity and newborn health statewide simulations

- Riley facilitates educational simulations for neonatal units and maternity centers across Indiana.
- Thirty neonatal unit and eight maternity outreach simulation programs were completed in 2018.

Community initiatives

Infant mortality. Riley supports community infant mortality efforts and provides systems improvement expertise to the Indiana Perinatal Quality Improvement Collaborative.

Maternal substance abuse. In 2018, the Riley maternal fetal medicine program at IU Health University Hospital facilitated nine centering groups to support 84 opioid-exposed pregnant women.

Maternity Center at Riley Hospital for Children to open in 2021

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 tower will house services to care for low-risk to highly complex pregnancies and will include dedicated operating rooms, 68 private rooms for mothers and 45 private NICU rooms.

Floor 1 | Atrium and Cafeteria

Floor 2 | Labor and Delivery

Floor 3 | Neonatal Intensive Care Unit (NICU)

Floors 4 and 5 | Mother/Baby Postpartum
Adolescent Medicine

Riley at Iu Health Adolescent Medicine is one of the largest and most active divisions of its kind in the nation for clinical care, research and training. Dedicated to the care and treatment of young people up to age 21, our fellowship-trained physicians, experienced in caring for the special needs of teenagers and young adults, treat a variety of adolescent health conditions, from eating disorders and reproductive health to sports injuries. The adolescent medicine team routinely works with other Riley specialties, including cardiology, respiratory care, child development, diabetes, endocrinology, and pediatric and adolescent gynecology.

Specialized care for adolescents and children
Adolescent Gynecology and Reproductive Healthcare
Riley adolescent medicine specialists evaluate and treat a variety of gynecological conditions, including delayed puberty, dysfunctional uterine bleeding, polycystic ovary syndrome, chronic pelvic pain and dysmenorrhea. Riley offers specialized gynecology and reproductive health services such as long-acting reversible contraceptive options.

Our specialists have extensive experience consulting with patients and families about fertility preservation for adolescents with complex illnesses, including heart transplants and congenital heart conditions, sickle cell disease, cystic fibrosis, childhood cancer, and diabetes mellitus.

Riley Gender Health Program for Children and Adolescents
Riley at Iu Health has the only comprehensive program in Indiana targeted to meet the unique needs of transgender and gender non-binary children and adolescents. Through our interdisciplinary program, we address the medical, psychological, nutritional, family, social, legal and school issues associated with diverse gender identities.

Charis Center for Eating Disorders
The Charis Center, Indiana’s most comprehensive eating disorders treatment program, offers the full array of medical, psychological and family services for patients with eating disorders. The center treats patients of all ages and provides three levels of care: Partial hospital program – Eleven-hour therapy, five days per week

Intensive outpatient program – Three-hour therapy, three days per week; provides group therapy targeted for patients who need more focused treatment

Outpatient care – More than 10,000 outpatient visits annually

DIVISION CHIEF
J. Dennis Fortenberry, MD, MS

“Our physicians and team members are deeply committed to high standards of evidence-based, collaborative practice to support the mental and physical health and well-being of adolescent and young adult patients throughout Indiana.”

Adolescent Medicine team members
J. Dennis Fortenberry, MD, MS Division Chief
Rachel Katzenellenbogen, MD
Eric Meininger, MD, MPH
Mary Ott, MD, MA
Cynthia Robbins, MD, MS
Mary Rouse, MD
Marcia Shew, MD, MPH
Rebekah Williams, MD, MS
Kelly Donahue, PhD, HSPP
Beth Thielking, MSN, CPNP, CDE
Cardiology

Ranked ninth in the nation by U.S. News & World Report, the Riley Heart Center is one of the most highly respected programs for diagnosis and treatment of congenital and acquired heart conditions in children. Care is managed by a highly skilled and experienced team of specialists, including cardiologists, cardiovascular surgeons, cardiovascular critical care specialists, cardiovascular anesthesiologists, neonatologists and adult cardiologists specializing in congenital heart disease.

With world-class facilities and the latest technology, Riley cardiology experts provide the full continuum of care from fetuses and premature babies to adults with congenital heart disease.

The Riley Heart Center is currently one of only 10 pediatric heart programs in the U.S. with the highest quality rating (three star) from The Society of Thoracic Surgeons (STS). This places Riley as one of only five programs earning both a three-star STS rating and top 10 placement in U.S. News & World Report rankings.

With data from 118 programs and more than 500,000 surgeries, STS is the largest database in North America for pediatric and congenital heart surgery. For 2018, Riley’s mortality rate is lower than the overall mortality rate for programs contributing data to STS in seven out of 10 cardiothoracic surgery categories.

Three-star rating from The Society of Thoracic Surgeons

Riley has completed more than 150 pediatric heart transplants since 1989. We are also one of the few pediatric heart centers capable of implanting mechanical support devices, including total artificial hearts, and offering transplant as an option for adults with complex congenital heart disease.

100% THREE-YEAR HEART TRANSPLANT SURVIVAL (2013-2017)

Riley has achieved a 100% three-year heart transplant survival rate (2013-2017). This is a result of our team’s dedication to providing the best care possible for our patients.

Transcatheter closure of patent ductus arteriosus (PDA) in tiny premature infants

- 455 479 427 500

2015 2016 2017 2018

46 PDAs (0 premature infants) 51 PDAs (2 premature infants) 47 PDAs (7 premature infants) 78 PDAs (21 premature infants)

Electric cardiotocography (ECG)

- 11,520 studies performed at Riley Children’s Health
- 5,842 studies referred to Riley cardiologists for interpretation
- 17,362 total volume

Cardiac MRI

The Riley Heart Center has Indiana’s only comprehensive pediatric cardiac MRI program, providing thorough, in-depth evaluation of cardiac structure and function in children and adults with all types of heart disease. Cardiac MRI does not use ionizing radiation and is not invasive, making the procedure easier for children to undergo. In some cases, it is also an alternative to cardiac catheterization. Our team performs more than 300 highly specialized cardiac MRI exams each year.

Cardiac catheterization

RileyHeart Center specialists use the latest advancements in cardiac catheterization, making it possible to diagnose and treat cardiac birth defects without conventional surgery. We routinely perform leading-edge procedures, including atrial septal defect closure, ventricular septal defect closure, balloon valvuloplasty and transcatheter valve replacement.

Total catheterization volume: 2015 – 2018

- 455 479 427 500

2015 2016 2017 2018

46 PDAs (0 premature infants) 51 PDAs (2 premature infants) 47 PDAs (7 premature infants) 78 PDAs (21 premature infants)

Fetal Cardiology Program

The Fetal Cardiology Program, part of the comprehensive Riley Fetal Center, offers in-depth diagnostic imaging and counseling during pregnancy to enable thorough evaluation and development of a treatment plan. With 1,647 evaluations performed in 2018, patient volume has more than doubled since 2000. Fetal echocardiograms are performed at five locations in Indianapolis with plans for extended statewide outreach.

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Child Development and Developmental Pediatrics

The child development and developmental pediatrics teams at Riley at IU Health have the expertise, experience and resources to care for infants and children with neurodevelopmental disabilities, including those who may have co-occurring behavioral or emotional concerns. We work together to build collaborative and specialized services to improve access and overall quality of care for our patients.

Our specially trained professionals help families understand their child’s health condition and develop personalized treatment plans to ensure each child receives the care he or she needs. Providing comprehensive care, our teams are comprised of board certified physicians, pediatric nurse practitioners, psychologists, speech pathologists, social workers, dietitians and others. We work in collaboration with other Riley subspecialists. One example is our partnership with Riley Otolaryngology-Head and Neck Surgery to offer a deaf and hard of hearing program to serve children and families impacted by hearing loss.

Patients and families benefit from new, expanded location

Riley Child Development and Developmental Pediatrics are now located in the Pediatric Care Center, a newly renovated building on the Riley Hospital for Children campus. The larger space houses interdisciplinary teams that often collaborate to support children with developmental needs, offering more services and improved access.

Inpatient care for children with complex medical concerns

Riley Developmental Pediatrics leads the complex inpatient service at Riley Hospital, in addition to providing outpatient services. Our inpatient team serves children who have complex medical needs or existing chronic conditions and require a hospital stay. We deliver comprehensive and coordinated care, addressing both medical and social needs. The complex care inpatient approach allows healthcare providers to collaborate as they individualize and streamline each child’s care plan.

Treatment innovations to meet unique needs

In addition to offering comprehensive evaluations for neurodevelopmental disorders, Riley Child Development clinicians also provide innovative interventions. Patients can now access parent-child interaction therapy, an evidence-based treatment for challenging behaviors. Brett Enneking, PsyD, HSPP is scheduling young children ages 2 to 8 and their parents for this treatment modality.

Connecting patients with community resources

Our team members are committed to providing individualized care for each child and family, with the goal of helping children develop to their full potential. Focused on the importance of community in the lives of children, we are knowledgeable about resources and committed to helping families make connections in their local communities.

Multidisciplinary team of experts

- 6 board certified specialists in neurodevelopmental disabilities
- 3 board certified developmental-behavioral pediatricians
- 1 board certified sleep medicine specialist
- 4 general pediatricians
- 1 medicine/pediatrics specialist
- 9 licensed psychologists
- 6 certified pediatric nurse practitioners
- 2 speech language pathologists
- 1 genetic counselor

Training the next generation of clinicians

Riley at IU Health understands the importance of educating individuals interested in working with this complex patient population. We provide training to help increase the number of leaders in neurodevelopmental disabilities nationwide.

Leadership Education in Neurodevelopmental Disabilities (LEND)

Celebrating its 50th anniversary, the Riley Child Development LEND Program is part of a system of graduate-level interdisciplinary leadership training programs that are federally funded through the Health Resources & Services Administration’s Maternal and Child Health Bureau. The program produces leaders and innovators in the field of autism and other neurodevelopmental and related disabilities who are solidly grounded in their own disciplines and able to work collaboratively with colleagues in interdisciplinary settings.

Residency and fellowship programs

IU School of Medicine’s neurodevelopmental disabilities residency and developmental-behavioral pediatrics fellowship programs, based at Riley at IU Health, provide a variety of clinical experiences to help shape the knowledge of physicians working in the field of neurodevelopmental disabilities.

DIVISION CHIEF, CHILD DEVELOPMENT

Angela M. Tomlin, PhD, HSPP

“Riley Child Development provides a range of evaluations and expertise to address the needs of children with neurodevelopmental disorders. To further enhance follow-up and improve access to care for patients and families, our team will soon pilot telehealth services.”

DIVISION CHIEF, DEVELOPMENTAL PEDIATRICS

Thomas M. Lock, MD

“Our recent move to the Pediatric Care Center allows for more interaction with Riley colleagues in other pediatric disciplines, improving our ability to collaborate on individualized care plans for our patients.”

Complex care inpatient service hospital discharges: 2017 – 2018

<table>
<thead>
<tr>
<th>Year</th>
<th>Discharges</th>
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</thead>
<tbody>
<tr>
<td>2017</td>
<td>897</td>
</tr>
<tr>
<td>2018</td>
<td>1,145</td>
</tr>
</tbody>
</table>

Developmental Pediatrics

Thomas M. Lock, MD
Division Chief
Marilyn J. Bull, MD
Colanie Christensen, MD
Devonne A. Elkins, MD
Deborah K. Hamby, MD
Jordan C. Huskins, MD
Stephanie J. Jackson, MD
Abigail F. Klemz, MD
Henry R. Knouse, DO
Carolyn L. Lytle, MD
Matthew Miller, MD
Joseph O’Neill, MD
Casandra Buning, CPNP
Charlene H. Davis, CPNP
Patricia A. Halloran, CPNP
Mary F. Hickel, CPNP
Kara L. Levy, CPNP
Donna Watkins, CPNP

Child Development

Angela M. Tomlin, PhD, HSPP
Division Chief
Billy E. Beechler, MD
Michelle J. Curtin, DO
Brett Enneking, PsyD, HSPP
Elesia N. Hines, PsyD, HSPP
Steven M. Koch, PhD, HSPP
Rebecca H. McNally Koehn, PhD, HSPP
Christine M. Raches, PsyD, HSPP
Maura Rouse, PsyD, HSPP
Lynne A. Sturm, PhD, HSPP
Paula A. Sullivan, PhD, HSPP
Calitine Martin, MS, CCC-SLP
Sarah Muir, MS, CCC-SLP

Riley Children’s Health Medical Specialties Annual Report 2018 | 11
Child Protection Program

The Riley at IU Health Child Protection Program offers multidisciplinary clinical services and education to improve the evaluation and care of maltreated children. The five physicians in our program are board certified in child abuse pediatrics—a newly recognized subspecialty—and are the only board certified child abuse pediatricians practicing in Indiana.

Our child protection team offers consultation in cases of suspected child maltreatment. These consultations are evidence based, providing objective assessment to help determine the extent of injury and whether medical cause or accidental mechanism accounts for the injury pattern. Specifically, our team provides:

- Evaluation of suspected victims of child abuse and/or neglect
- Crisis counseling for families
- Professional consultation for healthcare providers, child protection services, law enforcement and other professionals
- Professional education
- Expert testimony in legal settings when required

A leader in the field of child protection, Riley offers these specialized programs:

**Pediatric Center of Hope.** Providing comprehensive medical evaluation for children alleged to have been sexually abused, this program serves approximately 500 children annually.

**Crisis Counseling Services.** An extension of the Pediatric Center of Hope, these services bridge the gap from the time a child is identified as a possible child sexual abuse victim to the four- to eight-week time frame in which formal ongoing counseling may become available. Riley provides these crisis counseling services to about 1,500 children and family members annually.

