



# EMPOWERING

THE FUTURE OF CHILD HEALTH



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THE FUTURE OF CHILD HEALTH

*2018-2019 Annual Report*

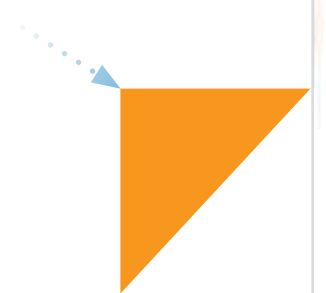


**NATIONWIDE CHILDREN'S**  
*When your child needs a hospital, everything matters.™*



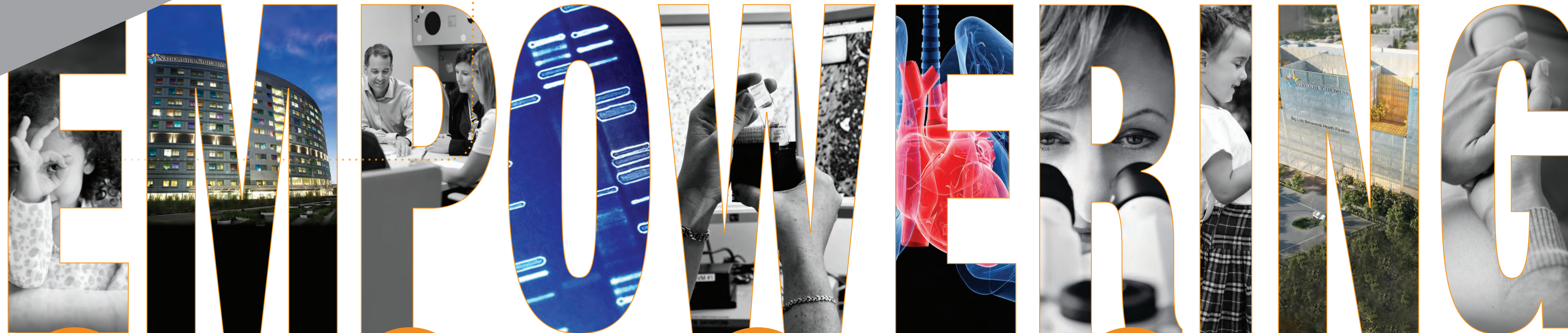
**THE OHIO STATE UNIVERSITY**  
COLLEGE OF MEDICINE

[NationwideChildrens.org/2019-Report](https://NationwideChildrens.org/2019-Report)



# Empowering

- **HEALTH CARE LEADERS** to quantify and achieve zero preventable harm
- **SCIENTISTS AND CLINICIANS** to harness the power of the human genome to redefine disease and how we treat it
- **PATIENTS AND FAMILIES** to access essential behavioral health services
- **COMMUNITIES** to improve well-being and access to care for every child



## QUALITY, SAFETY AND SERVICE

*Leading achievements in quality and safety outcomes*



## GENOMICS AND TRANSLATIONAL MEDICINE

*Redefining diseases and how we treat them*



## WELLNESS/POPULATION HEALTH

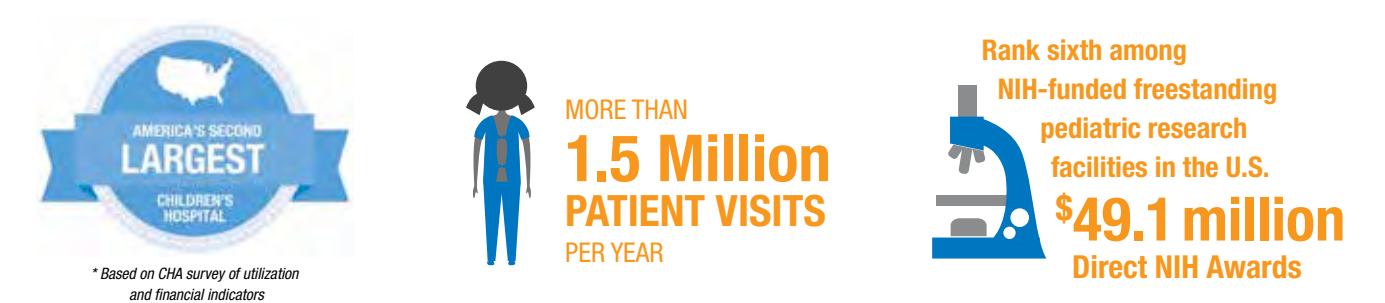
*Advancing America's largest pediatric accountable care organization*



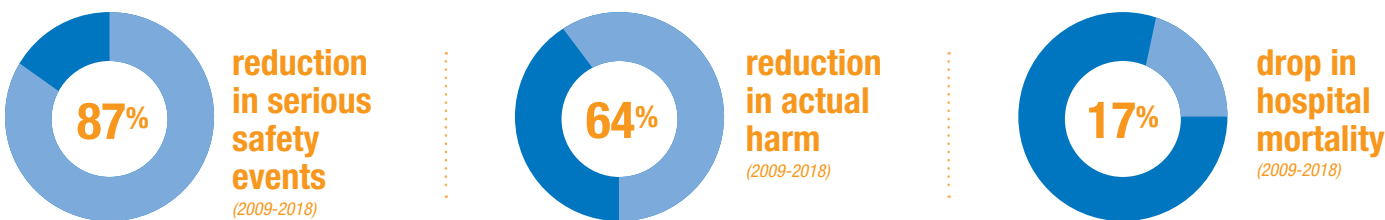
## BEHAVIORAL HEALTH

*Addressing challenges that impact pediatric mental and behavioral health*

HONORS AND ACHIEVEMENTS:



LEADING THE COUNTRY IN QUALITY AND SAFETY



ONCE AGAIN NAMED TO THE HONOR ROLL OF BEST CHILDREN'S HOSPITALS AND RANKED IN ALL 10 SPECIALTIES BY U.S. NEWS & WORLD REPORT



- America's second largest pediatric hospital, neonatal network and provider of pediatric surgery\*
- Patients from all 50 states and 48 foreign countries travel to Nationwide Children's for care
- More than 97,800 donors contributed nearly \$51 million to support the hospital's mission
- Three-time Magnet™ designation for nursing excellence
- Provide more than \$191 million in charity care and community benefit services annually
- Fully accredited by the Association for the Accreditation of Human Research Protection Programs

\* Based on Children's Hospital Association Survey of Utilization and Financial Indicators of Children's Hospitals

DEAR COLLEAGUES AND FRIENDS:



I have been fortunate to spend the last 25 years of my career at Nationwide Children's Hospital, alongside thousands of talented staff working to improve the health of children in our region and throughout the world.

This is the first time, however, that I have the honor of introducing our annual report as this institution's chief executive officer. As you will see, Nationwide Children's commitment to the patients and families we serve is stronger than ever, and we continue to shape the future of pediatric medicine through our innovative approach to population health, clinical care and discovery.

This year, a landmark gene therapy, based on decades of research at our hospital, was given federal approval and is already changing children's lives around the country. We welcomed one of the nation's most preeminent pediatric surgeons, an early pioneer in fetal surgery, as our surgeon-in-chief. Our nursing staff, the front line of our family-centered care, has become the first in our state to earn the prestigious Magnet Recognition from the American Nurses Credentialing Center four times.

In the midst of these and other signature accomplishments, Nationwide Children's has continued our transformational investments in four areas that will accelerate our journey to best outcomes for children:

- Population Health.** Our pediatric accountable care organization, Partners For Kids, has modeled ways that pharmacists can improve care for the 330,000 children in our coverage region and help lower overall spending on medications.
- Behavioral Health.** Our Center for Suicide Prevention and Research has shown that suicide screening in an Emergency Department is important for children as young as 10, and how an increased suicide rate was associated with a popular Netflix show.
- Genomics.** The Steve and Cindy Rasmussen Institute for Genomic Medicine at Nationwide Children's has created a new method to identify "gene fusion events" that can cause pediatric cancer.
- Quality, Safety and Service.** A quality improvement project shared by a number of clinicians and researchers has led to a nearly 29% reduction in asthma-related emergency department utilization in our county.

The achievements you'll read about in this report are possible because of the Nationwide Children's team, and their mission to give children their best chance at healthy, happy lives. I am incredibly proud to have the opportunity to further empower this team as CEO, and to present its extraordinary work from the last year.

Best,



**TIM ROBINSON**  
Chief Executive Officer  
Nationwide Children's Hospital

DEAR FRIENDS:



“The end of the beginning.” That’s how I described where Nationwide Children’s Hospital is on its journey when, this past winter, we named Tim Robinson as the new chief executive officer.

Tim exemplifies everything we were seeking in a successor for our outstanding retiring CEO, Dr. Steve Allen. He has galvanized my belief in the tremendous strength of this organization and our ability to lead the way as a destination academic medical center, research and technology commercialization engine, and a steadfast community partner.

In his role as the hospital’s chief financial officer for nearly 25 years, Tim has been at the center of every major decision during our time of significant growth, and his thoughtful, inclusive approach earned him the admiration of people throughout the enterprise along the way. His innovative thinking helped make possible one-of-a-kind efforts like Partners For Kids<sup>SM</sup>, our program for caring for Ohio’s neediest children, and Healthy Neighborhoods Healthy Families, which has won national acclaim for reimagining population health efforts and what it means to be a children’s hospital. We are fortunate to have him guiding our 14,000 employees as we take the hospital to the next level.