**Child Abuse Consultation Service.** This program facilitates comprehensive medical evaluations for children alleged to have been physically abused or neglected. Annually, our team sees approximately 400 children referred to our program by medical providers or child protective services.

**Pediatric Evaluation and Diagnostic Services (PEDS) Program.** Each year through PEDS, Riley at IU Health consults with the Indiana Department of Child Services on about 6,000 cases of suspected child maltreatment.

Our program’s core strengths:

- Comprehensive medical evaluations in cases of suspected child abuse
- Crisis counseling for families
- Leadership in community education and coordination of services

In 2018, the Riley child protection team facilitated more than 45 community education programs.

**Medical impression in suspected maltreatment consultations: 2018 – 2019**

- Undetermined: 44%
- Neglect: 15%
- Accidental: 5%
- Other physical abuse: 19%
- Abusive head trauma: 1%
- Medical: 5%
- No injury: 3%
- Unknown: 8%
- Other: 5%

**Physical abuse consultations by year**

<table>
<thead>
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<th>Year</th>
<th>Consultations</th>
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<td>5,552</td>
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<td>2017-18</td>
<td>5,425</td>
</tr>
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<td>5,442</td>
</tr>
</tbody>
</table>

**DIVISION CHIEF**

**Robert A. Hibbard, MD**

“When child maltreatment is suspected, our physician experts are available 24/7 to healthcare providers and family case managers faced with making immediate care decisions. This is one of the many unique features of Riley’s child protection program.”

**Founded by Riley at IU Health, the Liaison Child Abuse Forum brings together professionals from child protection services, law enforcement and public schools to solve problems in the identification and management of child abuse cases in Marion County. The forum meets monthly during the school year.”

12 | Refer a patient: 317.274.2617

Riley Children’s Health Medical Specialties Annual Report 2018
Critical Care
Cardiac Critical Care

Providing expert care for critically ill newborns, infants, children and adolescents with acquired or congenital heart disease, the Riley pediatric cardiovascular intensive care unit (CVICU) treats more than 500 inpatients and over 270 cardiopulmonary bypass patients each year. In addition to 12 beds for CVICU patients, our unit also includes a six-bed specialized neonatal ICU. We are the only program in Indiana that offers pediatric heart transplantation and ventricular assist device capability.

Focusing on patients and families, Riley specialists and professionals from a variety of disciplines—cardiothoracic surgery, cardiology, cardiac critical care, neonatology, nursing, respiratory therapy, nutrition and pharmacy—are available for daily rounds to facilitate coordination and expedite care. This approach is primarily responsible for optimizing each patient’s hospital stay. Focused on quality, Riley Cardiac Critical Care is a leader with a purposefully developed culture of safety resulting in a 15% decrease below benchmark data for adverse events of all causes.

For more on Riley’s rating, refer to the Cardiology section on page 8.

The Riley Heart Center is an extremely effective cardiac critical care model that includes multidisciplinary experts, along with dedicated cardiovascular ICU nurses and advanced practice providers, all working together to provide the best possible care to our patients.

The only pediatric hospital in Indiana offering emergency ECMO

The Riley at IU Health Extracorporeal Membrane Oxygenation (ECMO) Program provides cardiopulmonary bypass support in the CVICU setting for neonates and children who suffer from cardiac failure that is refractory to conventional therapies. For more on ECMO at Riley, refer to pages 16 and 36.

Additionally, as one of the first pediatric heart programs in the U.S. to give a child a Berlin Heart ventricular assist device, we also offer mechanical ventilricular support of children with heart failure refractory to medications.

Other notable outcome measures for 2018:

- **CLABSI** (central line-associated bloodstream infection) 0 versus 0.86% of patients
- **CAUTI** (catheter-associated urinary tract infection) 0 versus 0.72% of patients
- Surgical site infections 0 versus 0.38 per 100 surgeries

In 2018, the Riley at IU Health CVICU was one of just two centers in the U.S. that performed more than 400 surgeries with 0 CLABSI occurrences.

For more about intensive care at Riley, refer to the Pediatric Critical Care section on pages 16-17 and the Neonatology section on pages 36-37.

**Committed to quality and excellence**

The Riley Heart Center is a high-reliability unit with experienced specialists and team members working tirelessly to ensure patient safety and the highest quality care.

**Risk-adjusted surgical mortality**

<table>
<thead>
<tr>
<th>Facility</th>
<th>0.7%</th>
<th>1.8%</th>
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<tr>
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<td>All PC4* facilities</td>
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</table>

**Risk-adjusted medical mortality**

<table>
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<tr>
<th>Facility</th>
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</table>

Note: Risk adjustment is a methodological approach incorporating unique patient characteristics that impact patient outcomes and are unrelated to the quality of care delivered by the care team or hospital.

For more on Riley’s rating, refer to the Cardiology section on page 8.

**Training the next generation of critical care specialists**

Riley at IU Health is the only facility in the state that offers fellowship training in pediatric cardiac critical care. Fellowship trainees actively participate in the collaborative care of all cardiology and cardiovascular surgical patients admitted to the pediatric CVICU. We also share our knowledge internationally through lectures and humanitarian work to further promote children’s heart health.

**Advancing care at Riley and around the world**

Our team is committed to improving care for critically ill children with congenital and acquired heart disease at Riley, in the U.S. and internationally. In addition to contributing to several multicenter research studies, our physicians founded and serve as the coordinating center for the Collaborative Research in Pediatric Cardiac Intensive Care (CoRe-PICIC) network, which includes 20 U.S. sites participating in several ongoing clinical research projects. Riley specialists are involved in the Pediatric Cardiac Critical Care Consortium (PC4), which uses registry data from 38 congenital heart programs to evaluate best practices and drive improvements in care. Riley at IU Health cardiologists also serve in international medical missions, providing heart care to critically ill children in Uganda, Jordan and Lebanon.
Critical Care

Pediatric Critical Care

As one of the highest acuity centers in the U.S. according to The Children’s Hospital Association, the Riley pediatric intensive care unit (PICU) treats more than 2,500 patients annually. With 42 beds, our PICU is capable of caring for children with a variety of complex illnesses and offers services other hospitals are not equipped to provide, including extracorporeal membrane oxygenation (ECMO), inhaled nitric oxide therapy, dialysis and high-frequency oscillatory ventilation.

Committed to excellence in quality and patient safety

Riley pediatric critical care specialists actively participate in the Virtual PICU System database that uses registry data from 123 ICUs to evaluate best practices and drive improvements. By studying Riley’s outcomes, reviewing literature and performing multidisciplinary process improvements, our team is constantly searching for methods to improve critical care delivery.

Facilitating safe sedations

The Riley procedural sedation team is led by a pediatric critical care physician and sedation nurse who manage the dispensing of medicines that reduce awareness, anxiety, pain and discomfort during medical care/procedures such as:

- Lumbar puncture, bone marrow aspiration
- Liver biopsy, kidney biopsy
- Hearing tests, dental care
- Imaging studies, including MRI, CT, ultrasound and interventional radiology procedures
- PICC placement

ECMO provides essential critical care support

The Riley ECMO program supports over 40 patients annually, making it a high-volume pediatric ECMO center with exceptional patient outcomes. In addition, Riley at IU Health is the only pediatric hospital in Indiana with an emergency ECMO program, using ECMO in the pediatric cardiac arrest (E-CPR) setting.

For more on ECMO at Riley, refer to pages 15 and 36.

2018 quality improvement highlights

The Riley PICU led a hospitalwide medication reduction project resulting in a 30% decrease in medication utilization to optimize patient exposure and rightsize care. In addition, our team:

- Reduced the incidence of catheter-associated urinary tract infections (CAUTI) to 1.
- Reduced the occurrence of pressure injuries for critically ill patients by half from 0.24% per 100 patient days in 2017 to 0.12% per 100 patient days in 2018.
- Developed a team approach for unplanned extubation.

Our pediatric critical care team’s unplanned extubation rate remains very low at 0.2 per 100 ventilator days compared to national benchmarks of 1 per 100 ventilator days.

Skilled critical care transport

Led by pediatric critical care physicians, our highly skilled transport team brings Riley’s standard of care to 4,000 pediatric transport patients each year. Trained to care for critically ill children in extremely complex situations, our multidisciplinary team provides:

- Air or ground support
- Multiple forms of respiratory support: high-flow nasal cannula, intubation and mechanical ventilation, and inhaled nitric oxide
- Invasive and noninvasive monitoring and point-of-care testing
- IV/IO placement, needle decompression and chest tube placement
- Isotope transport for patients under 5 kilograms

The Riley procedural sedation team provided care for 1,401 children in 2018 with 0 serious adverse events. According to the Pediatric Sedation Research Consortium, our team has an excellent safety record with outcomes better than or equal to most sedation centers.

Advancing care for critically ill patients

The Riley pediatric critical care team participates in 15 studies through the multicenter Pediatric Lung Injury and Sepsis Investigators (PALISI) network and is currently leading studies through the Hematopoietic Stem Cell Transplant and Pediatric ECMO subgroups of PALISI. In 2018, our critical care physicians published more than 34 articles in peer-reviewed journals, authored multiple book chapters and edited a new pediatric critical care textbook.

Leadership in community critical care training

The Pediatric Community Outreach Mobile Education (PCOME) project is a collaborative initiative formed by Riley pediatric intensivists to provide on-site training and education to community hospital healthcare providers for the initial stabilization and management of pediatric patients. PCOME, currently leading a multicenter simulation education project, is internationally recognized for its innovative approach to teaching pediatric care for common pediatric conditions, as well as low-volume, high-acuity illnesses.

All FAA Part 135 aviation services provided by Metro Aviation, Inc., which maintains exclusive operational control over all aircraft.

DIVISION CHIEF
Mara E. Nitu, MD, MBA

“With an engaged, talented and compassionate team of intensivists, Riley provides leading-edge critical care for all pediatric conditions and is poised to contribute to paradigm shifts in care, advancing the science in our field by participating in multiple international multicenter studies.”

Skilled critical care transport

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Division Chief
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Samer Abo-Sultan, MD
Veda L. Ackerman, MD
Andrew L. Beardsley, MD
Zachary J. Berrens, MD, MPH
Matthew L. Friedman, MD
Courtney Frye, MD
Joey Hobson, MD
Brian D. Leland, MD
Riad Lutfi, MD
Chris G. Markham, MD
Danielle K. Mauze, MD
Laura A. Pacholski, MD
Nathan D. Swinger, MD
Alvaro J. Tori, MD
Matthew L. Yunits, MD
Janine Zee-Cheng, MD
Monica Broo, NP
Angela Finley, NP
Christina Geis, NP
Jennifer Hamilton, NP
Sandra Kennedy, NP
Ann McCaldin-Mills, NP
Kim McElmisse, NP
Anita Paul, NP
Natalie Szczyiorski, NP
Brianna Gemmcke, RN, MSN
Katie Jones, RN, BSN
Renee McKinney, RN, BSN

For more about intensive care at Riley, refer to the Critical Care Section on pages 14-15 and the Neonatology Section on pages 36-37.

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Renee McKinney, RN, BSN

For more about intensive care at Riley, refer to the Critical Care Section on pages 14-15 and the Neonatology Section on pages 36-37.
Dermatology

Board certified pediatric dermatologists at Riley at IU Health provide expert care and the latest treatments for common dermatological conditions, such as acne and eczema, and more complex disorders of the skin.

Treating children from birth to age 18, our dermatologists collaborate with other Riley specialists to provide comprehensive care, ensuring that each patient’s individual needs are met.

Comprehensive dermatology care
Dermatologists at Riley diagnose and treat a variety of conditions:
- Acne
- Alopecia areata
- Atopic dermatitis
- Drug reactions (skin)
- Genetic skin disorders
- Hyperhidrosis
- Infantile hemangiomas
- Melanoma and mole screening
- Nail disorders
- Pigmented birthmarks
- Psoriasis
- Skin infections
- Vascular malformations
- Vitiligo

Research to advance dermatology treatment
Riley dermatology specialists participate in clinical studies and research related to many skin, hair and nail conditions in children. Specific studies about vascular birthmarks are conducted through collaborative efforts, including the Pediatric Dermatology Research Alliance and the Hemangioma Investigator Group, an international consortium dedicated to advancing infantile hemangioma research.

Leading-edge dermatology treatments offered at Riley:
- Allergy patch testing
- Beta blockers for hemangioma
- Laser and excisional surgery
- Phototherapy

Studies led by Riley dermatologists have received funding support from the National Institutes of Health.

DIVISION CHIEF
Anita N. Haggstrom, MD

“Early recognition of problematic skin conditions and accurate diagnoses lead to improved outcomes for patients. Our pediatric dermatologists are dedicated to improving skin health with the latest treatment advances tailored to address the physical and developmental needs of each child.”

Dermatology team members
Anita N. Haggstrom, MD
Division Chief
Sarah A. Skillman, MD
Jenna L. Streicher, MD
Donna C. Cummings, PA-C

Refer a patient: 317.944.7744
Diabetes and Endocrinology

The Riley at IU Health diabetes and endocrinology team annually treats thousands of infants, children and adolescents with diabetes and other endocrine disorders. All of Riley’s board certified endocrinologists have received additional subspecialty training in pediatric endocrinology and pediatric diabetology. The team also includes certified diabetes educators who partner with physicians to provide a wide range of educational resources. Recognized for preeminent care, our program is ranked among the top 15 in the nation by U.S. News & World Report.

Providing comprehensive services for children with dysfunction of the endocrine glands, Riley at IU Health treats a variety of disorders, including:

- Type 1 and Type 2 diabetes
- Delayed and precocious puberty
- Growth disorders
- Disorders of sex development
- Congenital and acquired disorders of thyroid function
- Hypopituitarism
- Metabolic bone disease
- Disorders of calcium metabolism
- Turner syndrome
- Adrenal disorders (including congenital adrenal hyperplasia and adrenal insufficiency)
- Dyslipidemia

Caring for children statewide, Riley endocrinologists provide outpatient care in Indianapolis, Carmel, South Bend, Bloomington and Evansville. In addition, our experienced team offers extensive, multidisciplinary educational services for newly diagnosed patients and parents requiring specialized instruction. Family education, empowerment and psychosocial support are emphasized, and all patients have 24/7 access to a nurse practitioner or physician.

Pediatric endocrinology outpatient visits: 2016 – 2018

Riley at IU Health offers specialized programs for children with diabetes and other endocrine disorders

- Type 1 Diabetes Program
- Type 2 Diabetes Comprehensive Care Program
- Pediatrics to Adult Program for Transitioning Adolescents
- Youth Diabetes Prevention Program
- Hip Hop Obesity Program
- Endocrine Diseases Newborn Screening Program
- Gender Health Program
- Comprehensive Care Center for Congenital Adrenal Hyperplasia
- Prader-Willi Syndrome Program
- Turner Syndrome Program
- Growth Disorders Program
- Metabolic Bone Disease Program
- Disorders of Sex Development Program

Riley endocrine patient distribution by diagnosis: 2018

Total number of unique endocrine patients: 6,289

Riley diabetes patient volume: 2018

DIVISION CHIEF
Erica A. Eugster, MD

“Our team combines the latest evidence-based clinical care with a compassionate and family-centered approach to provide outstanding services to children and adolescents dealing with endocrinologic conditions.”

Diabetes and Endocrinology team members

Erica A. Eugster, MD
Division Chief
Linda A. DiMeglio, MD
Jamie Felton, MD
John S. Fuqua, MD
Nadine G. Haddad, MD
Tamara S. Hannon, MD
Erik A. Imel, MD
Heba Ismail, MD
Nancy B. Johnson, MD
Zeina M. Nabhan, MD
Todd D. Nebesio, MD
Juan C. Sanchez, MD
Emily K. Sims, MD
Emily C. Walvoord, MD
Kelly Donahue, PhD
Heather Jolivette, NP
Jill Meier, NP
Mary Kaye Mitscher, NP
Staci Nekic, NP
Tina Potterff, NP
Karen Stancombe, NP

Refer a patient: 317.944.3889
Emergency Medicine

Home to Indiana’s only Level I Pediatric Trauma Center, Riley at IU Health has a team of more than 30 emergency medicine physicians specializing in the care of infants and children up to 18 years old. Our nurses and other medical team members, including child life specialists, are trained and experienced in working with children and families during health-related emergencies. We pair pediatric clinical expertise with kindness and compassion to care for some of the youngest and most critically ill children in Indiana.

In addition, Riley pediatric emergency medicine physicians influence the care of children beyond our hospital walls. For example, our specialists in pediatric disaster medicine and emergency medical services work to educate response teams at other hospitals on the nuances of pediatric care and to develop protocols, training and policies that ensure the best care is available even before children arrive at Riley.

For the children and adolescents who come to our ER, Riley emergency medicine team members have access to the latest medical and information technology, including 24-hour access to pediatric radiology, all pediatric subspecialties and other resources found in a nationally ranked academic medical center. Our team works closely with other physician specialists and health professionals throughout the hospital to ensure coordinated, effective care for every patient. Committed to quality and safety, Riley emergency medicine physicians not only provide care in the ER, but some also have subspecialty expertise in global health, emergency medical services, pediatric ultrasound and informatics.

Care coordination resource:
the Indiana Network for Patient Care
Through membership in this care network, Riley at IU Health has access to medical records for most Indiana hospitals. If a child has visited a participating hospital, Riley can retrieve critical information about the child’s medical history, drug allergies and specific needs.

Indiana’s leading pediatric trauma center
Riley Hospital is one of a select number of hospitals in the nation—and the only one in Indiana—to be verified by the American College of Surgeons (ACS) as a Level I Pediatric Trauma Center. 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. Riley has been a verified Level I Pediatric Trauma Center since 1992.

DIVISION CHIEF
Elizabeth Weinstein, MD

“More than 80% of Riley emergency medicine physicians are credentialed in bedside pediatric point-of-care ultrasound—used to diagnose and manage illness and injury with greater speed, better accuracy and improved patient safety. It’s one example of our continual efforts to use evidence-based practices to elevate care.”

By the numbers: Riley Emergency Department

Average daily census: **131**

ESI Level 1 or 2 (acuity): **16.4%**

Admission rate: **16.6%**

Median length of stay: **170 minutes**

Median door-to-doctor time: **20 minutes**

Average door-to-doctor time: **35 minutes**

Emergency medicine patient visits

![Emergency medicine patient visits chart]

<table>
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<th>Year</th>
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Electronic resource:
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Emergency medicine

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<tr>
<td>Elizabeth Weinstein, MD</td>
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<tr>
<td>Sheryl E. Allen, MD</td>
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<td>Tyler S. Arnold, MD</td>
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<td>Stephen J. Cico, MD, MEd</td>
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<td>Robert W. Collins, MD</td>
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<td>Gregory W. Faris, MD</td>
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<td>Geoffrey P. Hays, MD</td>
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<td>Melanie S. Heniff, MD</td>
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<td>Susan M. Hoffer, MD</td>
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<td>Darlene R. House, MD</td>
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<td>Heather Kelker, MD</td>
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<td>Roxanna Lefort, MD, MPH</td>
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<td>Karl A. Lemme, MD</td>
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<td>Brian C. Phillips, MD</td>
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<td>David Rayburn, MD</td>
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<td>Debra S. Rusak, MD</td>
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<td>Heather R. Saavedra, MD</td>
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<td>Sandra H. Schwab, MD</td>
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<td>Halg V. Setrakan, MD</td>
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<td>Cory D. Showalter, MD</td>
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<td>Sean M. Thompson, MD</td>
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<td>Mary Vergese, MD</td>
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<td>Brian E. Wagers, MD</td>
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<td>Jennifer D. Walthall, MD, MPH</td>
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<tr>
<td>Anne Whitehead, MD</td>
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<tr>
<td>Kyle B. Yoder, MD, MPH</td>
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Gastroenterology, Hepatology and Nutrition

Our team of 17 specialists (including two hepatologists) leads nationally in research and clinical care, performing more than 2,700 endoscopies and managing 16,000 outpatient visits each year.

Leading-edge research improves care
Gastroenterology specialists at Riley are currently participating in more than 70 approved research studies to advance patient care and treatment of common and complex GI and liver disorders, including:

- Cholestatic liver disease
- Constipation
- Eosinophilic esophagitis
- Fatty liver
- Gastroesophageal reflux disease
- Hepatitis B and C
- Inflammatory bowel disease
- Irritable bowel syndrome
- Motility disorders
- Pancreatitis
- Short bowel syndrome

Since 1988, Riley at IU Health transplant surgeons have performed 258 pediatric liver transplants. In recent years, our team has completed 10-15 liver transplants annually with a one-year survival rate of 100%.

Expert care for complex conditions
Riley at IU Health offers patient-centered care programs for a number of gastrointestinal conditions:

- Aerodigestive Program
- Biliary Atresia Program
- Colorectal and Urogenital Health Program
- Cystic Fibrosis/GI Program
- Eosinophilic Diseases Program
- Fatty Liver Program
- Fecal Microbiota Transplant Program
- ImproveCareNow network center (for children and adolescents with Crohn’s disease and ulcerative colitis)
- Inflammatory Bowel Disease Program
- Intestinal Rehabilitation Program (short bowel syndrome)
- Liver Transplant Program
- Malone Antegrade Continence Enema (MACE) Program
- Motility Program
- Nutrition Support Program
- Pancreatitis Program
- Pediatric GI Psychology Program
- Weight Management Program

Advanced technology
We use the latest technologies for the diagnosis and treatment of digestive and liver disease:

- Upper endoscopy and colonoscopy
- Capsule endoscopy
- Motility testing
- Gastric pacemaker
- Neurostim treatments
- Bravo wireless pH probe studies

Our team treats a variety of GI and liver conditions, including:

- Alagille syndrome
- Alpha-1 antitrypsin deficiency
- Anirian fissure
- Autoimmune hepatitis
- Biliary atresia
- Celiac disease
- Cirrhosis and portal hypertension
- Clostridium difficile
- Constipation
- Crohn’s disease
- Cyclic vomiting syndrome
- Cystic fibrosis liver disease
- Delayed gastric emptying
- Encopresis
- Eosinophilic disorders
- Failure to thrive
- Feeding problems
- Fulminant hepatic failure
- Functional abdominal pain
- Gallbladder disease
- Gastroesophageal reflux
- Gastrointestinal polyps
- GI foreign bodies
- Hepatitis (A, B and C)
- Hirschsprung’s disease
- Inflammatory bowel disease
- Irritable bowel syndrome
- Lactose intolerance
- Motility disorders
- Neonatal hepatitis
- Nonalcoholic steatohepatitis
- Obesity and metabolic syndrome
- Pancreatitis
- Peptic ulcers, gastritis and helicobacter pylori
- Sclerosing cholangitis
- Short bowel syndrome
- Ulcerative colitis
- Wilson’s disease

DIVISION CHIEF
Jean P. Molleston, MD
“We use our expertise in gastrointestinal, liver, pancreatic and nutritional disorders, supported by GI psychology and nutrition resources, to provide outstanding care for children with a wide range of conditions. Our active participation in clinical research and medical education completes our mission and enhances patient care.”

Riley GI specialists have published 60 peer-reviewed articles since 2017.

Jean P. Molleston, MD
Division Chief
William E. Bennett, MD, MS
Molly A. Bozic, MD
Joseph M. Crotty, MD, MPH
Joseph F. Fitzgerald, MD
Elaine Gilbert, PsyD, HSPP
Kathryn E. Harlow, MD, MS
Emily C. Hon, MD
Brian A. McFerron, MD
Sara K. Naramore, MD
Marian D. Pfefferkorn, MD
Erin Phipps, MD
Ryan T. Pitman, MD, MS
Kanika Puri, MD
Girlish S. Rao, MD
Brandon A. Sparks, MD
Steven J. Steiner, MD, MS
Charles P.B. Vanderpool, MD
Shamaila Waseem, MD
Jill M. Lindgren, CPNP

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Emily C. Hon, MD
Brian A. McFerron, MD
Sara K. Naramore, MD
Marian D. Pfefferkorn, MD
Erin Phipps, MD
Ryan T. Pitman, MD, MS
Kanika Puri, MD
Girlish S. Rao, MD
Brandon A. Sparks, MD
Steven J. Steiner, MD, MS
Charles P.B. Vanderpool, MD
Shamaila Waseem, MD
Jill M. Lindgren, CPNP
General Pediatrics and Primary Care

Committed to providing exceptional and comprehensive pediatric primary care, Riley Children’s Health serves children of all ages, including newborns, children, adolescents and young adults. Our board certified pediatricians, internal medicine/pediatricians and family medicine physicians see children in offices across Indiana, anchored by a community pediatrics division of Indiana University School of Medicine.

IU School of Medicine General and Community Pediatrics

Primary care

Faculty physicians provide preventive care and disease management to children with a variety of neurodevelopmental and chronic conditions. More than 75% of the patients visiting this on-site practice at Riley Hospital are children with special healthcare needs. Evidence-based medical management and a team-based approach promote high-quality care. The multidisciplinary care team includes skilled pediatricians, a nurse practitioner, pharmacist, nursing and medical assisting professionals, and a social worker. Integrated mental health services are also available.

Diagnostic office

Pediatricians in this office work closely with Riley specialty programs to care for children with more complex health issues. Services include:

- **Autism Early Evaluation Program.** Expert physicians evaluate children, ages 18-42 months, who are at risk for autism spectrum disorder. Following a patient’s initial visit, the team coordinates care, assisting families with initiating essential therapies and navigating healthcare financing.
- **Infant Growth and Development Program.** Our team provides support to more than 60 infants each month who are discharged from the neonatal intensive care unit with feeding challenges.

General Diagnostic Office. Offering hope for families of children with illnesses that are difficult to diagnose, our multidisciplinary team assesses the child’s illness from numerous perspectives. Our team handles a variety of referral cases, including children with:

- Vague, persistent symptoms like fatigue or fever
- Unusual presentation of illness
- Neurodevelopmental challenges
- Possible genetic syndromes

Patient volume: 2018

- Patient visits: 8,914
- Social work referrals: 876
- Mental health integrated into primary care (visits): 667

Community-Based Primary Care

Riley Children’s Health primary care pediatricians, internal medicine/pediatricians and family medicine physicians focus on meeting the highest quality, safety, educational and care standards. Our practice teams provide effective, evidence-based care that is personalized to meet the needs of each child.

- Get-to-know-you visits
- Well-child visits
- Sick and acute care visits
- Sports physicals
- Chronic disease management
- Immunizations
- Vision and hearing screenings

Riley’s community-based primary care physicians completed more than 244,300 patient visits in 2018.

For a full list of Riley community-based primary care providers, visit rileychildrens.org/findprimarycare.