Among the investments of the past decade whose returns began to exceed everyone’s expectations this year are those in research. There are too many to list, but I will point to one that is the first of its kind in the world: Zolgensma. With the Food and Drug Administration’s approval of this revolutionary, single-infusion gene therapy for spinal muscular atrophy, the world changed for children and families facing a disease once considered a death sentence.

Just as visionary is our work in behavioral health. The opening of the Big Lots Behavioral Health Pavilion in March 2020 will bring desperately needed new resources to young people and families living with mental illness. In the process, we will break the stigmas that hold back progress in this area and demonstrate how an integrated, community-wide system can change lives.

These successes are only possible thanks to the talented, passionate men and women who come to work at Nationwide Children’s every day and the generous donors who believe that children everywhere deserve transformational health care and research. This year we honored two of our most distinguished philanthropic leaders by dedicating the Abigail Wexner Research Institute and the Steve and Cindy Rasmussen Institute for Genomic Medicine at Nationwide Children’s. These dedications honor transformational individuals, and I am humbled by your dedication and grateful for the gift of being inspired by you.

What lies ahead in 2020 will leave people saying, “Just when I thought I’d seen them do everything...” We want the world talking about us because it helps attract the talent and resources that makes possible world-class care and discoveries. The words we all most want to hear from our work, however, are simply, “I feel better. Can I go out and play?”

Like the butterflies in our logo and on our buildings, every child is meant to fly. Helping them do it is our mission. Together we make it possible.

ALEX R. FISCHER  
*Chair*  
Nationwide Children’s Hospital Inc.  
Nationwide Children’s Hospital Board of Directors



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*Big Lots Behavioral Health Pavilion – Opening March 2020*



*Conference Center – Opening May 2020*

### A NEW ERA FOR BEHAVIORAL HEALTH

March 2020 marks an unprecedented milestone in the integration of physical well-being and behavior health with the official opening of the Big Lots Behavioral Health Pavilion, America’s largest behavioral health treatment and research center on a pediatric campus just for children and adolescents.

The new pavilion is a \$158 million investment and part of an acceleration to the Nationwide Children’s Hospital strategic plan to address a disparity in mental health treatment services that has become a national crisis for children.

The pavilion was designed for the unique needs of behavioral health patients, following the latest evidence-based treatment philosophies. In addition to treatment spaces, the pavilion houses behavioral health research and fosters collaboration between community partner agencies. The complete facility includes:

- Nine Stories, 400,000 sq. ft.
- 48 Inpatient Beds for Three Units:
  - Adolescent Inpatient
  - Child Inpatient
  - Intellectual & Developmental Disability
- Outpatient Programs
- Outpatient Crisis Clinic
- 16-bed Youth Crisis Stabilization Unit
- 10-bed Psychiatric Crisis Center
- Family Resource Center

### A NATIONAL DESTINATION FOR COLLABORATION

Completion of the new Conference Center on the west campus of Nationwide Children’s dramatically expands space necessary for national and international conferences. Construction on the 90,000-square-foot, multistory facility began in late 2018 and required just over a year to complete. The first events are scheduled to take place in the spring of 2020.

The \$55 million facility comprises two levels for conference activities, including the Dr. Steven J. Allen Auditorium – named for the Nationwide Children’s CEO who served for nearly 13 years before retiring in 2019. The auditorium is capable of seating more than 460 theatre seats and can be divided for multiple group sizes. Conference space also includes approximately 5,000 square feet of pre-function space and individual training rooms. The facility also features an attached parking garage. The lower level houses the Nationwide Children’s Simulation Program, which provides hands-on experiential learning for faculty and community providers.



## QUALITY, SAFETY AND SERVICE

### Reducing Asthma-Related Emergency Department Visits Through Quality Improvement

Numerous studies have demonstrated that quality improvement (QI) methodologies improve asthma outcomes. However, moving that success from individual patients to a large population is challenging. In a recent study published in *Academic Pediatrics*, clinicians and researchers from Nationwide Children's Hospital and Partners For Kids<sup>SM</sup>, one of the country's oldest and largest pediatric accountable care organizations (ACO), worked together to use QI-methodology to reduce asthma-related emergency department (ED) utilization across a large urban network.

"Asthma affects more than 1 in 12 children, and it is one of the most common reasons for pediatric emergency room visits and hospitalizations. We know that good preventive care and early treatment of flares can protect our patients from severe episodes of difficulty breathing that lead them to seek help in the emergency department," says **Elizabeth Allen, MD**, pulmonologist and lead physician for the Nationwide Children's Keep Me Well Asthma Quality Improvement Initiative. She is also associate professor of Clinical Pediatrics at The Ohio State University College of Medicine. "Recognizing this, in 2010, Nationwide Children's made improving the health of children with asthma one of its top quality improvement priorities."

The team used multiple evidence-based interventions to address various levels of general pediatric asthma care and high health care utilizers. They analyzed the annual asthma ED and inpatient utilization rates of 2- to 18-year-old members of the ACO living in the surrounding county and compared them to national rates from 2006 to 2014.

"Providing consistent, evidence-based care for all patients with asthma, including more intensive interventions for families and patients who struggle with their asthma management, can have a measurable positive impact on their health," says **Richard J. Brilli, MD**, chief medical officer at Nationwide Children's and professor of Pediatrics at Ohio State. "Achieving this in the 'real world' – including busy primary care offices – requires teamwork across specialties and professions."

Through serial interventions and teamwork, the quality improvement initiative was able to reduce asthma-related ED utilization rates by an average of 3.9% per year from 2008 to 2016. The ACO's asthma ED utilization rates fell from 18.1 visits per 1,000 children to 12.9 visits per 1,000 children at a time when national rates were rising.

The team continues to optimize patient care by leveraging electronic medical record support, providing family education, expanding the school-based asthma program and investing in innovative approaches such as predictive analytics to help identify (and help) the most at-risk children.

#### CITATION:

Allen ED, Montgomery T, Ayres G, Cooper J, Gillespie J, Gleeson SP, Groner J, Hersey S, McGwire G, Rowe C, Snyder D, Stukus D, Stukus KS, Timan C, Wegener N, Brilli RJ. Quality Improvement-Driven Reduction in Countywide Medicaid Acute Asthma Health Care Utilization. *Academic Pediatrics*. 2019 Mar;19(2):216-226.



Elizabeth D. Allen, MD  
Pulmonary Medicine



Gloria Ayres, BS  
Respiratory Care Program  
Coordinator



Richard J. Brilli, MD  
Chief Medical Officer



Jennifer Cooper, PhD  
Center for Innovation in  
Pediatric Practice



Sean P. Gleeson, MD  
President, Partners  
For Kids



Judith Groner, MD  
Pediatrician



Stephen Hersey, MD  
Primary Care Pediatrics



Gerd McGwire, MD  
Hospital Pediatrics



Courtney Rowe, CPNP-AC  
Community Practices Program  
Manager



Dane Snyder, MD  
Chief, Primary Care  
Pediatrics



David Stukus, MD  
Allergy/Immunology



Kristin S. Stukus, MD  
Emergency Medicine



Christopher Timan, MD  
Neonatology



*“The pharmacy role has evolved over time...from predominantly being focused on pharmacy expenditures in the PFK population to more network- and practice-level interventions.”*  
– Charitha Gowda, MD, MPH, MSCE, PFK Associate Medical Director

WELLNESS AND POPULATION HEALTH

Pharmacists: The ‘Next Big Thing’ in Population Health Management

Partners For Kids<sup>SM</sup> (PFK), one of the country’s oldest and largest pediatric accountable care organizations, is a provider-based organization dedicated to population health management with three key aims: improved patient care experience, better population health and lower per capita health care costs. Because medications are a key factor in health care expenses, more than half of accountable care organizations use pharmacists to help achieve their three aims. PFK, however, has made pharmacists an increasingly integral part of their efforts to improve care quality, offer clinician training, improve patient satisfaction, reduce costs, and even boost patient adherence and high-risk behavior identification.

“The pharmacy role has evolved over time,” says **Charitha Gowda, MD, MPH, MSCE**, an associate medical director of PFK. “It went from predominantly being focused on pharmacy expenditures in the PFK population to more network- and practice-level interventions, working with quality improvement specialists on disease-specific management processes.”

Pharmacists now co-lead many of the organization’s quality improvement projects in asthma, reproductive health, ADHD, depression and other diseases that depend greatly on appropriate medication management. For example, the program’s pharmacists have used patient adherence to asthma medications (via data on prescription pick-up) as a marker of disease control. By bringing prescription-related data to the prescribers, patients with risk factors — such as filling too many rescue inhaler prescriptions — can get the extra attention they need before they end up with even bigger health problems.

“Pharmacists have extensive education and training in drug and disease nuances as well as patient-specific scenarios that impact the affordability and practical adherence issues for a medication,” says **Brigid Groves, RPh, PharmD, MS**, a clinical pharmacist at Nationwide Children’s Hospital and one of two PFK pharmacists. She co-authored an invited review paper about the involvement of pharmacists in PFK work, published in *Children* in July. “Pharmacists have the data and the background to really help physicians and other care providers by working with them to identify the most appropriate, efficacious, cost-beneficial and patient-friendly medications to use.”