DIVISION CHIEF

**Dorota A. Szczepaniak, MD, FAAP**

“Our multidisciplinary teams support patients in family-centered medical homes where we focus on relational care and patient well-being. Committed to excellence in evidence-based primary care, we aim to provide effortless access to care for all, and to improve patient and population health outcomes.”

General and Community Pediatrics team members

- Dorota A. Szczepaniak, MD, FAAP
- Beth A. Barron, MD
- James T. Blackwell, MD
- Marly P. Bradley, MD, JD
- Stephen M. Downs, MD, MS
- Robert Gonzalez, MD
- Mitchell A. Harris, MD
- Dawn P. Haut, MD, MPH
- Jill V. Helphinstine, MD
- Maria J. Herrera, MD, MS
- Henry L. Jones, MD
- Thomas K. Klausmeyer, MD
- Mallery R. Neff, MD
- Meagan B. O’Neill, MD
- Erin J. Phipps, MD
- April A. P’Pool, MD
- Lori Price, MD
- Deanna R. Reinoso, MD
- Nayan T. Srivastava, MD
- Ryan J. Stegnink, MD
- Sarah M. Steclaus, MD
- Katie M. Swee, MD
- Patricia A. Treadwell, MD
- David E. Van Reken, MD
- Laura Walls, MD

For a full list of Riley community-based primary care providers, visit rileychildrens.org/findprimarycare.
Hematology/Oncology

 Ranked among the top 15 pediatric cancer programs in the nation by U.S. News & World Report, Riley Hematology/Oncology provides patient- and family-centered care for children and adolescents with cancer and blood disorders. Our expert team of cancer specialists treats more than 80% of children and adolescents diagnosed with cancer in Indiana, and we also care for children in bordering regions of Michigan, Illinois, Ohio and Kentucky. Our physicians see more than 300 new oncology patients and over 700 new hematlogy patients each year, and we annually manage more than 13,000 outpatient visits.

The Riley hematology/oncology program is affiliated with the Indiana University Health Melvin and Bren Simon Cancer Center and the Indiana University Simon Cancer Center, which this year earned a Comprehensive Cancer Center designation from the National Institute for Cancer Research. The IU Simon Cancer Center is Indiana’s only NCI-designated cancer center for clinical care.

Clinical care leaders

Collaborating with specialists in other medical fields, Riley hematologists and oncologists provide comprehensive treatment and are dedicated to ensuring the best possible outcomes for children and young adults with cancer. Some key highlights of our program:

- 85% five-year survival rate
- 70 open clinical trials in oncology
- 9 open clinical trials in hematology

Stem Cell Transplant and Cellular Therapy Program

Riley at IU Health is the only facility in Indiana offering pediatric stem cell transplant, CAR-T cell therapy and immune effector cell therapy for pediatric patients. Employing both autologous and allogeneic transplants, as well as CAR-T cell therapy, Riley oncologists use cellular therapy to fight a variety of pediatric cancers and other severe diseases, including acute lymphoblastic leukemia (ALL), acute myeloid leukemia, sickle cell disease, immunodeficiency, bone marrow failure and other non-malignant conditions.

Leukemia and Lymphoma Program

This program is the largest of its kind in Indiana and offers the latest and most innovative treatments, including CAR-T cell therapy, for newly diagnosed and relapsed childhood leukemia and lymphomas. Using precision medicine and new immunotherapies, our highly trained physicians have diagnosed and treated more than a thousand children in the past decade, with very high cure rates.

Solid Tumor Program

Riley oncologists have extensive experience in diagnosing and treating solid tumor malignancies of all types. Our patients have access to leading-edge clinical trials, including the innovative antibody therapy for neuroblastoma known as Hu3F8. Riley at IU Health is the only hospital in Indiana offering this novel treatment and has treated patients from around the world.

CureWorks: Riley partnership offers greater access to immunotherapy trials

A unique collaboration among five elite academic children’s hospitals that includes Riley, CureWorks enables Riley oncologists to offer more clinical trial options in CAR-T cell therapy science to children with cancer. Joining Riley in the CureWorks network is Seattle Children’s Hospital, Children’s Hospital Los Angeles, Children’s National (Washington, DC) and BC Children’s Hospital (Vancouver, British Columbia).

Member hospitals are supported in launching and participating in exclusive clinical trials. CureWorks streamlines immunotherapy production, clinical trial enrollment and the trial coordination process. In addition to expanding access to the latest treatments, the collaboration allows Riley patients to get this more advanced care closer to home.

DIVISION CHIEF
Jamie L. Renbarger, MD, MS

“In addition to providing the highest quality care, we foster an environment of scientific excellence where biomedical research leads to novel discoveries involving molecular and clinical understanding of children with cancer and blood disorders. Our globally recognized translational research initiatives aim to revolutionize cancer prevention, diagnosis and treatment.”

Neuro-Oncology Program

Working closely with the Riley pediatric neurosurgery team, four pediatric neuro-oncologists provide advanced care for patients with brain tumors. We offer a multidisciplinary pediatric brain tumor program to meet the needs of patients suffering from malignancies of the brain after treatment.

Treatment of hematologic conditions

Hemostasis and Thrombosis Program – This program provides multidisciplinary care to children and adolescents with bleeding and clotting disorders, including heavy menstrual bleeding and vascular anomalies. We also collaborate with the Herzog Laboratory at IU School of Medicine, a leader in research for alternative forms of treatment for children with hemophilia.

Hemoglobinopathy Program – Serving children with sickle cell disease and other hemoglobinopathies such as thalassemia, Riley is the largest pediatric sickle cell disease program in the state and the only stem cell transplant center for non-malignant transplants.

Bone Marrow Failure Program – This program treats children with bone marrow failure syndromes and cytopenias and includes an internationally known, NCI-funded research laboratory employing functional genomics and super-resolution imaging to understand the mechanistic origins of genomic instability in Fanconi anemia and other bone marrow failure/cancer predisposition syndromes.

Precision genomics: Battling aggressive cancers with personalized treatment

The only program in Indiana to offer individualized treatment for children with relapsed or aggressive cancer, the Riley at IU Health Precision Genomics Program helps reveal new treatment options that may be effective when other treatments no longer work. Our innovative approach uses genetic testing to identify DNA, RNA and proteins in cancer cells that can be precisely targeted with different treatments. After testing is interpreted, the team researches therapeutic options and facilitates tumor board in collaboration with the treating physician. More than 290 pediatric patients have been evaluated through the program, and nearly a quarter of those patients are recommended therapy.

2018 patient volume

LEUKEMIA/LYMPHOMA
Leukemia patients treated 375
Leukemia/lymphoma patients enrolled in clinical trial 138
Relapsed patients treated with targeted immunotherapy 60

SOLID TUMOR
Neuroblastoma patients treated 19
Bone tumor patients treated 65
Soft tissue sarcoma patients treated 60
Wilms’ tumor patients treated 21
Liver tumor patients treated 6
Germ cell tumor patients treated 7
Retinoblastoma patients treated 10
Retinoblastoma patients treated 10
Total solid tumor patients enrolled in clinical trial 119

2018 patient volume

Brain tumor patients treated 230
Brain tumor patients enrolled in clinical trial 7

HEMATOLOGIC CONDITIONS
Pediatric patients treated 2,089
Hematology patients enrolled in clinical trial 31

Hematology/Oncology team members

Jamie L. Renbarger, MD, MS
Division Chief
Sandeep Batra, MD
Melissa K. Bear, MD, MS
Jacoqueline L. Carter, MD
Scott L. Coven, DO, MPH
James M. Croop, MD, PhD
Meghan D. Drayton Jackson, DO
Michael J. Ferguson, MD, MS
William S. Goebel, MD, PhD
Kerry M. Hege, MD, MS
Kyle W. Jackson, MD, MHP
Seethal A. Jacob, MD, MS, FAAP
Jay J. Jin, MD, PhD
Alex Lion, DO, MPH
Emily L. Mueller, MD, MS, FAAP
Robert P. Nelson, MD
Toshihiro Onishi, MD
Kathleen Overholt, MD
Kelsey Pibeam, DO
Kent A. Robertson, MD, PhD, FAAP
Daniel V. Runco, MD
Amanda J. Saraf, DO
Rachel R. Schulte, MD
Jodi L. Skiles, MD, MS
Patricia A. Treadwell, MD
Terry A. Vis, MD
Allison M. Yancey, MD, MS
Meghan Dean, RN, MSN, CPNP
Ann Haddix, RN, MSN, CPNP
Jessica Harrison, RN, MSN, CPNP
Kelly Hession, RN, MSN, CPNP
Jennifer Kaeberlein, RN, MSN, CPNP
Kristine Kauflman, RN, MSN, CPNP
Jüliann Kiefer, RN, MSN, CPNP
Cheri Lee, RN, MSN, CPNP
Sharon Tormoeheuren, RN, MSN, CPNP
Paula Towell, RN, MSN, CPNP
Jayne Van Bergen, RN, MSN, CPNP
Debra Wagner, RN, MSN, CPNP
Stayce Woodburn, RN, MSN, CPNP

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Hospital Medicine

With a team of more than 30 hospitalists, Riley at IU Health is home to one of the largest pediatric hospital medicine programs in the U.S. Serving more than 6,000 patients in 2018, our physicians are committed to excellence in the care of hospitalized children. We continually strive to improve care through quality improvement, collaboration with inpatient specialists and primary care providers, community outreach, and the education and training of future healthcare providers.

Dedicated to delivering exceptional inpatient care, Riley hospitalists have led family-centered rounds for nearly a decade. This type of rounding—conducted with physicians, learners and nursing team members at the bedside with the patient and family at the center of the discussion—allows for optimal communication and understanding of treatment plans, expected outcomes and length of stay.

Focused on high-quality inpatient care

Communication with primary care providers. In more than 90% of cases, our hospitalists provide inpatient summaries to primary care providers within 48 hours of discharge.

Herpes simplex virus (HSV) testing in febrile infants. Our hospital medicine team is committed to adherence to recommendations for HSV serum testing in infants younger than 21 days.

Safe sleep counseling. For 100% of newborn families, the key concepts of safe sleep are communicated verbally and documented on discharge information sheets.

Project REVISE (Reducing Excessive Variability in Infant Sepsis Evaluation). Riley at IU Health is an ongoing participant in this national evidence-based research study focused on decreasing antibiotic use in febrile infants.

Implementation of newborn sepsis calculator. Our team has initiated a new care improvement program designed to reduce the use of antibiotics in infants born to mothers with chorioamnionitis.

Facilitating clinical partnerships

Riley hospitalists—viewing their role as the “hospital medical home”—prioritize collaboration, communication and coordination of care with specialists and primary care providers. When patients are ready for discharge, we ensure primary care providers are kept informed of the hospitalization, procedures, treatments and follow-up.

Our collaboration with subspecialty teams has resulted in the development of evidence-based, standardized treatment of febrile infants, infants born to mothers with chorioamnionitis, and patients hospitalized with pneumonia, bronchiolitis and neonatal abstinence syndrome.

Nationally, Riley at IU Health was among the first 10 programs to develop a pediatric hospital medicine fellowship. Fellows benefit from a comprehensive array of clinical experiences, leadership training and mentorship in scholarly activity.

Training future physicians—our ongoing commitment

The Riley hospital medicine team provides instruction to more than 320 learners each year, hosting pediatric residents and medical students at all four of our hospital sites. In addition, our hospitalists train family practice residents at three hospital locations. These students and residents, guided by Riley hospitalists, learn to care for hospitalized patients and communicate with families, specialists and support teams with a goal of improving clinical care quality.

Communication with primary care providers. In more than 90% of cases, our hospitalists provide inpatient summaries to primary care providers within 48 hours of discharge.

Hospitalists at Riley at IU Health provide care to infants and children across central Indiana.

Riley Hospital for Children at IU Health
IU Health Academic Health Center, Indianapolis, Indiana
Care of hospitalized pediatric patients with attention to general pediatric health issues, as well as co-management of pediatric neurologic, genetic, adolescent and rheumatologic issues.

IU Health Methodist Hospital
IU Health Academic Health Center, Indianapolis, Indiana
Care of normal newborns

IU Health North Hospital
Carmel, Indiana
Care of hospitalized children in pediatric unit; overnight care of pediatric intensive care unit patients; emergency department consultations; care of normal newborns

IU Health West Hospital
Avon, Indiana
Care of hospitalized children in the pediatric unit; emergency department consultations; attendance during deliveries and resuscitation of infants; care of normal newborns, as well as infants (32 weeks estimated gestational age or older) in the hospital’s Level II neonatal intensive care unit

DIRECTOR
Rebecca M. Dixon, MD, FAAP
“We consider it an honor to care for families and children who are hospitalized for illness. It is a stressful and scary time for them, and treating their illness and helping them navigate the circumstances bring us great satisfaction and joy in our work.”