Other PFK pharmacist-led endeavors include in-office chart review, prescription management education for participating providers, evaluation of provider-based prescribing habits and prescription guideline development for common diseases. PFK pharmacists are now establishing partnerships with community pharmacists who can build long-term relationships with local providers to share data on their patients’ prescription behaviors, reinforce appropriate medication use and adherence when patients fill a prescription, and even relieve some physician burden by providing immunizations and other injection therapies.

It is an endeavor that PFK leaders hope will result in demonstrable improvements in health outcomes, cost and quality in numerous disease categories.

**CITATION:**  
Kuhn C, Groves BK, Kaczor C, Sebastian S, Ramtekkar U, Nowack J, Toth C, Valenti O, Gowda C. Pharmacist Involvement in Population Health Management for a Pediatric Managed Medicaid Accountable Care Organization. *Children*. 2019 Jul;6(7):82.

“Based on our research findings, we have an opportunity to significantly reduce the number of deaths by suicide among young people.”  
– Arielle H. Sheftall, PhD, Principal Investigator, Center for Suicide Prevention and Research



BEHAVIORAL HEALTH

Finding the Reasons Why: Looking for Answers in Trends of Child and Youth Suicides

Suicide is the second-leading cause of death among 10- to 24-year-olds. And even as awareness grows, suicide rates continue to climb. For decades, researchers have scoured the data to look for patterns that could help them understand why so many youth continue to be affected.

At the Center for Suicide Prevention and Research in the Abigail Wexner Research Institute at Nationwide Children’s Hospital, this search has revealed unique patterns in suicide for specific populations of children and young adults, including differences based on age, sex and race. Now, they are using the findings as a first step toward developing prevention strategies.

“If we can identify a pattern, if the epidemiology of suicide has changed over time and rates are increasing...the results from these studies allow us to start asking what are some of the factors that might have changed that are driving the increase,” says **Jeff Bridge, PhD**, director of the Center for Suicide Prevention and Research.

One notable study was published in May 2019 in the *Journal of the American Academy of Child and Adolescent Psychiatry*. The team at Nationwide Children’s was among several to investigate, and the first to publish their results, on whether or not the Netflix series “13 Reasons Why” could be linked to increased suicides.

What they found was compelling: The suicide rate among youth aged 10-17 years increased by almost 30% in the months following the release of the first season.

Following the “13 Reasons Why” study, Netflix removed the graphic suicide scene aired during the first season, saying it was “mindful about the ongoing debate around the show” and that it was doing so based on advice from medical experts.

“We hope the actions taken based on the evidence our study provided are proof of concept for how acting to reverse trends where a clear association has been established can save lives,” says **Arielle Sheftall, PhD**, principal investigator in the Center for Suicide Prevention and Research and co-author of the study. “Based on our research findings, we have an opportunity to significantly reduce the number of deaths by suicide among young people.”

**CITATION:**  
Bridge JA, Greenhouse JB, Ruch D, Stevens J, Ackerman J, Sheftall AH, Horowitz LM, Kelleher KJ, Campo JV. Association between the Release of Netflix’s 13 Reasons Why and Suicide Rates in the United States: An Interrupted Times Series Analysis. *Journal of the American Academy of Child & Adolescent Psychiatry*. 2019 Apr 28. pii: S0890-8567(19)30288-6.



*“This study is expanding our ability to identify fusion genes in pediatric cancers.”*  
– Elaine R. Mardis, PhD, Co-executive Director of the Steve and Cindy Rasmussen Institute for Genomic Medicine

GENOMICS

Identifying Genetic Drivers of Pediatric Cancer

“I think that one of the most important things we can do to help a cancer patient is to gain a more complete understanding of the intricacies underlying their specific cancer, and to use a personalized medicine approach to help guide treatment,” says **Stephanie LaHaye, PhD**, a postdoctoral scientist in the Steve and Cindy Rasmussen Institute for Genomic Medicine at Nationwide Children’s Hospital. “Here, we are taking a case by case approach to refine diagnosis, better understand prognosis, and identify potential targeted treatment options for these patients.”

Dr. LaHaye and her colleagues are part of a larger team of Nationwide Children’s scientists focusing on the development of the fusion detection platform. Using a multifaceted, automated, high-throughput approach to detect driver gene fusion events – chromosomal rearrangements, insertions or deletions – in patient RNA-sequencing data, researchers in the Steve and Cindy Rasmussen Institute for Genomic Medicine have identified 20 clinically meaningful fusions in 73 pediatric cancer cases so far.

“This study is expanding our ability to identify fusion genes in pediatric cancers,” says **Elaine R. Mardis, PhD**, co-executive director of the Institute. “This approach enables us not only to identify the fusion genes we understand already but also to discover new ones that may indicate what is driving the cancer development. In certain cases, this discovery also may indicate existing drugs that could shut down the disruptive function driving the cancer.”

“Our automated approach takes seven fusion calling algorithms and overlaps those data, allowing us to remove false positives and only focus on what we predict to be the true positives,” says Dr. LaHaye, who was awarded the Women in Cancer Research: 2019 Research Scholar Award at the 2019 American Association for Cancer Research Annual Meeting for her work on this project. “We require at least two of the seven algorithms to call the fusion for it to be output, which we then hierarchically sort based on evidence. When we identify a potentially clinically relevant fusion, we work with our colleagues in the clinical laboratory to confirm the findings.”

This information can then be used to inform the diagnosis and/or treatment of individual patients.

**CITATION:**  
LaHaye S, Voytovich K, Schieffer K, Fitch J, Miller K, Bir N, McGrath S, Miller A, Wetzel A, Varga E, Leraas K, Agarwal V, AbdelBaki MS, Finlay JL, Leonard JR, Boue DR, Osorio D, Gastier-Foster JM, Magrini V, Cottrell CE, White P, Mardis ER, Wilson RK. Utilization of an Ensemble Approach for Identification of Driver Fusions in Pediatric Cancer. AACR 2019.



# MILESTONES



## A Trusted New Leader on the Journey to Best Outcomes

### *Tim Robinson takes the reigns as CEO.*

As chief financial officer for more than 20 years, Tim Robinson helped guide Nationwide Children's Hospital through a period of unprecedented growth – from an important regional children's health system to an internationally preeminent academic medical center.

When CEO Steve Allen, MD, announced his retirement in 2018, a national search began for the person who could continue to build on Nationwide Children's institutional momentum. That search led right back to Robinson, who began as CEO on July 1, 2019.

"It should not be surprising that the nation's leader for pediatric health care is also the top institution in the country for growing amazing talent," said Alex Fischer, board chair of Nationwide Children's, in announcing Robinson's appointment. "Following a comprehensive national search, which attracted broad-based interest and conversations with the highest caliber physician and non-physician leaders in health care today, Tim was our unanimous and enthusiastic choice."

Robinson joined Nationwide Children's staff in 1995 as assistant treasurer. In 1997, he became senior vice president and CFO, and in 2008 was named executive vice president and chief

financial and administrative officer. He is credited with building the hospital's investment portfolio from \$100 million to almost \$3 billion, and leading the hospital to earn an Aa2 bond rating consistently since 2001.

But his achievements have gone far beyond the traditional definition of a CFO. Robinson led groundbreaking efforts in population health, such as Partners For Kids<sup>SM</sup> (PFK). Now one of the country's oldest and largest pediatric accountable care organizations, PFK grew from responsibility for 13,000 children to approximately 330,000 under Robinson's watch. He was also a driving force behind the Healthy Neighborhoods Healthy Families initiative, which has become a national model for health systems to improve housing, educational opportunities and public safety in their communities.

More recently, Robinson has championed research and related technology commercialization efforts, and 13 companies have now been created based on Nationwide Children's medical and scientific discoveries. The hospital's scientists had 10 patents issued in 2015; in 2018, there were more than 40.

### Q&A:

#### **Q. How has Nationwide Children's mission affected the hospital's extraordinary growth of recent years?**

**A.** Our mission has made it possible. We keep asking ourselves: "What can we do to improve the lives of children?" and each element of our strategic plan is part of the answer. We understand that addressing a community's social determinants of health is critical for keeping families healthy, so with neighborhood partners we created Healthy Neighborhoods Healthy Families, which helped build or renovate nearly 400 homes. We know first-hand that children's behavioral health needs are not being met, so we've greatly expanded our behavioral health offerings and are nearing completion of the largest center of its kind in the United States.

Our Institute for Genomic Medicine, our nationally prominent Zero Hero program to eliminate preventable patient harm, our accelerating efforts to give children access to therapies invented here – all are manifestations of our mission.

#### **Q: What attracted you to Nationwide Children's Hospital 25 years ago?**

**A:** What attracted me is what continues to attract so many of the team members: our mission, vision and values. I had a non-traditional path to pediatric health care – I had been treasurer for a national shoe retailer. But when I came here, I immediately fell in love with the people and with the way everyone pulls together for the patients we serve.

Many organizations talk about mission and values, but we put ours in the foreground. We are on a *Journey to Best Outcomes* for all children. The best way for us to succeed is to work as *One Team*. Those are not just words for us. I felt those guiding principles in my first week as an employee 25 years ago, and I am honored for the opportunity to support them as CEO.

#### **Q: What does the future hold for Nationwide Children's?**

**A.** Ten years ago no one would have imagined where we are today. But there is even greater opportunity ahead and some of it has already been planned. We have announced the construction of a new research building and a new simulation center for staff training. We continue our investments in population health and precision medicine. The Big Lots Behavioral Health Pavilion will be a hub of research and treatment.

Otherwise, we continue our *Journey to Best Outcomes*, and keep asking how we can best serve children. I am blessed to work with a forward-looking community, a talented leadership team and a visionary Board of Directors. I am excited to build on this foundation, and I know we have unmatched potential as a leader in research and pediatric medicine.

*Jerry Mendell, MD, and Evelyn Villarreal,  
one of the clinical trial participants with SMA type 1 who received the new gene therapy.*



## MILESTONES

### FDA Approves First-of-Its-Kind Gene Therapy

On May 24, 2019, Zolgensma became the first gene therapy approved by the U.S. Food and Drug Administration (FDA) for spinal muscular atrophy. It is the second gene therapy approved in the United States.

SMA, the number one genetic killer of babies under two years of age, is a progressive, childhood, neuromuscular disease caused by a mutation in a single gene. Children with SMA type 1 fail to meet motor milestones and typically die or require permanent mechanical ventilation by 2 years of age.

**Jerry Mendell, MD**, principal investigator in the Center for Gene Therapy at the Abigail Wexner Research Institute led the Phase 1 clinical trial to study gene therapy for SMA1. In the trial, an intravenous injection of Zolgensma delivered a functional copy of the gene to the participants' cells.

Most children in the study who received the FDA-approved dose gained the ability to sit and roll, and a few could crawl or walk. Additionally, after two years, 7 of 10 participants who were free of pulmonary support at the time of dosing remained support-free.

“Treatment of SMA1 with gene therapy has the potential to transform the disease course, in addition to improving patient and caregiver quality of life. Reduced used of ventilation and nutritional support, as well as decreased hospitalization, could significantly decrease the overall health care utilization of these patients,” says **Richard Shell, MD**, section chief of Pulmonary Medicine at Nationwide Children's and senior author of the publication describing long-term health outcomes of the therapy.

The preclinical work leading to the FDA approval of Zolgensma was conducted by researchers from Nationwide Children's and The Ohio State University College of Medicine. The therapy was licensed to AveXis to help advance its use into the clinical setting.

“Our Center for Gene Therapy is a national leader in gene therapy with a robust pipeline of more than 20 genetic targets in various stages of research,” says **Kevin Flanigan, MD**, director of the Center for Gene Therapy. “The Abigail Wexner Research Institute invested in a clinical trial infrastructure, a Good Manufacturing Practice facility, regulatory experts and an Office of Technology Commercialization with the goal of taking discoveries from the laboratory bench to the clinic.”

#### CITATIONS:

Al-Zaidy S, Pickard AS, Kotha K, Alfano LN, Lowes L, Paul G, Church K, Lehman K, Sproule DM, Dabbours O, Maru B, Berry K, Arnold WD, Kissel JT, Mendell JR, Shell R. Health Outcomes in Spinal Muscular Atrophy Type 1 Following AVXS-101 Gene Replacement Therapy. *Pediatric Pulmonology*. 2019;54:179-185.

Mendell JR, Al-Zaidy S, Shell R, Arnold WD, Rodino-Klapac LR, Prior TW, Lowes L, Alfano L, Berry K, Church K, Kissel JT, Nagendran S, et al. Single-Dose Gene-Replacement Therapy for Spinal Muscular Atrophy. *The New England Journal of Medicine*. 2017 Nov 2;377:1713-1722.

## MILESTONES

### New Leadership, New Horizons: Surgeon-in-Chief Shares Vision for the Future

In August 2019, Nationwide Children's Hospital welcomed Oluyinka Olutoye, MD, PhD, as Surgeon-in-Chief. In a Q&A, the internationally renowned pediatric and fetal surgeon shares his thoughts about the challenges and opportunities facing pediatric surgeons today.

**Q: What brought you to Nationwide Children's Hospital?**

I was initially attracted to the strength of the existing surgery services at Nationwide Children's and was further intrigued by the organization's desire to expand in breadth, depth, service access and reputation. I was impressed by the hospital's collaborative culture and its universal commitment to exceptional patient care, as well as its outcomes-driven model of high quality and safe care delivery. These elements, coupled with the organization's focus on discovery and innovation in pediatric research and educational excellence led me to join this team.

**Q: What are the biggest challenges or opportunities facing pediatric surgeons now?**

With continued advances in children's surgery, we know more and we can diagnose more. But we also have to think about conditions and ailments that we have not yet considered. We have to approach our surgical practice through a holistic perspective of care, for example, by considering the impact of social determinants of health not only on treatment strategies but also on overall patient outcomes.

Our challenge now is to improve patient access, develop multidisciplinary programs to meet their medical and psychosocial needs in one setting, approach clinical diagnosis and care delivery with quality and safety at the forefront, and emphasize a values-driven care model that puts the patient and family squarely in the center. Equally important, we must be prepared to both model and cultivate for our learners, the standards of professionalism, intellectual curiosity and versatility that will be required for effective clinical practice in the future.

**Q: What inspired you to specialize in fetal surgery?**

My interest in fetal surgery began in high school, when I read a biography of Christian Barnard – the first surgeon to perform a human-to-human heart transplant. I was especially intrigued by his earlier research where he and his colleagues sought to find out why some babies were born with intestinal anomalies (atresias). They performed surgery on fetal animals to recreate those anomalies. That was when I was first exposed to the idea that one could perform surgery on a fetus.

While I was always interested in medicine, one aspect that especially captured my interest was embryology – how the embryo develops and all the anomalies that can happen during development. This interest led me toward surgery and pediatric surgery. As a pediatric surgeon, I focused on the question “what if we didn't have to wait until the fetus is born to do something about their anomaly?” The mother's womb is the best intensive care unit there is, and by conducting corrective surgeries in the fetus while in the womb, we can help to change the trajectory of the baby's outcome in life.

**Q: What excites you most about the future of fetal surgery?**

Initially, fetal surgery was reserved for conditions where the fetus was either expected to die or predicted to have severe morbidity at birth but the outcomes could potentially be improved with intervention. Fetal surgery was only offered in those rare and severe cases where the potential fetal benefit outweighed the risk to the mother.

Over time, advances in the field have lowered the risk to the mother. These advances include miniaturization of instruments, better imaging technology and minimal uterine access. As the risks are reduced, it opens many opportunities to address other anomalies before birth. Furthermore, advances in genomics, gene and cell-based therapy offer other opportunities for non-surgical approaches to fetal maladies.

Things that would have been totally unreasonable to consider 10 to 15 years ago are now on the table. As the opportunity to help increases, so too does the responsibility to help. The fetal care landscape is broadening, and that's exciting.

**Q: What do you hope to bring to your new role as surgeon-in-chief at Nationwide Children's?**

I look forward to building on the exceptional work that has already been done at Nationwide Children's Hospital. There are strong clinical programs in place, with tremendous achievements in patient care, safety, quality and health outcomes. I hope to bring a collaborative leadership style, a spirit of excellence, a tireless dedication to best outcomes, and to share a vision for transformative and sustainable growth as we move from excellence to pre-eminence.



*Oluyinka O. Olutoye, MD, PhD, Surgeon-in-Chief*

MILESTONES

Technology Commercialization at Nationwide Children’s Hospital

Scientific discovery is the basis for new technologies and products that improve the lives of children everywhere. Nationwide Children’s Hospital has a remarkable track record of moving discoveries into the marketplace. The hospital’s Office of Technology Commercialization facilitates the transfer of new technologies, research and innovations to outside partners to benefit patients, the local community and the general public.

“There is a real pipeline here,” says **Matthew McFarland, RPh, PhD**, vice president, Commercialization and Industry Relations at Nationwide Children’s. “We’re not only innovating clinical tools to help provide safer and better health care, we’re also developing therapeutics, diagnostic biomarkers, software that improves data analysis and models that help study disease.

“People might not intuitively think of a nonprofit hospital like Nationwide Children’s as a hotbed for technology commercialization,” he says. “They should. Just like universities, we make substantial investments in commercialization of new discoveries and create job-producing startup companies.”

To date, the Office of Technology Commercialization has supported the transfer of a wide variety of technology licenses, including virtual reality programs, surgical and clinical devices, and gene therapy products. Furthermore, they helped investigators file more than 300 patents in the last five years. In that same time, more than 40 patents were issued.

STARTUP COMPANIES BASED ON NATIONWIDE CHILDREN’S DISCOVERIES INCLUDE:



FACULTY HONORS AND GRANTS



Stephen Lessnick, MD, PhD

Lessnick Awarded \$6.2 Million Childhood Cancer Moonshot Grant

**Stephen Lessnick, MD, PhD**, director of the Center for Childhood Cancer and Blood Diseases at the Abigail Wexner Research Institute, has received a federal five-year, \$6.2 million grant to help uncover how proteins produced by a mutated gene transform healthy cells into tumor cells. The National Cancer Institute grant is part the 21st Century Cures Act of 2016 authorizing a total of \$1.8 billion to fund the “Cancer Moonshot” over a seven-year period with the goal of accelerating cancer research. Dr. Lessnick, who is also a professor of Pediatrics at The Ohio State University College of Medicine, is part of a national consortium of researchers investigating fusion oncoproteins, a class of proteins that drive cancer in children. Focusing on a particular fusion oncoprotein, EWS/FLI, Dr. Lessnick hopes to describe the process of how fusion proteins turn healthy cells into tumor cells in the detail needed for investigators to develop a new therapy. He will work with Richard Wilson, PhD, and Elaine Mardis, PhD, leaders of the Steve and Cindy Rasmussen Institute for Genomic Medicine at Nationwide Children’s, to define the specific DNA EWS/FLI attaches to and where it is located in the genome.