Hospital Medicine team members
Rebecca M. Dixon, MD, FAAP
Director
Richelle Baker, MD
Amanda Benaderet, MD
Sara Bland, MD
Melissa Boling, DO
Allison Burke, MD
Patrick Clements, MD
Angela Dietrich, MD
Blake Froberg, MD
Michael Goodman, MD
Amanda Gripe, MD
Fatima Jahl, MD
Eddie Kim, MD
Ellen Klink, MD
Hank Knouse, DO
Manasa Mantravadi, MD
Jon Merrell, MD
Rachel Peterson, MD
Emily Pittman, MD
Callyn Riggs, MD
Peter Ronco, MD
Laura Ruhl, MD
Jonathan Salisbury, MD
Michele Saysana, MD
Kim Schneider, MD
Emily Scott, MD
Andrew Shriner, MD
Nicole Steber, MD
Emily Webber, MD
Margaret Westwater, MD
Laurie Willie, MD
Janine Zee-Cheng, MD
Infectious Diseases

The Ryan White Center for Pediatric Infectious Diseases and Global Health at Riley at IU Health is a leader in global pediatric infectious disease clinical care, research and education. The center helps children and families affected by infectious diseases overcome or manage these conditions. Our specialists focus on prevention, diagnosis, treatment and ongoing care of children with infectious diseases. We offer a number of services designed to provide comprehensive care for children with infectious diseases and to prevent infection and its complications in children.

Complete inpatient and outpatient care

With board certified pediatric infectious disease specialists, Riley at IU Health houses one of the few dedicated inpatient pediatric infectious disease programs in the nation. Children can be transferred to Riley at any time and receive direct primary care from the specialists most familiar with infections and their complications.

Our infectious disease specialists also provide comprehensive outpatient care for children with infectious diseases. In most cases, patients can be seen within one week at Riley Hospital in downtown Indianapolis or at the Riley Children’s Health outpatient office in Carmel. In addition, our team strives to accommodate urgent visits that require even more rapid evaluation.

24/7 pediatric infectious disease consultations

Responding to thousands of inquiries from community physicians each year, Riley infectious disease specialists are available 24 hours a day, seven days a week, to answer questions about infectious disease concerns or to accept transfer of patients with complex infectious disease problems.

Travel medicine services

Riley infectious disease specialists provide health services to children and families before and after international travel, including preventive medicine, vaccinations, travel education, as well as support for parents of internationally adopted children. These services are provided to young travelers of all ages and the adults accompanying them on their trip.

Riley at IU Health laboratories are capable of diagnosing many travel-related conditions such as malaria and parasitic and diarrheal infections. Our travel medicine team stays current on the latest alerts and advisories from the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO).

HIV primary care

Infectious disease specialists at Riley evaluate and treat the majority of Indiana children with human immunodeficiency virus (HIV). The program is led by experts in all aspects of HIV and its complications, and includes professionals in nursing, pharmacy and social work to provide the best care for children with HIV.

Infection prevention and anti-microbial stewardship

At Riley, we are committed to keeping the rates of hospital-acquired infections low. Additionally, our anti-microbial stewardship program aims to not only prevent unnecessary antibiotic use that could lead to drug resistance or drug-related complications, but also encourages the use of the correct antibiotic when one is needed. A major part of our infection prevention program is the promotion of vaccines, which are the most effective means of preventing infection.

As a major referral program, the Ryan White Center for Pediatric Infectious Diseases and Global Health provides care for more than 4,100 inpatient and outpatient visits annually.

Committed to infectious disease research

Physician researchers with the Ryan White Center at Riley at IU Health are dedicated to preventing infection, disease and complications in malaria, HIV and sickle cell disease—among the leading causes of death and disability in children worldwide. We also conduct research studies in diseases commonly affecting Indiana children, including Kawasaki disease and cytomegalovirus infection.

Malaria research

• Parasite and host factors that lead to severe malaria in children
• Complications of severe malaria, including neurodevelopmental impairment and acute kidney injury
• Effects of changing transmission on malaria immunity

HIV research

• Adherence to HIV medications
• Stigma in HIV
• Disclosure of HIV status to children
• Evaluation and treatment of HIV in adolescents
• Neurodevelopmental impairment in infants exposed to HIV

Sickle cell disease research

• Prevention of infection, including malaria, in sickle cell disease

Kawasaki disease research

• KIDCARE: Preventing recurrence of Kawasaki disease

Cytomegalovirus (CMV) infection research

• VALCARE: Valganciclovir treatment for neonatal CMV

We are nationally known for our dedicated pediatric infectious diseases inpatient service, easy-to-access outpatient services, outstanding infection prevention and anti-microbial stewardship programs, and groundbreaking research.”

Our team treats a variety of complex infectious diseases and conditions, including:

• Bloodstream infection
• Bone and joint infections
• Central nervous system infections
• Eye infections
• Fever of unknown origin
• Histoplasmosis
• Human immunodeficiency virus (HIV)
• Infection in the immunocompromised patient
• Kawasaki disease
• Lyme disease
• Lymphophenopathy
• Pneumonia
• Recurrent fevers
• Sepsis
• Transplant-associated infection
• Travel-associated infection and prevention
• Tuberculosis

Refer a patient: 317.944.7260

Chandy C. John, MD, MS
Division Chief

John C. Christenson, MD
Elaine G. Cox, MD
Leslie A. Enane, MD
Annette S. Foll, MD
Aka Khan, MD
Michelle L. Kussin, PharmD
John J. Manaloor, MD
Megan S. McHenry, MD, MS
Bree A. Weaver, MD
James B. Wood, MD, MS
Medical and Molecular Genetics

Indiana’s largest provider of genetics services, Riley Medical and Molecular Genetics offers evaluation and management of a wide variety of genetic conditions. We provide genetic assessment, genetic testing, treatment and genetic counseling for individuals or families touched by inherited conditions, chromosomal disorders or other genetic disease. The Riley genetics team provides care and management for all ages and a host of conditions, including birth defects and multiple congenital anomalies, inborn errors of metabolism (IEM), intellectual disability or neurodevelopmental disorders, skeletal dysplasias, disorders of growth, cancer, family history of genetic disease, hearing disorders, ophthalmologic disorders, and more. We routinely care for patients with high medical complexity and rare disease.

Expert care and statewide leadership

Our team members have been the designated caregivers for patients with IEM since the initiation of statewide newborn screening and have outstanding metrics in days from diagnosis to implementation of medical care, including dietary treatment with medical formula. Riley Medical and Molecular Genetics is a leader in establishing standardized, comprehensive diagnostic evaluation of infants with congenital heart defects. Our on-site diagnostic laboratories, including our Biochemical Genetics Laboratory, allow for stat testing and rapid diagnostics in the most seriously ill infants and children with genetic disease.

NIH FUNDING LEADER

Riley Medical and Molecular Genetics is ranked 12th nationally in National Institutes of Health (NIH) funding for genetics research.

Total research funding in 2018*: more than $14 million

*NIH and other sources

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Riley Neonatology is committed to quality care and patient safety:

- Decreased CLABSI (central line-associated bloodstream infection) per 1,000 line days from 2.88 to 0.32 over the past four years.
- Reduced unplanned extubation rate (per 500 ventilator days) to 0.37, less than the national benchmark of 1.
- Develops and implements evidence-based practice guidelines to standardize care and improve outcomes.
- Participates in the Vermont Oxford Network to evaluate care compared to NICUs nationwide and to perform collaborative quality improvement with NICUs throughout Indiana.
- Member of the Children’s Hospitals Neonatal Consortium of Level IV NICUs to improve care and outcomes.

Neonatology

With a 60-bed, Level IV neonatal intensive care unit (NICU), Riley at IU Health offers the most advanced neonatology services in Indiana. Led by board-certified neonatologists, our expert team treats nearly 700 newborns each year, delivering the highest level of care available for neonates in need of specialized, lifesaving services. From diagnosis through treatment, we collaborate with the full spectrum of medical, surgical, and interventional subspecialists based at Riley.

Our team is multidisciplinary with dedicated advanced practice providers who communicate with referring obstetricians, neonatologists, pediatricians and primary care physicians about infants being treated in our NICU.

Delivering leading-edge therapies, Riley at IU Health provides whole-body therapeutic hypothermia, ECMO, continuous video EEG, peritoneal dialysis, inhaled nitric oxide and high-frequency jet and oscillatory ventilation.

NeuroNICU Program

The Riley NeuroNICU Program focuses on safeguarding infant brain health, bringing together a comprehensive team of neonatologists, neurologists and neurodiagnostic specialists and team members dedicated to providing the highest level of care for infants born with:

- Neonatal encephalopathy
- Seizures
- Stroke
- Intracranial hemorrhage

Annually, the NeuroNICU program treats about 210 infants, accounting for 30% of the total admissions to the Riley NICU.

Riley Heart Center NICU

Riley Neonatology offers a dedicated program to support babies with cardiovascular anomalies, providing care through a collaboration with cardiothoracic surgery, cardiovascular intensive care and genetics. Each year, approximately 150 newborns with congenital heart disease are treated in the Riley Heart Center NICU.

Bronchopulmonary dysplasia (BPD) team

For infants with severe lung disease acquired from extreme premature birth, specialists from pediatric pulmonology, neonatology, respiratory therapy, as well as advanced practice providers, collaborate to provide consistent, individualized care aimed at improving patient outcomes.

Extracorporeal Membrane Oxygenation (ECMO) Program

The ECMO program at Riley at IU Health is designated by the Extracorporeal Life Support Organization (ELSO) as a Platinum Level Center of Excellence, which recognizes centers that demonstrate an exceptional commitment to evidence-based processes and quality measures, team member training, continued education, patient satisfaction and clinical care. Team members include neonatologists, pediatric surgeons, pediatric intensivists, pediatric cardiovascular surgeons, as well as nurses specially trained in ECMO. At Riley, survival rates for neonates requiring ECMO for respiratory or cardiac failure are consistently above ELSO average. For more on ECMO, refer to pages 15 and 16.

Special support services for families of critically ill newborns

- An on-site human milk lab for storage and personalized supplemental feeding to support optimal growth and development.
- NICView™, a camera system allowing parents to observe their newborns using an Internet-connected device when they are not at the baby’s bedside.

Neonatal critical care transport

Our neonatal transport team manages care for more than 900 neonatal helicopter and ground transports each year. We have access to specialized therapies, including high-frequency ventilation, inhaled nitric oxide and whole-body hypothermia. IU Health LifeLine team members communicate directly with neonatologists during transport. For more on pediatric transport, refer to page 17.

Neonatologists at Riley provide care throughout central Indiana

Neonatology team members

Laura S. Haneline, MD
Division Chief
Jayme D. Allen, MD
Alana L. Barbato, MD
David W. Boyle, MD
Bobbi J. Byrne, MD
Paulomi M. Chaudhry, MD
D. Wade Clapp, MD
Scott C. Denne, MD
Matthew D. Durbin, MD
Mark L. Edwards, MD
Osayame A. Ekharuwe, MD
William A. Engle, MD
Levi Funches, Jr., MD
Veronica M. Guiffoy, MD
David E. Hertz, MD
Abbey C. Hines, PsyD
Sandra J. Hoesli, MD
Katie A. Huff, MD
Sara K. Kane, DO
Matthew A. Kardatzke, MD
Poonam Khurana, MD
Melissa D. Kiltzman, MD
K. Lim Kua, MD
James A. Lemons, MD
Matthew C. Lewis, MD
Edward A. Liechty, MD
Ilzin Z. Lien, MD
Diane E. Lorant, MD
Melinda H. Markham, MD
JoAnn E. Matory, MD
Brock H. Medske, MD
Jason Z. Niehaus, MD
Charles C. Njinimban, MD
Rebecca S. Rose, MD
Zeynep N. Salih, MD
Riddh Shukla, MD
Gregory M. Sokol, MD
Beatrice Stefanescu, MD
Anna E. Thomas, MD
Charles C. Njinimban, MD
Michael S. Trautman, MD
Elizabeth A. Wetzel, MD
Paul D. Winchester, MD
Laura S. Haneline, MD
Division Chief

See page 17 for a complete list of neonatologists, respiratory specialists, and other members of the neonatal critical care team.

Riley Early Years program

The Riley Early Years program—a care collaboration between neonatology, psychology, developmental pediatrics and general pediatrics—provides follow-up care for NICU patients after discharge. The program serves as a single screening and referral point for patients as they grow through infancy and early childhood.

For more about intensive care at Riley, refer to the Cardiac Critical Care and Pediatric Critical Care sections on pages 14-17.
Nephrology

Ranked as one of the nation’s top 15 nephrology programs by U.S. News & World Report, Riley Nephrology, led by eight pediatric nephrologists, is Indiana’s only provider of comprehensive evaluation and treatment services for children with kidney disease or kidney failure. In addition, Riley has the largest pediatric end-stage kidney disease program in Indiana and provides dialysis and transplantation for children throughout the state.

Nephrologists at Riley are leaders in using novel technologies and research breakthroughs to launch new clinical programs that lead to better treatments for children impacted by kidney disease.

Multidisciplinary programs provide specialized care

Delivering personalized care that focuses on patient and family needs, our nephrology programs are designed to provide leading-edge patient care and treatment with a multidisciplinary, team-based approach.

Stone Program

The multidisciplinary Riley at IU Health Stone Program focuses on long-term kidney stone prevention and relief. The program educates patients on the importance of making meaningful diet and fluid intake changes to help prevent and control symptoms. With care plans customized for each patient, Riley nephrologists work closely with colleagues in pediatric urology on strategies to help reduce or eliminate the occurrence of kidney stones.

Metabolic Bone Disease Program

In collaboration with pediatric endocrinologists, Riley nephrologists help diagnose and treat children who are at risk for frequent fractures due to metabolic bone disease and low bone density caused by abnormalities in minerals of calcium, phosphorus and vitamin D.

Transition Program

Pediatric and adult nephrologists collaboratively manage patients with the goal of preparing adolescent patients for independence and establishing continuity with nephrologists in internal medicine at IU Health.