Rachel Stanley, MD, MHSA

Emergency Medicine Receives \$2.8 Million PECARN Grant

The Emergency Medicine Department at Nationwide Children’s received a four-year, \$2.8 million grant to continue leading one of the six U.S. Research Node Centers for the Pediatric Emergency Care Applied Research Network (PECARN), the first federally-funded pediatric emergency medicine research network. **Rachel Stanley, MD, MHSA**, chief of Emergency Medicine, leads the Great Lakes node center as the principal investigator. The grant is awarded by the Emergency Medical Services for Children (EMSC) Program administered by the Health Resources and Services Administration’s Maternal and Child Health Bureau. PECARN, founded in 2001, is the nation’s first federally funded pediatric research network dedicated to research about prevention and management of acute illnesses and injuries in children across the continuum of emergency medicine care. It comprises 18 hospital emergency departments that care for more than 1 million injured and ill children every year.



Karen McCoy, MD

Cystic Fibrosis R&D Program Awarded \$2 Million CF Foundation Grant

A team of researchers at Nationwide Children’s Hospital and The Ohio State University (OSU) was awarded a \$2 million grant over four years to continue development of the Cure CF Columbus Research and Development Program (C3 RDP). The program aims to study the relationship between immune system function and cystic fibrosis to develop treatments that will improve clinical outcomes for children and adults with CF. Nationwide Children’s and OSU teamed up in 2007 to establish a multidisciplinary translational research team of microbiologists, biochemists, immunologists, cell biologists, pathologists and CF pulmonary clinicians. Since then, the team of 29 clinical and basic science investigators have been building a body of research geared toward changing outcomes for patients in the clinic. Research projects include, understanding aspects of the adaptive and innate immune systems and how immune dysfunctions related to CF lead to infection with microorganisms. **Karen McCoy, MD**, chief of the Division of Pulmonary Medicine at Nationwide Children’s is co-director of C3 RDP, along with Daniel Wozniak, PhD, professor of Microbiology and Microbial Infection and Immunity at The Ohio State University College of Medicine.

Continued



*John A. Barnard, MD*

and also as president of the NASPGHAN Foundation.

### Barnard Honored for Lifelong Contributions to Pediatric Gastroenterology

**John A. Barnard, MD**, was honored by the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN) with the 2018 Harry Shwachman Award for making major, lifelong scientific and educational contributions to the field of pediatric gastroenterology, hepatology and nutrition. NASPGHAN is the preeminent professional society for pediatric gastroenterologists in North America. Dr. Barnard is chief of Pediatrics at Nationwide Children's Hospital, president of the Abigail Wexner Research Institute, and holds the Ann I. Wolfe Endowed Chair in Pediatric Research Leadership. He is also chair of Pediatrics at The Ohio State University College of Medicine. He has served as president of NASPGHAN,



*Jerry R. Mendell, MD*

years before retiring in 2019. During Dr. Allen's tenure, he helped build Nationwide Children's into a renowned pediatric research institution, including overseeing an increase from \$41.7 million to \$105.9 million in external research awards. Nationwide Children's is currently ranked fifth in the country for National Institutes of Health funding among freestanding children's hospitals.

### Mendell Named Allen Distinguished Scholar in Pediatric Research

**Jerry R. Mendell, MD**, became the inaugural recipient of the Allen Distinguished Scholar in Pediatric Research in May 2019, an award recognizing a preeminent senior researcher who exemplifies the innovation happening at Nationwide Children's and the Abigail Wexner Research Institute. Dr. Mendell has made fundamental contributions in clinical research and in the molecular genetics of neuromuscular disease throughout his career. He was among the first to test muscle cell transplantation for Duchenne muscular dystrophy in the early 1990s, and the first person to study viral mediated gene therapy for muscular dystrophy in humans. The Allen Distinguished Scholar is named for **Steve Allen, MD**, who served as Nationwide Children's CEO for nearly 13



*Cynthia A. Gerhardt, PhD*

illnesses such as childhood cancer.

### Gerhardt Receives Endowed Chair in Pediatric Behavioral Health

**Cynthia A. Gerhardt, PhD**, received the Janet Orttung-Morrow, MD, and Grant Morrow, III, MD, Endowed Chair in Pediatric Behavioral Health in May 2019. Endowed chairs are among the highest honors that can be bestowed upon a researcher, academic, or clinician. Dr. Gerhardt is the director of the Center for Biobehavioral Health in the Abigail Wexner Research Institute. She is also a psychologist in the Pediatric Psychology and Neuropsychology Program at Nationwide Children's and a professor of Pediatrics and Psychology at The Ohio State University College of Medicine. Dr. Gerhardt is an internationally known expert in risk and resilience factors associated with family adjustment to stress, particularly life-threatening



*Zarife Sahenk MD, PhD*

and restore peripheral nerve function in children and adults with CMT1A.

### Nationwide Children's Named CMTA Center of Excellence

The Charcot-Marie-Tooth Association named Nationwide Children's a CMT Center of Excellence, in recognition of the comprehensive care and expertise provided to children with the most common form of Charcot-Marie-Tooth disease, CMT1A. **Zarife Sahenk, MD, PhD**, an attending neurologist, is director of the CMT Center which comprises a multidisciplinary team of specialists in neuromuscular disorders, genetics counseling and orthopedics, as well as physical and occupational therapy. All clinical care is coordinated within a single location, within a single visit. Dr. Sahenk serves as director of Clinical and Experimental Neuromuscular Pathology in the Abigail Wexner Research Institute and is a principal investigator in the Center for Gene Therapy.

## NEW APPOINTMENTS



*Andrea E. Bonny, MD*

### Bonny Named Chief of Adolescent Medicine

**Andrea E. Bonny, MD**, has been named chief of the Division of Adolescent Medicine at Nationwide Children's Hospital. Dr. Bonny, a principal investigator in the Center for Clinical and Translation Research at the Abigail Wexner Research Institute and associate professor of Pediatrics at The Ohio State University College of Medicine, joined Nationwide Children's in 2011. She also serves as the director of research for Adolescent Medicine. Dr. Bonny's research focuses on reproductive health care for adolescents and adolescent substance abuse. She has served as a principal investigator on multiple externally funded grants including awards from the National Institutes of Health. She has authored more than 55 peer-reviewed publications and invited papers and has lectured nationally and internationally.



*Deena Chisolm, PhD*

### Chisolm Named Director of Center for Innovation in Pediatric Practice and VP Health Services Research

**Deena Chisolm, PhD**, has been named the director of the Center for Innovation in Pediatric Practice and vice president of Health Services Research at the Abigail Wexner Research Institute (AWRI). Dr. Chisolm is professor of Pediatrics at The Ohio State University College of Medicine and professor of Health Services Management and Policy at OSU's College of Public Health. Dr. Chisolm joined the AWRI in 2003 as a postdoctoral researcher, becoming a principal investigator in 2004. In 2012, she became co-director of the Patient-Centered Pediatric Research Fellowship program and in 2015 was named director of Population Health and Equity Research within the

Center for Innovation in Pediatric Practice. Her current research explores how health literacy, health policy and social factors influence the health of at-risk adolescents transitioning to adulthood and is funded by agencies including the National Institute on Minority Health and Health Disparities, and the National Institute on Drug Abuse.



*Anne M. Connolly, MD*

### Connolly Named Division Chief of Neurology

**Anne M. Connolly, MD**, has joined Nationwide Children's Hospital as division chief of Neurology and a member of the Center for Gene Therapy. An internationally recognized expert in pediatric neuromuscular disease and neuroimmunology, Dr. Connolly's early research involved examining the relationship between auto-antibodies and development of childhood neurological disorders. She has helped develop outcome measures for infants and boys with Duchenne muscular dystrophy, and has led or been a collaborator in numerous pivotal clinical trials in children with neuromuscular disorders. Dr. Connolly, who is also a professor of Pediatrics at The Ohio State University College of Medicine, has published 90 peer-reviewed articles, 18 invited reviews and chapters and given more than 40

invited lectures the world over. She is associate editor for the *Journal of Child Neurology* and has served as a national thought leader for multiple foundation and government agency efforts to improve outcomes in children with neuromuscular disorders.



*Catherine Krawczeski, MD*

### Krawczeski Named Division Chief of Cardiology

**Catherine Krawczeski, MD**, joined Nationwide Children's as division chief of Cardiology in The Heart Center, George H. Dunlap Endowed Chair in Cardiology, and professor of Pediatrics at The Ohio State University College of Medicine. Prior to joining Nationwide Children's, Dr. Krawczeski was medical director of the CVICU and director of the pediatric cardiology fellowship at Lucile Packard Children's Hospital. She has authored more than 100 peer-reviewed publications, book chapters and invited papers, and has lectured extensively nationally and internationally. She is a fellow of the American Academy of Pediatrics, the American College of Cardiology and the American Heart Association. An accomplished physician-scientist, Dr. Krawczeski's research focuses on acute kidney injury following cardiac surgery and interventions for congenital heart disease. She has served as a principal investigator or co-investigator on more than 10 funded grants since 2004, with seven supported by the National Institutes of Health.

NEW APPOINTMENTS



Oluyinka Olutoye Named Surgeon-in-Chief

**Oluyinka O. Olutoye, MD, PhD**, has been appointed surgeon-in-chief at Nationwide Children’s as well as professor and the E. Thomas Boles chair of Pediatric Surgery at The Ohio State University College of Medicine. In this role, Dr. Olutoye leads the 11 surgical departments within Nationwide Children’s. Dr. Olutoye previously served as co-director of the Fetal Center at Texas Children’s Hospital. As a pediatric and fetal surgeon, he brings specialized clinical expertise in fetal and neonatal surgery. In addition to his clinical expertise, Dr. Olutoye also leads an established research program focused on the role of the inflammatory response in scarless fetal wound healing, *in utero* correction of severe congenital malformations, and the early detection of necrotizing enterocolitis in preterm infants. Dr. Olutoye received his medical degree from Obafemi Awolowo University in Nigeria, and earned his PhD in anatomy from Virginia Commonwealth University. He completed his General Surgery residency at the Medical College of Virginia Hospitals, Virginia Commonwealth University, and his fellowships in Pediatric and Fetal Surgery at the Children’s Hospital of Philadelphia.



Wallihan Named Residency Director

**Rebecca G. Wallihan, MD**, was named program director of the Nationwide Children’s Pediatric Residency Program in 2019. An attending physician in Infectious Diseases at Nationwide Children’s, Dr. Wallihan has served as associate director for the Pediatric Residency Program since 2012 and vice chair for Education in the Department of Pediatrics since 2015. On the national scene, she has served a number of important roles in the Association of Pediatric Program Directors (APPD). These include serving as a member of the Vision 2020: Research and Scholarship Strategic Plan Working Group, the Research and Scholarship Task Force, and as a content expert for the Pediatric Milestones Assessment Collaborative – a joint initiative between APPD and the National Board of Medical Examiners. Dr. Wallihan is also associate professor of Pediatrics at The Ohio State University College of Medicine.

RESEARCH INSTITUTE DEDICATED TO ABIGAIL WEXNER



Nationwide Children’s Hospital dedicated the hospital’s Research Institute as the Abigail Wexner Research Institute at Nationwide Children’s in May 2019. As a lawyer and community volunteer, **Abigail S. Wexner** is involved in philanthropic work nationally and locally, with a particular focus on children’s issues. She began serving on the Nationwide Children’s board in 1993 and acted as board chair for seven years from 2005 to 2012. During her tenure as chair, Mrs. Wexner led the hospital through the largest expansion in its 127-year history, including completion of a 12-story hospital building and a third research building with more than \$1.2 billion in regional economic impact. The Wexners’ cumulative personal giving and philanthropic impact at Nationwide Children’s now exceeds more than \$80 million. This transformational funding has enabled the hospital to expand its clinical and research programs as one of America’s premier pediatric leaders.

DEPARTMENT, SECTION & RESEARCH INSTITUTE REPORTS

Dear Colleagues:

The Ohio State University College of Medicine is among the best places anywhere to train to be a physician. Last year, nearly 7,800 students applied for just 209 positions at an institution with a reputation for teaching students to deliver the highest level of health care, in a compassionate and caring way. One of the keys to the success of our medical education program is the strong symbiotic relationship we enjoy with Nationwide Children’s Hospital. Allow me to share some highlights with you.

Nationwide Children’s is one of Ohio State’s largest medical training environments. At Nationwide Children’s, in fiscal year 2019:

- 194 third-year medical students completed core rotations in Pediatrics
- 171 fourth-year medical students completed rotations
  - 154 were Ohio State students
    - 101 medical students completed required rotations
    - 70 medical students chose elective rotations
  - 37 were visiting students
- More than 30 first-year medical students completed a summer research experience at Nationwide Children’s

Additionally, 41 first- and second-year medical students are completing their longitudinal clinical placements (Longitudinal Practice) at Nationwide Children’s sites, where 32 Pediatrics faculty members serve as Longitudinal Practice preceptors.

Finally, 14 of our graduating medical students (8%) went into Pediatrics, one went into Child Neurology and seven selected Medicine/Pediatrics as their specialty.

In addition to our education partnership, The Ohio State University College of Medicine is creating stronger research collaborations with Nationwide Children’s. There are currently many successful collaborative programs with more under development.

On behalf of The Ohio State University College of Medicine, I congratulate Tim Robinson, John Barnard, MD, and all of the faculty and staff of the Department of Pediatrics and Nationwide Children’s for another outstanding year. Through our partnership with Nationwide Children’s, we are leading the way in educating the next generation of doctors, advancing research and enhancing care delivery throughout central Ohio and beyond.

Sincerely



A handwritten signature in dark ink, appearing to read "K. Kent".

**K. CRAIG KENT, MD**  
*Dean, College of Medicine*  
The Ohio State University  
Leslie H. and Abigail S. Wexner Dean’s Chair in Medicine  
Vice President of Health Sciences



# DEPARTMENT OF PEDIATRICS

The mission of the Department of Pediatrics at Nationwide Children’s Hospital and The Ohio State University is to achieve excellence in teaching, research, academics, advocacy and administrative service. We promote optimum health and provide evidence-based, efficient and compassionate medical care to our patients and their families.

The department comprises 27 clinical divisions, the Steve and Cindy Rasmussen Institute for Genomic Medicine and 13 research centers of emphasis in the Abigail Wexner Research Institute. Department of Pediatrics faculty members have formal joint appointments with The Ohio State University College of Medicine.

Our faculty has an unwavering commitment to excellence and aspires to the highest levels of professionalism, humanism, diagnostic acumen, clear communication and compassion. We educate and mentor more than 350 third- and fourth-year medical students from The Ohio State University and train approximately 300 residents and subspecialty fellows each year. Our Center for Faculty Development oversees a robust program that strives to engage, support and educate our more than 500 faculty. An important mission of our department and hospital is the discovery and dissemination of new knowledge related to child health and health care delivery. This discovery mission is supported by more than \$120 million in research funding.



## Dear Colleagues:

Each year in this report we have the privilege of presenting just a few of the myriad highlights of the clinical care, teaching and research conducted by our outstanding Department of Pediatrics faculty. The following division reports convey our efforts to promote optimal child health by providing comprehensive, state-of-the-art programs for children in Ohio and across the globe. Our vibrant training programs provide among the most diverse and preeminent educational experiences in pediatrics available in the United States.

Many of our discoveries over the past year have resulted in high-impact publications, seminal breakthroughs and landmark commercialization opportunities. With more than \$120 million in research support, we are ranked 6th among free-standing children’s hospitals in National Institutes of Health funding.

I invite you to explore the following pages and appreciate the depth and breadth of our pursuit to achieve best outcomes for children everywhere.

Sincerely,

John A. Barnard, MD  
Ann I. Wolfe Chair in Pediatric Research  
President, Abigail Wexner Research Institute at Nationwide Children’s Hospital  
Professor and Chair, Department of Pediatrics  
The Ohio State University College of Medicine

## Department of Pediatrics Vice Chairs



**Timothy Feltes, MD**  
Senior Vice Chair,  
Clinical Affairs



**Linda Cripe, MD**  
Vice Chair,  
Academic Affairs



**Rebecca Wallihan, MD**  
Vice Chair,  
Education



**Dennis Durbin, MD**  
Vice Chair,  
Research

2018 – 2019 NATIONWIDE CHILDREN’S RESIDENCY PROGRAM  
NATIONWIDE CHILDREN’S HOSPITAL | THE OHIO STATE UNIVERSITY COLLEGE OF MEDICINE

**PEDIATRICS RESIDENCY  
PROGRAM DIRECTOR**

Rebecca G. Wallihan, MD

**INTERNAL MEDICINE/  
PEDIATRICS RESIDENCY  
PROGRAM DIRECTOR**

Margaret Chase, MD

**ASSOCIATE PROGRAM  
DIRECTORS**

**PEDIATRICS**

Mary Kay Kuzma, MD  
Alexander T. Rakowsky, MD  
Suzanne M. Reed, MD  
Claire A. Stewart, MD

**INTERNAL MEDICINE/PEDIATRICS**

Lucas McKnight, MD  
Allison Rossetti, MD

**PEDIATRICS CHIEF RESIDENTS**

Dr. Taylor Ballenger  
Dr. Sara Dong  
Dr. Kylene Draeger  
Dr. Jill O’Hara  
Dr. Laura Walawender

**PL-4**

Dr. Sheri Poskanzer

**PL-3**

Dr. Matthew Allen  
Dr. Sarah Ashland  
Dr. Elizabeth Barnhardt  
Dr. Ben Cole  
Dr. Frances Comer  
Dr. Courtney Coyle  
Dr. Kayla Daniel  
Dr. Hannah Elkus  
Dr. David Fosselman  
Dr. Emily Gray  
Dr. Kate Hawa  
Dr. Katy Howell  
Dr. Bridget Hughes  
Dr. Megan Ilgenfritz  
Dr. Nicole Kendel  
Dr. Monica Kraft

Dr. April Lehman  
Dr. Ben Levinson  
Dr. Jake Little  
Dr. Andrea Nachreiner  
Dr. Erin Nealon  
Dr. Julie Newsom  
Dr. Claire Noltemeyer

Dr. Jenn Norman-Pitzer  
Dr. Danielle Pottinger  
Dr. Shauna Schord  
Dr. Zubin Shah  
Dr. Anja Skljarevski  
Dr. Kate Somers  
Dr. Courtney Thomas  
Dr. Anna Valentine  
Dr. Megan Yanny  
Dr. Becky Zhao