Outpatient Dialysis Program

At any given time, there are on average 30 children on dialysis in the Riley Outpatient Dialysis Unit. The modality of dialysis is blended between hemodialysis and peritoneal dialysis. Riley’s unit is the only outpatient chronic hemodialysis unit in Indiana exclusively for pediatric patients. Our treatment goal is for all children to receive a renal transplant.

Kidney Transplant Program

The Riley at IU Health Pediatric Kidney Transplant Program is nationally ranked in the top quartile, based on the number of patients receiving transplants and its leadership in positive patient outcomes. Our transplant center is part of the Improving Renal Outcomes Collaborative (IROC), a nationwide pediatric kidney transplant outcomes network that seeks to improve long-term health outcomes and quality of life for children with kidney transplants.

Better treatment through innovation

Riley Nephrology has formed a statewide Ambulatory Blood Pressure Monitor network that is in line with the current American Academy of Pediatrics blood pressure guidelines. The network allows for more timely blood pressure-related diagnoses without unnecessary testing or the need for patients to travel long distances. Riley increased the number of studies from 50 in 2017 to more than 400 over the past year.

Improving quality of life

Riley Nephrology Music Program. Providing a diversion to help children better cope with multiple hours of inpatient dialysis, the Riley Nephrology Music Program is the first initiative of its kind in the U.S. Each week during their treatment, patients participate in 30-minute private piano lessons. With philanthropic support from donors and the Riley Children’s Foundation, each child also is given a keyboard to practice at home. In 2018, music program participants performed in a piano recital for their families and Riley team members.

Kidney Camp. Children with kidney disease enjoy a week at Kidney Camp each year. Riley supports the camp by providing an on-site nephrologist, dialysis nurses and nurse practitioners who provide dialysis care and medical management.

Leadership in research

Riley at IU Health has two R01-funded nephrologists and is among the leading recipients of National Institutes of Health funding for pediatric nephrology.

- Two laboratories that earned more than $1.1 million in NIH funding in 2018
- Active participation in a number of clinical trials and research consortia
- 32 research publications in 2018-2019
- 18 presentations at national meetings

Riley at IU Health and IU School of Medicine offer a three-year nephrology fellowship program certified by the American Board of Pediatrics.

- Provides extensive training in all areas of clinical nephrology
- Six months of inpatient service and six months of outpatient experience
- Two years of research to broaden understanding of renal disease

DIVISION CHIEF

David Hains, MD

“Riley Nephrology is uniquely positioned to implement leading-edge treatments and use new research discoveries to care for pediatric patients across Indiana, while also personalizing treatment options for every child we treat.”
Neurology

With 16 board certified pediatric neurologists, Riley Neurology is the largest child neurology group in Indiana. Our specialists consult with patients throughout the Midwest, routinely treating the most complicated neurologic disorders. Providing comprehensive, seamless care for patients and families, our team has developed a number of specialized services, including programs for headache and refractory epilepsy.

Delivering both inpatient and outpatient care, Riley Neurology outpatient services are centered at Riley Hospital for Children with a satellite office in Carmel, Indiana, and outreach programs in Avon, Lafayette and Bloomington. Our neurologists offer inpatient coverage and manage epilepsy monitoring units at Riley Hospital in downtown Indianapolis and Riley Hospital for Children at IU Health North Hospital in Carmel.

Subspecialty programs treat complex neurologic conditions

Pediatric epilepsy. As the largest epilepsy surgery program in the state, Riley Neurology offers the full range of surgical evaluations and treatments for epilepsy. Our team includes two surgeons specializing in pediatric epilepsy and five pediatric epilepiologists. Riley neurologists, in cooperation with our pediatric neurosurgeons, work diligently to improve identification and surgical treatment of epilepsy patients with medically refractory epilepsy. Riley is increasing the use of intracranial electroencephalogram (EEG) monitoring, including stereo EEG. We also are leaders in the use of the vagus nerve stimulator.

Neuromuscular/MDA. A certified Muscular Dystrophy Association (MDA) Care Center, Riley offers a bi-monthly multidisciplinary program with specialists from neurology, neurogenetics, physiatry, cardiology, pulmonology, genetics counseling, social work and physical therapy. In 2018, Riley performed more than 200 electromyograms (EMGs) and nerve conduction studies on children from birth to adulthood. In addition, our neuromuscular specialists are active in clinical trials of several agents for Duchenne muscular dystrophy, and Riley leads the state in the treatment of spinal muscular atrophy (SMA). Our team administers both onabotulinumtoxinA, an intrathecal therapy that can help maintain or improve strength in SMA, as well as the revolutionary gene therapy for SMA, known as Zolgensma.

Pediatric stroke. With the only pediatric stroke program in Indiana, Riley treats patients with congenital, perinatal and childhood stroke and cerebral sinovenous thrombosis. Our neurologists, in collaboration with hematology and neurosurgery, evaluate patients for stroke etiology and counsel patients and families on treatment, prognosis, long-term needs and prevention of recurring stroke.

Riley Neurology by the numbers: 2018

Epilepsy Surgery Program
45 evaluations
38 therapeutic procedures
- 23 vagus nerve stimulators
- 12 craniotomies
- 1 hemispherectomy
- 2 laser ablations
4 invasive monitoring procedures
- 3 subdural grids
- 1 stereo EEG

Patient volume
3,021 new outpatient consults
10,691 return patient visits

Electrophysiological monitoring
2,130 routine EEGs
2,316 prolonged video EEGs

Concussion. Riley neurologists consult and treat pediatric concussions through a newly formed collaboration with adult neurology, neurosurgery, pediatric rehabilitation, neuropsychology and physical therapy. The team includes a school teacher to provide additional patient support.

Pediatric headache center. Riley is the only facility in Indiana with a center focused exclusively on pediatric headache symptoms. This multidisciplinary center, led by a pediatric neurologist board certified in headache medicine, a clinical pain psychologist and a nurse practitioner, offers medical management, biofeedback, cognitive behavioral therapy, cranial nerve blocks, botulinum toxin and trigger point injections.

Neurogenetics. Directed by a pediatric neurogeneticist and neurodevelopmental pediatrician, Riley’s neurogenetics team specializes in the diagnosis of neurodevelopmental disorders via clinical evaluation and expanded genetic testing, particularly next generation and whole exome sequencing. The program also facilitates treatment of those disorders for which interventions are available.

Neonatal neurology. Through the first and only program of its kind in Indiana, Riley’s neonatal neurologists collaborate with NICU specialists to examine outcomes and develop best practices for term and preterm neonates with neurologic injury, disease or seizures. For more, refer to the NeuroNICU Program on page 36.

Movement disorders. Riley offers the only pediatric movement disorders program in the state, which includes collaboration with a neurosurgeon experienced in deep brain stimulation.

Riley Neurology offers the largest program in Indiana focused on neurocutaneous syndromes such as neurofibromatosis and tuberous sclerosis.
Palliative Care

Riley at IU Health Palliative Care offers comprehensive pediatric palliative care services for children with a variety of life-limiting or life-threatening medical conditions. Committed to helping patients live the best quality of life possible, we support families in medical decision-making, advance directives, and complicated pain and symptom management. Our team also oversees end-of-life care for patients in pediatric hospice.

Patient visit volume

Launched in 2014 with 760 patient visits, Riley Palliative Care has grown significantly in just five years. Our team members conduct inpatient and outpatient clinical visits and offer home-based care in partnership with hospice services.

1,950 patient visits in 2018

240 new consultations annually for the past three years

Building an international reputation in palliative care

Riley at IU Health contributes to palliative care education and training at all levels—from undergraduates and medical students to residents, fellows, and nursing and physician colleagues. Our team has built a national and international reputation for our work with opportunities to teach in several different states, as well as international programs such as Bugando Medical Center in Tanzania, the International Society of Nurses in Cancer Care in Auckland, New Zealand, and hosting the first-ever pediatric End-of-Life Nursing Education Consortium (ELNEC) training course at Beijing Medical Center in China.

Riley Palliative Care, affiliated with Indiana University School of Medicine, participates in ongoing education training in Vital Talk, an empathic communication training skills curriculum, as well as ELNEC and the Pediatric End-of-Life Education Curriculum for Pediatric Residents.

Leadership of home-based pediatric hospice care

Serving children and families across the state, our palliative care team collaborates with 13 hospices statewide, serving as the medical directors for home-based pediatric hospice services. Patients and families have 24/7 on-call access for guidance and support.

These hospices include:
- Center for Hospice Care
- Community Hospice
- Deaconess Hospice
- Family Life Care
- Good Samaritan Hospice
- Guardian Angel
- Hospice of the Wabash Valley
- IU Health Hospice (Bloomington, Lafayette and Indianapolis)
- Our Hospice
- Seasons Hospice
- Unity

Riley Palliative Care directs home-based hospice care for 40 to 50 patients annually with an average length in hospice stay of 53.9 days.

Dedicated team provides comprehensive palliative care
- 2.5 full-time physicians
- 2 advanced practice nurses
- 1 palliative care social worker
- 1 administrative assistant

Riley Palliative Care also offers training tracks for palliative care chaplain residents and clinical palliative care medicine fellows.

Referral sources within Riley Hospital

Our palliative care services are integrated across specialties, with our team receiving referrals for new consultations from several clinical departments.

- 21.5% Other
- 27.5% Neonatal intensive care unit
- 12% Developmental pediatrics
- 18% Pediatric hematology/oncology
- 21% Pediatric intensive care unit

Riley Palliative Care develops end-of-life education for hospices across the state to continually improve the home-based experience for pediatric patients. Additionally, we work closely with and educate IU Health colleagues to enhance the quality of our care, improve communication, and promote effective and timely care delivery.

DIVISION CHIEF
Adam B. Hill, MD

“Riley Palliative Care is an interdisciplinary team that serves families in inpatient, outpatient and home-based settings, focusing on quality of life in the midst of life-threatening and/or life-limiting medical conditions.”

Riley Palliative Care team members

Adam B. Hill, MD
Division Chief
Kari Kendall, MD
Mona Raed, MD
Amy Haskamp, MSN, RN, PCNS-BC, CPON, CHPPN
Amy Hatton, MSN, RN, CPNP, CHPPN
Caitlin Scanlon, MSW
Shannon Lytle

Refer a patient: 317.944.3478
Physical Medicine and Rehabilitation

A child’s ability to move, perform activities of daily living and interact with family, school and community can be impacted by certain medical conditions. Led by expert physiatrists, Riley Physical Medicine and Rehabilitation offers medical management to optimize health, function and overall well-being. Working with Riley specialists across multiple disciplines to understand each patient’s challenges, our team develops interdisciplinary, customized treatment plans to address specific functional goals.

We specialize in treating the functional needs of children and adolescents affected by a variety of diseases and conditions, including:

- Trauma
- Amputation
- Brain injury
- Severe burns
- Neuromuscular disorders
- Cancer
- Spinal cord injury
- Stroke
- Congenital diseases
- Rhizotomy/Baclofen pump placement

Inpatient rehabilitation delivers individualized, coordinated care and seamless recovery

Home to Indiana’s only pediatric inpatient rehabilitation center, Riley at IU Health provides a level of expertise and care coordination unlike any other. With a goal to facilitate seamless recovery, our physiatrists and multidisciplinary team members work with patients and families to help children return home, to school and to their community as soon as possible.

Inpatient resources offer added support

With equipment and toys for children of all stages and levels of function and mobility, our pediatric rehabilitation gym facilitates recovery and functional improvement. Because families play an important role in the inpatient rehabilitation and recovery care team, our center provides sleeping arrangements in patient rooms if parents choose to stay with their children in the hospital.

Riley at IU Health also offers an acute inpatient rehabilitation facility—a more advanced rehabilitation center at our downtown Indianapolis hospital for patients requiring more intensive or interdisciplinary therapy and support, such as occupational therapy, physical therapy or speech/language therapy.

Outpatient rehabilitation provides continuity of care

Outpatient rehabilitation is essential to prevent complications and continue improvement after hospital discharge. In addition to therapy, the pediatric physical medicine and rehabilitation team provides adaptive tools, education on lifestyle changes and support to help each child function comfortably at home and thrive as they grow.

Patients have access to several multidisciplinary programs, including:

- Neuro-Oncology Program
- Traumatic Brain Injury Program
- Spina Bifida Program
- Cerebral Palsy Program
- Muscular Dystrophy Program

Riley at IU Health offers structured therapy programs designed to maximize children’s function and mobility so they can return to regular activities. While in the hospital, early treatment is essential to ensure patients retain any current mobility and to help prevent any future decline in function.

The physical medicine and rehabilitation care teams at Riley at IU Health provide individualized care for each patient that includes:

- Daily visit from a physiatrist.
- Documented plan of care within the first four days of admission with weekly team meetings to evaluate progress and modify care plan, as needed.
- Family meetings to coordinate care, provide updates and plan for care following discharge.
- Emotional and social support from family support services.
- A teacher who works with the child’s school to facilitate schoolwork during hospitalization and to provide assistance once the child returns to school.
- Recommendations for and provisions of resources to ensure a safe transition from hospital to home.

Inpatient volume and outcomes

In 2018, the Riley at IU Health Inpatient Pediatric Rehabilitation Center admitted 130 children and young adults ranging from 3 months to 23 years old. The top three admitting diagnoses were non-traumatic brain dysfunction, traumatic brain injury and neurological conditions, excluding cerebral palsy.

The WeeFIM II® System, provided by Uniform Data Systems (UDS), allows the Riley team to compare pediatric rehabilitation outcomes to similar facilities across the U.S., including gains in independence and length of stay. The Riley Inpatient Pediatric Rehabilitation Center has a shorter length of stay (15.8 days) and a greater WeeFIM II® System Rating Total Gain (24.6) when compared to similar facilities nationwide that also use the UDS system.