**PL-2**

Dr. Karen Allen  
Dr. Zeenath Ameen  
Dr. Brett Ballard  
Dr. Angelique Boutzoukas  
Dr. Kyle Burghgräf  
Dr. Lauren Carlozzi  
Dr. Danny Clark  
Dr. Aila Co  
Dr. Kaci Cunningham  
Dr. Laura DiScenna  
Dr. Maureen Faust  
Dr. Nate Forman  
Dr. Sarah Gaubatz  
Dr. Jackie Giafaglione  
Dr. Lauren Gunderman  
Dr. Eric Jones  
Dr. Shelby Jordan  
Dr. Ajay Koti  
Dr. Jared Kusma  
Dr. Kelsey Lecerf  
Dr. Rachael Levine  
Dr. Celia Ligorski  
Dr. Nina Ma  
Dr. Kristin Maletsky  
Dr. Lauren Matera  
Dr. Aishwarya Navalpakam  
Dr. Haley Pearlstein  
Dr. Michael Perisa  
Dr. Stephanie Quach  
Dr. James Reineke  
Dr. Jessica Rutsky

Dr. Jennifer Scheer  
Dr. Louisa Sethi  
Dr. Tara Shenoy  
Dr. Liv Singh  
Dr. Sam Stough  
Dr. Destiny Wilson

**PL-1**

Dr. Collin Abbott  
Dr. Ruth Abrams  
Dr. Keerthi Akubathini  
Dr. Abha Athale  
Dr. Erika Basil  
Dr. Brianna Brun  
Dr. Amanda Campbell  
Dr. Sarah Chen  
Dr. Christian Coletta  
Dr. Zac Daniels  
Dr. Jonathan Digby  
Dr. Dave Drees  
Dr. Megan Fredwall  
Dr. Chris Gable  
Dr. Noga Gal  
Dr. Matt Grisham  
Dr. Rae Gumayan  
Dr. Franziska Hoche  
Dr. Monica Hoff  
Dr. Anneliese Huntzinger  
Dr. Kelly Irwin  
Dr. Megan King  
Dr. Antonia Kopp  
Dr. Megan MacGregor  
Dr. Abby McGinnis  
Dr. Rachel Nash  
Dr. Jackie Nicodemo  
Dr. Kortney Pifher  
Dr. Aubrey Pizza  
Dr. Bucky Ribbeck  
Dr. Melanie Ribbeck  
Dr. Alex Saucedo  
Dr. Isma Shah  
Dr. Ashleigh Slemmer  
Dr. Cristina Tomatis Souverbielle  
Dr. Carly Stilphen  
Dr. Mosquera Vasquez  
Dr. Mark Wells  
Dr. Bianca Zapanta

**INTERNAL MEDICINE-  
PEDIATRICS**

**CHIEF RESIDENTS**

Dr. Mena Botros  
Dr. Taylor Jersak

**PGY-4**

Dr. Jason Gonzalez  
Dr. Adam Ketner  
Dr. Susan Li  
Dr. Hannah Lipshultz  
Dr. Audrey Lloyd  
Dr. Salma Shaikhouni  
Dr. Martin Vonau  
Dr. Sam Yang

**PGY-3**

Dr. Matthew Emery  
Dr. Katherine Ernst  
Dr. Matthew Lyons  
Dr. Sarah MacDowell  
Dr. Lucy Rosenbaum  
Dr. Mary Ryan  
Dr. Brittany Shrefler  
Dr. Corey Toocheck  
Dr. Akshay Vijayaraman  
Dr. Sneh Xavier

**PGY-2**

Dr. Philip Chang  
Dr. Anyelika Delerme  
Dr. Michelle Gillespie  
Dr. Robbi Gomez  
Dr. Audrey Hiltunen  
Dr. Austin Meyer  
Dr. Michelle Moore Padilla  
Dr. Nathaniel Sherrer  
Dr. Brynne Underwood

**PGY-1**

Dr. Nabeeha Ahmad  
Dr. Kristin Cooper  
Dr. Rachel D’Amico  
Dr. Michael Dienstbach  
Dr. Mary Hanks  
Dr. Rachael Mangaudis  
Dr. Timothy Pian  
Dr. Daniel Schmitz  
Dr. Savannah Smith  
Dr. Aisha White



ADOLESCENT MEDICINE

The Section of Adolescent Medicine at Nationwide Children’s Hospital provides general and specialty care for adolescents. The staff is expert in all aspects of health care for adolescents, with an emphasis on comprehensive primary care, reproductive health care, eating disorders, LGBTQ youth, substance abuse, health for incarcerated youth, and adolescents with complex health problems.

FACULTY



Andrea E. Bonny, MD  
Chief

Elise D. Berlan, MD, MPH

Gayathri Chelvakumar, MD, MPH

Casey B. Cottrill, MD, MPH

Fareeda W. Haamid, DO

Cynthia M. Holland-Hall, MD, MPH

Steven C. Matson, MD

Erin R. McKnight, MD, MPH

The Adolescent Medicine Clinic is located in the Livingston Ambulatory Center on our Columbus campus. Primary care is offered as are consultative clinics for adolescents with reproductive health needs and addiction. The Medical Clinic at the Franklin County Juvenile Detention Facility provides health care for detained youth. The Eating Disorders Program is a multidisciplinary team involving Adolescent Medicine physicians, a psychiatrist, Behavioral Health therapists, nurses and dietitians. Three levels of care are available: partial hospitalization, intensive outpatient therapy and coordinated outpatient visits. The Medication-Assisted Treatment for Addiction (MATA) program has treated adolescents and young adults with opioid addiction with substitution therapy since 2007. BC4Teens/Young Women’s Contraceptive Services increases accessibility to long-acting reversible contraception. The THRIVE

program provides comprehensive care to transgender and gender nonconforming youth. Physicians in the section also provide ongoing and consultative care for adolescents who have been admitted to Nationwide Children’s with diverse medical problems such as gynecological conditions and complications from eating disorders. An Accreditation Council for Graduate Medical Education Fellowship in Adolescent Medicine has been in place since 2010.

Our faculty members are active participants in research and education. Erin R. McKnight, MD, MPH, and Andrea E. Bonny, MD, were recipients of an NIH grant to develop new statistical approaches for estimating county-level rates of opioid misuse to target areas of highest priority. Gayathri Chelvakumar, MD, MPH, presented her research at the World Professional Association for Transgender Health in Buenos Aires, Argentina. Steven C. Matson, MD, and Andrea E. Bonny, MD, were invited keynote speakers at the 1<sup>st</sup> Annual Jerry Rauh Memorial Lectureship at Cincinnati Children’s Medical Center and spoke on integration of medication treatment of addiction into outpatient medical care.

SELECTED PUBLICATIONS

Hepler S; **McKnight E, Bonny A**, Kline D. A Latent Spatial Factor Approach for Synthesizing Opioid-Associated Deaths and Treatment Admissions in Ohio Counties. *Epidemiology*. 2019 May;30(3):365-70.

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Manos BE, Bravender TD, Harrison TM, Lange HLH, **Cottrill CB**, Abdel-Rasoul M, **Bonny AE**. A Pilot Randomized Controlled Trial of Omega-3 Fatty Acid Supplementation for the Treatment of Anxiety in Adolescents with Anorexia Nervosa. *International Journal of Eating Disorders*. 2018 Dec;51(12):1367-72.

Norris AH, Pritt NM, **Berlan ED**. Can Pediatricians Provide Long-Acting Reversible Contraception? *Journal of Pediatric and Adolescent Gynecology*. 2019 Feb;32(1):39-43.

Powers JM, Stanek JR, Srivaths L, **Haamid FW**, O’Brien SH. Hematologic Considerations and Management of Adolescent Girls with Heavy Menstrual Bleeding and Anemia in U.S. Children’s Hospitals. *Journal of Pediatric and Adolescent Gynecology*. 2018 Oct;31(5):446-50.

FAST FACTS

July 2018 through June 2019

|                                                     |       |                                                                  |
|-----------------------------------------------------|-------|------------------------------------------------------------------|
| Adolescent Medicine Clinic Visits: .....            | 5,912 | Linden Primary Care Adolescent Medicine Clinic Visits: <b>16</b> |
| Adolescent Medicine Eating Disorders Visits:.....   | 3,234 | Total Adolescent Medicine Clinic Visits: ..... <b>9,853</b>      |
| Dublin Adolescent Medicine Clinic Visits:.....      | 228   | Inpatient Consults: ..... <b>54</b>                              |
| East Broad Adolescent Medicine Clinic Visits: ..... | 463   |                                                                  |

2018 – 2019 NATIONWIDE CHILDREN’S FELLOWSHIP PROGRAM

ADOLESCENT MEDICINE

Maria D. Brown, MD  
Ashley M. Ebersole, MD  
R. Claire Roden, MD

ALLERGY AND IMMUNOLOGY

The Division of Allergy and Immunology at Nationwide Children’s Hospital provides comprehensive services for the diagnosis and treatment of patients with allergic and immunologic diseases from birth through age 21. Clinical activity includes an active outpatient clinic, several multispecialty clinics, an urgent referral clinic and inpatient consultation services. The division is also actively involved in both basic science and clinical research.