DIVISION CHIEF
Francisco Angulo-Parker, MD

“Our program, which has grown significantly in recent years, includes the only dedicated pediatric rehabilitation inpatient unit in the state. We focus on functional intervention and work collaboratively with medical and ancillary teams at Riley to optimize care for all of our patients.”

Physical Medicine and Rehabilitation team members
Francisco Angulo-Parker, MD
Division Chief
Laura Black, MD
Jessica Camilleri, DO
Sara Cartwright, MD
Ann Coon, CPNP
Jennifer Jack, CPNP

Children and adolescents may be admitted to Riley’s inpatient rehabilitation center if they are:

- Medically stable
- In need of active and ongoing multidisciplinary intervention
- Able to tolerate at least three hours of therapy a day

Refer a patient: 317.944.2353
Psychiatry and Psychology

Providing diagnosis and treatment for children of all ages, the psychiatry and psychology specialists at Riley at IU Health partner with children and families to evaluate the circumstances and develop a treatment plan to address each child's mental health needs. Our expert team includes child and adolescent psychiatrists, clinical child psychologists and psychiatric social workers.

Focusing on advanced, evidence-based evaluations and treatments, Riley psychiatric specialists provide expert care for psychiatric diagnoses and behavior problems. These evaluations and treatments include:

- **Diagnostic evaluation.** Our specialists conduct thorough interviews and use the latest assessment methods to identify problems and establish a diagnosis.
- **Psychological testing.** In-depth psychological testing can be used to provide specific, quantifiable results explaining the nature and severity of psychological challenges.
- **Individual psychotherapy.** Riley specialists work one-on-one with children, helping them learn coping strategies to build skills and address challenges in feelings, beliefs and behaviors with the goal of moving toward desired changes.
- **Family therapy and behavior modification.** Through consultation with children and family members, our specialists work to change family interactions and structure to improve children’s behavior and mental well-being.
- **Pharmacotherapy.** Based on thorough evaluation, our physicians may recommend treating certain psychological conditions with medicines that help regulate brain-based psychological and behavioral problems.

**Specialized programs address unique needs**

**Christian Sarkine Autism Treatment Center**

An expert resource dedicated to treating children with autism spectrum disorder, this center offers leading-edge care for children with autism who struggle with social interactions, communication and other developmental abnormalities.

**ADHD/Disruptive Behavior Disorders Program**

This comprehensive program offers evaluation and treatment for children with persistent, severe patterns of inattention, hyperactivity and impulsivity. Our team also provides diagnostic and treatment services for other issues such as oppositionality, defiance, outbursts, rule breaking and anger control issues.

**Tic/Anxiety/Compulsive Disorders Program**

Riley at IU Health specialists diagnose and treat children with various Tic/Anxiety/Compulsive Disorders.

**Dual Diagnosis Program**

Designed for children and teens with psychiatric disorders who also struggle with substance abuse, this concentrated outpatient program helps patients and families deal with the challenges of each circumstance to promote recovery and improved well-being. This program for children ages 10 to 18 uses a treatment model called ENCOMPASS that incorporates cognitive behavioral therapy, motivational enhancements, parent management training and medication-assisted treatment.

**Mood Disorders Program**

Riley psychiatric specialists manage evaluation and care for children with a variety of mood disturbances, including:
- Social isolation
- Depression
- Loss of interest or pleasure in normal activities
- Irritability
- Suicidal ideation

**Pediatric Psychology Testing Program**

We offer standardized psychological tests for many issues, including:
- Intellectual ability strengths and weaknesses
- Attention and learning problems
- Severe/unexplained emotional, behavioral or personality problems
- Memory problems

**Leading-edge research designed to improve clinical care**

Riley psychiatrists and psychologists—faculty members at IUS School of Medicine—conduct innovative research to better understand how behaviors, emotions, abilities and skills develop in children and adolescents and how disorders surface at different ages and stages of development. Our investigators lead research to uncover new insights for a variety of disorders:

- ADHD
- Autism spectrum disorder
- Addictions
- Disruptive behavior disorders
- Mood disorders
- Language and learning disorders
- Psychosis
- Substance abuse disorders
- Tourette syndrome

Our highly trained specialists treat a variety of psychiatric and psychological conditions, including:

- Attention-deficit/hyperactivity disorder
- Anxiety disorders
- Autism spectrum disorder
- Bipolar disorder
- Depression
- Language and learning disorders
- Obsessive compulsive disorder
- Post-traumatic stress disorder
- Psychosis
- Substance abuse disorders
- Tourette syndrome

**DIVISION CHIEF**

David W. Dunn, MD

“Using a team approach to provide evidence-based care for children with emotional and behavioral problems, we offer a variety of multidisciplinary programs, including a new behavioral health access program in the Riley emergency department. Improving access to mental healthcare for children and adolescents in Indiana is one of our highest priorities.”

**Psychiatry and Psychology team members**

**Psychiatry**

David W. Dunn, MD

Jennifer Downs, MD

Julianne Giust, MD

Leslie Huvershorn, MD

Amber Hunt, DO

Cassie Karlsson, MD

Mallory Neff, MD

Ryan O’Connor, MD

Martin Piasecki, MD, PhD

Maurizio Pugliese, DO

Kristen Schrader, MD

Kelda Walsh, MD

Rachel Yoder, MD

Katie Feeley, NP

**Psychology**

Zachary Adams, PhD

Hillary Blake, PsyD

Melissa Butler, PsyD

Jill Fonstad, PhD

Elaine Gilbert, PsyD

Stephanie Hullmann, PhD

Thomas Hammer, PhD

William Kronenberger, PhD

Ann Laggis, PhD

Noha Minshawi-Patterson, PhD

Gabriela Rodriguez, PhD

Emily Roth, PsyD

Amy Williams, PhD

**Social Work**

Sarah Harris, LCSW, MSW

Kathy Hayes, LCSW, MSW

Lindsey Noble, LCSW, MSW

Laura Redelman, LCSW, MSW

Valerie Scislowsicz, LCSW, MSW

Tamara Stanley, LCSW, MSW
Pulmonology, Allergy and Sleep Medicine

A leader in clinical care, teaching and research in pediatric respiratory medicine, Riley at IU Health Pulmonology, Allergy and Sleep Medicine is ranked among the top pulmonary programs in the nation by U.S. News and World Report. As the only comprehensive pediatric pulmonary program in Indiana, our skilled team cares for children throughout the state and nation, and aims to:

- Provide child-focused, family-centered, comprehensive and advanced care to children with respiratory, allergy and sleep disorders.
- Serve as a specialized medical home that works together with hospital- and community-based providers in the care of children with chronic allergy and respiratory illnesses.
- Conduct basic, clinical and translational research that directly brings new discoveries and therapies to the forefront of treatment.
- Train pediatric physician-scientists and clinician educators as future academic leaders.

Dedicated programs combine expertise with care coordination to treat complex conditions

**Cystic Fibrosis Center**
Riley at IU Health has one of the largest cystic fibrosis centers in the nation and works collaboratively with affiliate and outreach centers in South Bend, Fort Wayne and Evansville to provide care across the state of Indiana. The center also partners with the Riley genetics team to coordinate cystic fibrosis newborn screening for Indiana.

**Asthma Program**
The Riley Asthma Program, which treats more than 10,000 Indiana children, includes the state’s only multidisciplinary pediatric high-risk asthma center, providing comprehensive treatment for Hoosier children with refractory and difficult-to-treat asthma.

**Pulmonary Hypertension Program**
A multidisciplinary pulmonology, cardiology, genetics, pharmacy and nursing team treats all etiologies of pediatric pulmonary hypertension (PH). With all care organized by a dedicated nurse coordinator, patients may undergo comprehensive guideline-based evaluations that often include echocardiograms, cardiac catheterization, radiographic scans and exercise testing. In addition, Riley specialists have extensive experience prescribing all forms of oral, inhaled, IV and subcutaneous PH medications. Based on eligibility, some children with PH may participate in clinical research trials evaluating new medications.

**Chronic Ventilation Program**
Dedicated to providing expert care to children with any condition that requires chronic mechanical ventilation, this program is designed to safely and seamlessly transition patients from hospital to home. The program team oversees an inpatient and operates an outpatient center for children requiring long-term mechanical ventilation.

**Primary Ciliary Dyskinesia Program**
Attracting nationwide referrals, this center of excellence offers various diagnostic and investigational tests to diagnose and treat the rare respiratory disorder of primary ciliary dyskinesia. Additionally, our team’s experience promotes an optimal environment for clinical and translational research.

**Aerodigestive Program**
Our comprehensive, patient- and family-focused program facilitates care from pulmonology, otolaryngology, gastroenterology, pediatric surgery and speech pathology for children with anatomic and functional problems of the respiratory and gastrointestinal tracts. The team approach enhances care quality by efficiently diagnosing and treating children through coordinated appointments and procedures.

Our physicians are at the forefront of improving clinical care through their leadership and participation in these organizations:

- **Cystic Fibrosis Foundation**
- **American Thoracic Society**
- **American Board of Pediatrics**
- **American Academy of Pediatrics**
- **Childhood Interstitial Lung Disease Network**
- **Pulmonary Hypertension Association**
- **Primary Ciliary Dyskinesia Foundation**

In recent years, Riley’s successful transition from inpatient to outpatient asthma care has decreased hospital readmission rates by more than 90%.

**Allergy**
Committed to clinical excellence, Riley’s allergy program is led by three pediatric allergy physicians and two nurse practitioners. Our team participates in multidisciplinary programs such as the Gastrointestinal Digestive Disease Program and the High-Risk Asthma Program.

The allergy program at Riley at IU Health conducts 200 oral food challenges each year—more than any other facility in the state. We are also designated as a center of excellence by the Food Allergy Research and Education Network. Allergy physicians at Riley are involved in trials of food immunotherapy and in nationally recognized studies of the developing airway microbiome.

**Pediatric Sleep Medicine Program**
With 16 beds in two locations, our program includes five board certified sleep medicine physicians, two behavioral sleep psychologists, a team of respiratory therapists and registered polysomnographic technologists.

The only pediatric sleep center in Indiana, Riley’s program is accredited by the American Academy of Sleep Medicine.

**Research focused on improving clinical outcomes**
Riley pediatric respiratory disease researchers conducted 69 clinical studies and published over 60 manuscripts in 2018 related to:

- **Cystic fibrosis**
- **Primary ciliary dyskinesia**
- **Asthma**
- **Sickle cell disease**
- **Food allergies**
- **Sleep disorders**
- **Preterm lung disease**
- **Pulmonary hypertension**

**Committed to education and training**
Our program has two active fellowship programs in pediatric pulmonology and allergy.

**Pulmonology, Allergy and Sleep Medicine team members**

**Pulmonology**
- James F. Chmiel, MD, MPH
- Anuja Bandypadhyay, MD
- A. Ioana Cristea, MD, MS
- Ameet S. Daftary, MD, MBA
- Angela O. Delecaris, MD
- Benjamin M. Gaston, MD
- Deborah C. Givan, MD
- Michelle S. Howenstine, MD
- Hasnnaa E. Jalou, MD
- Nadia L. Krupp, MD
- Evans M. Machogu, MD, MS
- Jeffrey D. Macke, MD
- Gregory S. Montgomery, MD
- Heather N. Muston, MD
- Sandeep S. Puranik, MD
- Clement L. Ren, MD, MBA
- Don B. Sanders, MD, MS
- John C. Stevens, MD
- Robert S. Tepper, MD, PhD
- Michael S. Tsangaris, MD
- Tiffany L. Turner, MD
- Andrea D. Weist, MD
- Kate Lyn Walsh, PsyD
- Grace A. Godfrey, NP, RN, MSN
- Ariels D. Lowden, NP, RN, MSN
- Lauren Y. Utt, NP, RN, MSN
- Nancy J. Valentine, NP, RN, MSN
- Girish V. Vittalpur, MD
- Jay J. Jin, MD, PhD
- Kirsten M. Kloepfer, MD, MS
- Cecilia M. Beachler, NP, RN, MSN
- Olivia M. Swinger, NP, RN, MSN
- Sarah M. Honaker, PhD, HSPP, CBBSM
- Kate Lyn Walsh, PsyD
- Simon J. Conway, PhD
- Joan M. Cook-Mills, PhD
- Michael D. Davis, PhD
- Benjamin M. Gaston, MD
- Mark H. Kaplan, PhD
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- Matthew J. Turner, MD, PhD
- Kai Yang, PhD
- Baohua Zhou, PhD

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- Robert S. Tepper, MD, PhD
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- Kai Yang, PhD
- Baohua Zhou, PhD

**Sleep Medicine**
- Ameet S. Daftary, MD, MBA
- Anuja Bandypadhyay, MD
- Deborah C. Givan, MD
- Stephanie J. Jackson, MD
- Hasnnaa E. Jalou, MD
- Sarah M. Honaker, PhD, HSPP, CBBSM
- Kate Lyn Walsh, PsyD
- Basic Science Research
- Simon J. Conway, PhD
- Joan M. Cook-Mills, PhD
- Michael D. Davis, PhD
- Benjamin M. Gaston, MD
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- Baohua Zhou, PhD

**Pulmonology, Allergy and Sleep Medicine**

James F. Chmiel, MD, MPH
Division Chief

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Matthew J. Turner, MD, PhD
Kai Yang, PhD
Baohua Zhou, PhD
Radiology

Specializing in the diagnosis of medical conditions in infants, children and adolescents, the Riley at IU Health pediatric radiology team performs thousands of imaging exams each year. Our highly trained radiologists use advanced radiologic technologies tailored to the needs of children:

- 1.5T magnetic resonance imaging (MRI) scanners that produce and process images quickly
- Computed tomography (CT) scanners that allow organs to be viewed in different planes or as three-dimensional images
- An on-site interventional radiology suite
- Fluoroscopy rooms that use advanced low-dose fluoroscopy equipment and can reduce X-ray dosage by as much as 70%
- Digital radiology (DR) units that produce high-quality images quickly and shorten exam times
- Ultrasound units specifically designed for pediatric imaging

Expert team of radiology specialists

Our 17 fellowship-trained pediatric radiologists have specialized training in a variety of areas:

- Cardiac imaging
- Pediatric musculoskeletal imaging
- Pediatric genitourinary imaging
- Fetal imaging
- Pediatric oncologic imaging
- 4 pediatric neuroradiologists
- 1 pediatric neurointerventional radiologist
- 1 pediatric nuclear medicine specialist
- 2 pediatric interventional radiologists

Latest advancements in technology

Riley Radiology offers leading-edge EOS X-ray technology, which provides the highest quality images with the lowest possible dose of radiation.

SPECT/CT allows a cross-sectional rendering of nuclear medicine images. The CT image is fused to the nuclear medicine image for precise localization of areas on the SPECT image, allowing for a more accurate diagnosis. We are one of the only facilities in the region to offer SPECT/CT technology.

Offering a full array of radiologic and imaging services

- Computed tomography (CT)
- Anesthesia for diagnostic and interventional procedures
- EOS
- Fluoroscopy
- Magnetic resonance imaging (MRI)
- Ultrasound
- Nuclear medicine
- Procedural sedation

Minimally invasive interventional radiology methods provide effective diagnosis and treatment

Our specially trained interventional radiologists use 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 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:
  - Tumors
  - Joint pain
  - Bile ducts that are blocked or damaged
  - Blocked or damaged arteries or veins
  - Blockages in the urinary tract
- Stop intestinal bleeding
- Stop internal bleeding caused by organ trauma or pelvic fractures

CO-DIVISION CHIEFS

Matthew Cooper, MD
Donald Corea, DO

“We take pride in offering the latest in imaging-driven diagnosis and care. Using advanced technologies and minimally invasive methods, Riley offers radiology services tailored to the specific needs of young patients and delivered with compassion by experienced professionals.”

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:
  - Tumors
  - Joint pain
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  - Blockages in the urinary tract
- Stop intestinal bleeding
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Radiology exam volume: 2017 – 2018

<table>
<thead>
<tr>
<th>Service</th>
<th>2017</th>
<th>2018</th>
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</thead>
<tbody>
<tr>
<td>Computed tomography (CT)</td>
<td>7,249</td>
<td>7,630</td>
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<tr>
<td>Fluoroscopy</td>
<td>4,769</td>
<td>6,278</td>
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<tr>
<td>Interventional radiology</td>
<td>2,263</td>
<td>2,393</td>
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<tr>
<td>Magnetic resonance imaging (MRI)</td>
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<tr>
<td>Nuclear medicine</td>
<td>1,483</td>
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<tr>
<td>Radiographs</td>
<td>58,000</td>
<td>62,809</td>
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<tr>
<td>Ultrasound</td>
<td>12,570</td>
<td>13,596</td>
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<tr>
<td><strong>TOTAL EXAMS</strong></td>
<td><strong>96,349</strong></td>
<td><strong>102,558</strong></td>
</tr>
</tbody>
</table>
Rheumatology

Led by the only group of board certified pediatric rheumatologists in Indiana, Riley Rheumatology is one of the nation’s largest programs specializing in inflammatory, autoimmune diseases and arthritis in childhood. Our team of 10 rheumatologists and five dedicated rheumatology nurses offers the latest and most promising treatments, some of which are only available through research trials. Our specialists are involved in clinical trials of novel medications and drug combinations that are defining how to treat these chronic inflammatory diseases in children.

Treatment for the full array of pediatric rheumatic illnesses

Riley at IU Health rheumatologists provide consultation to physicians throughout the region and manage or co-manage children with a wide range of pediatric conditions—sometimes even for diseases yet to be named. Our skilled team diagnoses and treats a broad range of inflammatory and autoimmune illnesses, including:

- Antiphospholipid syndrome
- Autoinflammatory diseases
- Childhood nonbacterial osteomyelitis
- Childhood scleroderma and morphea
- Childhood systemic lupus erythematosus
- Juvenile dermatomyositis and polymyositis
- Juvenile idiopathic arthritis
- Juvenile mixed connective tissue disease
- Periodic fever syndromes, such as NOMID, PFAPA and familial Mediterranean fever
- Raynaud’s disease
- Reactive arthritis and Reiter’s syndrome
- Rheumatic fever
- Sarcoidosis
- Sjögren’s syndrome
- The many childhood forms of vasculitis

Occasionally, we diagnose a biomechanical issue to be the root cause of a child’s musculoskeletal pain and are able to rule out a chronic inflammatory or autoimmune disease. For all rheumatology patients, our physicians gather a detailed medical history, perform a thorough physical examination and address the current medical issues while considering all aspects of the child’s health.

When treatment is required, Riley rheumatologists develop pediatric-focused treatment plans that improve a child’s health and function.

Partnering to discover new treatments

Multi-institutional collaborations. Riley rheumatology physicians and nurses are active participants and leaders in clinical and translational research to understand the mechanisms of these uncommon and often rare diseases. Our physicians and researchers conduct clinical trials of new medications for pediatric rheumatic disorders and are members of:

- Childhood Arthritis and Rheumatology Research Alliance (CARRA)
- Pediatric Rheumatology Collaborative Study Group (PRCSG)
- Clinical Immunology Society (CIS)

Riley rheumatologists lead CARRA work groups studying juvenile idiopathic arthritis, dermatomyositis, transition to adult rheumatic care, spondyloarthropathies, chronic non-bacterial osteomyelitis, systemic lupus erythematosus, lupus brain disease, scleroderma, ANCA-associated vasculitis and vasculitis of the central nervous system. Additionally, Riley is involved in the CARRA- and Arthritis Foundation-sponsored pediatric rheumatic disease registry, a database of information about a broad range of childhood rheumatic diseases and their outcomes over time.

Observational research studies. Riley specialists monitor long-term outcomes of children taking approved medications over the course of several years. These registries help identify drug benefits and safety issues only seen after years of medication use. Our pediatric rheumatologists also participate in studies of various biomarkers that may help predict an individual child’s response to a medication, including potential risks for side effects or especially positive responses.

Riley rheumatology physicians conduct about 1,300 new inpatient and outpatient consultations each year. In 2018, our team provided care for nearly 4,000 patients overall.

Rheumatology outpatient volume: 2017 – 2018

- **2017**:
  - Total outpatient visits: 2,955
  - New patients: 793
  - Returning patients: 2,162

- **2018**:
  - Total outpatient visits: 3,551
  - New patients: 953
  - Returning patients: 2,598

DIVISION CHIEF

Eric P. Hanson, MD

“Providing unique multidisciplinary care to children with rheumatic disease, Riley’s rheumatology program is entering a new era of growth in clinical and basic/translational research capabilities that will enhance the care we offer to our patients.”

Rheumatology team members

- Eric P. Hanson, MD
  Division Chief
- Susan Ballinger, MD
- Michael Blakley, MD
- Ellen Go, MD, MS
- Thomas Klausmeier, MD
- Melissa Oliver, MD, MS
- Kathleen O’Neill, MD
- Martha Rodriguez, MD
- Brandi Stevens, MD, MS
- Stacey Tarvin, MD, MS
The Riley pediatric critical care team, led by parents were told her prognosis was grim. Mikaela suffered cardiac arrest, and when she arrived at Riley, her didn’t regain consciousness, an ambulance was called. She typically lasted a couple of minutes. However, when Mikaela had been diagnosed with epilepsy in third grade, Victoria suspected she was having a seizure, which was stressful. We weren’t sure if she’d remember us. “But we didn’t want Mikaela to feel that cold, so we gave her a lot of medication to put her to sleep.”

It was a difficult three days on the cooling device, followed by three more days before Mikaela would recover from the medication-induced delirium.

Karen Haller remembers the anxiety of that first week. “When they brought her back off the cooling machine, it was stressful. We weren’t sure if she’d remember us.” But one word was all she had to hear to know that things would be OK. Mikaela opened her eyes, looked at her mom and said, “Mommy.”

During Mikaela’s two-week stay at Riley, Mark Turrentine, MD*, cardiothoracic surgeon, implanted a defibrillator to help control her heart rhythm. It’s hard for Mikaela to process that the entire episode happened, that she’s here and alive today, she said. “I’m grateful that God put people here to save my life.”

One child’s Riley story: Mikaela Haller, age 22
Lifesaving care turns grim prognosis into happy ending.

Mikaela Haller doesn’t remember much about her stay at Riley Hospital for Children five years ago. Now 22, Mikaela was a high school junior when she was LifeLine’d to Riley from Muncie after collapsing during a swim meet.

Her sister remembers it all. Victoria Haller, then a senior, was swimming in the same relay, two lanes over, when she had a “weird sister instinct” that Mikaela was in trouble. When Victoria looked over to lane one, she saw her sister at the edge of the pool trying to drag herself out.

When Victoria looked over to lane one, she saw her sister at the edge of the pool trying to drag herself out. Mikaela Haller doesn’t remember much about her stay at Riley Hospital for Children five years ago.

IU Health Methodist Hospital, but data for pediatric patients was not available at the time.

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IU Health Methodist Hospital, but data for pediatric patients was not available at the time.

“I’m grateful that God put people here to save my life.”
One child's Riley story: Evan Brenneman, age 3

Preschooler is thriving thanks to multi-specialty care and family support.

Evan Brenneman was born at IU Health West Hospital a week before Christmas in 2015. He was full-term, and his parents had no reason to think anything was wrong with him. But during delivery, he released and inhaled fecal material (meconium) and had to be resuscitated at birth. That wasn’t the worst of it.

Forty-eight hours after his birth, Evan was transferred by ambulance to Riley, where he spent three weeks in the NICU. While there, Riley doctors ordered a blood test for a rare, genetic disorder called Prader-Willi syndrome (PWS). Evan had many of the symptoms—low muscle tone, feeding and breathing difficulties, delayed development and unusually fair hair and skin.

The phone call after they were released from the hospital sent Evan’s parents, Natalie and Blake Brenneman, into a tailspin. The test was positive for PWS, a disorder that means unusual challenges for their son, not the least of which is hyperphagia—chronic hunger. Beyond that, an early diagnosis also meant unusual challenges for their son, not the least of which is hyperphagia—chronic hunger. Beyond that, an online search told Evan’s parents he might be nonverbal and could die of obesity-related causes as a young adult.

Right now, growth hormone therapy is the only approved treatment for PWS, though there are drugs in the trial stage. The chronic hunger doesn’t appear to have set in for Evan yet, but he is very preoccupied with food. His meals are strictly controlled, and there is no grazing outside of meal and snack time.

“We were pretty grief-stricken at first,” Natalie said. “Having a kid with additional needs can be difficult and sad—wondering about his future. But it’s been beautiful too. It seems like it’s brought us a lot more joy than sadness.”

His parents refer to Evan as “the mayor” because he loves to meet people. He’s chatty most of the time, Natalie said, “He’s able to vocalize pretty much everything he wants to communicate.”

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Natalie doesn’t know what her son’s future looks like, a fact that really bothered her at first. But then she realized that’s true of all kids.

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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 medical specialty administrator, please call:

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<thead>
<tr>
<th>SPECIALTY</th>
<th>PHONE NUMBER</th>
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<tbody>
<tr>
<td>Adolescent Medicine</td>
<td>317.274.8812</td>
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<tr>
<td>Cardiology</td>
<td>317.944.8906</td>
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<tr>
<td>Child Development and Developmental Pediatrics</td>
<td>317.944.4846 (Riley Pediatric Care Center)</td>
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<tr>
<td>Child Protection Program</td>
<td>317.274.2617</td>
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<tr>
<td>Critical Care</td>
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<tr>
<td>Cardiac Critical Care</td>
<td>317.963.3330 (IU Health 24/7 Transfer Center)</td>
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<td>Pediatric Critical Care</td>
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<td>Diabetes and Endocrinology</td>
<td>317.944.3889</td>
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<tr>
<td>Emergency Medicine</td>
<td>317.963.3330 (IU Health 24/7 Transfer Center)</td>
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<tr>
<td>Gastroenterology, Hepatology and Nutrition</td>
<td>317.944.3774</td>
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<td>General Pediatrics and Primary Care</td>
<td>1.888.IUHEALTH</td>
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<tr>
<td>Hematology/Oncology</td>
<td>317.944.2143</td>
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<td>Hospital Medicine</td>
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<td>Infectious Diseases</td>
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<td>Medical and Molecular Genetics</td>
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<td>Neonatology</td>
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<tr>
<td>Pulmonology, Allergy and Sleep Medicine</td>
<td>317.948.7208</td>
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<tr>
<td>Radiology</td>
<td>317.962.3580, 317.948.6315 (Reading Room)</td>
</tr>
<tr>
<td>Rheumatology</td>
<td>317.274.2172</td>
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Submit a referral online at rileychildrens.org/refer.
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 15 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.

rileychildrens.org