FACULTY



Mitchell H. Grayson, MD  
Division Chief



Rebecca Scherzer, MD  
Section Chief

FULL-TIME NATIONWIDE CHILDREN’S FACULTY

- Elizabeth A. Erwin, MD
- Irene J. Mikhail, MD
- Peter J. Mustillo, MD
- Benjamin Prince, MD
- Margaret Redmond, MD
- Kasey Strothman, MD
- David R. Stukus, MD

COMMUNITY-BASED FACULTY

- Roger A. Friedman, MD
- David W. Hauswirth, MD

- Philip N. Rancitelli, MD
- Grace Y. Ryu, MD

OSU-AFFILIATE FACULTY

- Rekha Raveendran, MD

This past year the Division of Allergy and Immunology received recognition for excellence in clinical, research and educational activities. The World Allergy Organization named the division a World Allergy Organization Center of Excellence. Our outstanding primary immunodeficiency program was named a Jeffrey Modell Foundation for Primary Immunodeficiencies Diagnostic and Research Center.

Our providers manage all allergic conditions, including asthma, allergic/nonallergic rhinitis, chronic sinusitis, hives, eczema, angioedema, drug and food allergies, latex allergy and stinging insect allergy. We provide allergy skin testing, allergen immunotherapy, asthma education, pulmonary function testing, comprehensive food allergy management, including oral food challenges, and drug allergy testing. We also evaluate children with recurrent or unusual infections and provide complete evaluation and management for primary immunodeficiencies.

Faculty participate in the Complex Asthma and 22q11 clinics and in multidisciplinary clinics with Hematology/Oncology, Otolaryngology (ENT) and Gastroenterology. We provide inpatient consultation and immediate assistance for health care providers through the physician consult transfer center.

A wide array of basic and clinical research is performed by division faculty, ranging from mechanisms driving development of asthma and allergies to clinical studies of eosinophilic esophagitis, food allergy, use of technology to improve patient outcomes, transition of care, primary immunodeficiency, asthma, and allergic and non-allergic rhinitis.

The Allergy and Immunology faculty provide clinical and didactic instruction for the Nationwide Children’s

Hospital Allergy and Immunology Fellowship Program and Pediatric Residency Program along with students from The Ohio State University College of Medicine. Faculty and fellows have leadership positions in national allergy and immunology organizations and are invited speakers at local, regional, national and international conferences.

GRANTS AWARDED  
JUNE 1, 2018 – JUNE 30, 2019

\$530,000

SELECTED PUBLICATIONS

Grayson MH, Camarda LE, Hussain S-RA, Zemple SJ, Hayward M, Lam V, Hunter DA, Santoro JL, Rohlfing M, Cheung DS and Salzman NH. Intestinal Microbiota Disruption Reduces Regulatory T Cells and Increases Respiratory Viral Infection Mortality Through Increased IFN $\gamma$  Production. *Front Immunol*. 2018 Jul 10;9:1587.

Grayson MH, Feldman S, Prince BT, Patel PJ, Matsui EC, Apter AJ. Advances in Asthma in 2017: Mechanism, Biologics and Genetics. *J Allergy Clin Immunol*. 2018 Nov;142(5):1423-1436.

Kraft MT, Scherzer R, Erwin EA, Mikhail I. Caregiver Perceptions of When to Offer an Oral Food Challenge for Children with Food Allergy. *Ann Allergy Asthma Immunol*. 2019 Jun;122(6):660-661.

Patrick MD, Stukus DR, Nuss, K. Using Podcasts to Deliver Pediatric Educational Content: Development and Reach of PediaCast CME. *Digital Health*. 2019 Feb;5:1-9.

Scherzer R, Grayson MH. Heterogeneity and the Origins of Asthma. *Ann Allergy Asthma Immunol*. 2018 Oct;121(4):400-405

FAST FACTS

July 2018 through June 2019

|                                               |       |
|-----------------------------------------------|-------|
| Main Campus Allergy Clinic Visits:.....       | 5,219 |
| Immunology Clinic Visits: .....               | 427   |
| Complex Asthma-Allergy Clinic Visits:.....    | 220   |
| Hilliard Allergy Clinic Visits: .....         | 736   |
| Westerville Allergy Clinic Visits: .....      | 477   |
| Early Peanut Introduction Clinic Visits:..... | 76    |
| Total Clinic Visits: .....                    | 7,155 |
| Inpatient Consults: .....                     | 73    |

2018 – 2019 NATIONWIDE CHILDREN’S FELLOWSHIP PROGRAM

ALLERGY & IMMUNOLOGY

- Basil Kahwash, MD
- Ruchi Singla, MD
- David E. Tapke, MD
- Jennifer Yonkof, MD



*“A new device for PDA closure recently approved by the FDA has potential to reduce the incidence of device-related complications. This important work by Dr. Berman and Dr. Backes indicates a need for additional study and identification of additional therapeutic options to avoid complications for premature infants with PDA.”*

– Catherine D. Krawczeski, MD, Cardiology Chief, Heart Center Co-director

## *The Heart Center*

### **Percutaneous Occlusion Linked to Respiratory Improvements in Low-Weight Infants with PDA**

Percutaneous occlusion for patent ductus arteriosus (PDA) in infants weighing less than 6 kg is associated with potential longer term improvements in respiratory health, research by investigators at Nationwide Children’s Hospital shows.

At the same time, the procedure is associated with risks of device-related complications and, particularly among infants weighing less than 3 kg, adverse cardiopulmonary outcomes, according to the study published in *The Journal of Pediatrics*.

“We’ve used catheter-based PDA closure on infants who have not spontaneously closed their PDA beyond the first 30 days of life and who continued to have evidence of potential complications related to an open ductus,” says **Carl H. Backes, Jr., MD**, attending neonatologist and attending cardiologist at Nationwide Children’s and co-author of the study. “But fundamental questions of the appropriate use of the procedure remain.”

The retrospective study analyzed the medical records of 92 infants who had a PDA closure device implanted while being treated in The Heart Center at Nationwide Children’s Hospital from 2003 to 2017.

Pulmonary outcomes were quantified using a composite pulmonary score based on weighted clinical therapies, including type (mechanical ventilation, continuous positive airway pressure or nasal cannula), need for supplemental oxygen and pulmonary medications (systemic steroids, diuretics). A lower score indicates respiratory improvement.

Scores were calculated weekly for 28 weeks. By then, the mean score for the cohort dropped more than 50% from the pre-procedural mean.

The procedure was successful in all but two infants. In those who underwent successful device closure, post-procedural echocardiograms indicated mild left pulmonary artery obstruction in 20 infants and mild descending aorta obstruction in seven immediately following device implantation. The numbers dropped to three and four infants respectively by discharge. Infant age and weight were not associated with the device-related complications. No patient required reintervention for these findings.

Among infants weighing less than 3 kg, the rate of oxygenation failure was 28% and rate of decreased left ventricular systolic function (LVSF) was 29%; among infants weighing 3 and 5.9 kilograms, the failure rate was 8% and LVSF 5%.

“The low but real device-related complications identified in this study underscore the need for continued device development,” says **Darren Berman, MD**, co-director of Cardiac Catheterization and Interventional Therapies in The Heart Center at Nationwide Children’s, and study co-author. “In fact, a newer device, just recently FDA approved, will help reduce the incidence of device-related complications significantly.”

He and the rest of the authors call for clinical trials comparing percutaneous occlusion to alternatives in order to definitively determine risks and best practices.

#### **CITATION:**

Nealon E, Rivera BK, Cua CL, Ball Mk, Stiver C, Boe BA, Slaughter JL, Chisolm J, Smith CV, Cooper JN, Armstrong AK, Berman DP, Backes CH. Follow-up after Percutaneous Patent Ductus Arteriosus Occlusion in Lower Weight Infants. *The Journal of Pediatrics*. 2019 Sep;212:144-150.e3.

THE HEART CENTER

The Heart Center at Nationwide Children’s Hospital combines all clinical and research disciplines under one umbrella in order to meet our mission: to improve outcomes by discovering the causes of heart disease and developing novel therapies for our patients, focusing on each as an individual and providing the state-of-the-art care that all patients deserve, regardless of age. We support the mission of Nationwide Children’s to provide our services in a safe environment focused on family-centered care.

FACULTY



Catherine D. Krawczeski, MD  
Co-Director  
Chief, Pediatric Cardiology



Mark E. Galantowicz, MD  
Co-Director  
Chief, Cardiothoracic Surgery



Vidu Garg, MD  
Director  
Translational Research

- Aimee K. Armstrong, MD
- Carl H. Backes, MD
- Darren P. Berman, MD
- Brian A. Boe, MD
- Jessica L. Bowman, MD
- Elisa A. Bradley, MD
- Sergio A. Carrillo Melendez, MD
- Steven C. Cassidy, MD
- John P. Cheatham, MD
- Kristin M. Chenault, MD
- Marco Corridore, MD
- Linda H. Cripe, MD
- Clifford L. Cua, MD
- Curt J. Daniels, MD
- Stephen M. Druhan, MD
- Timothy F. Feltes, MD
- Richard P. Fernandez, MD
- Jill A. Fitch, MD
- Jennifer Gauntt, MD
- Robert J. Gajarski, MD, MHSA
- Stephen A. Hart, MD
- Don Hayes, MD, MS, MEd
- Kan N. Hor, MD
- Anna N. Kamp, MD, MPH
- Naomi J. Kertesz, MD
- Omar M. Khalid, MD
- Sarah Khan, MD
- John P. Kovalchin, MD
- Rajesh Krishnamurthy, MD
- Anthony Y. Lee, MD
- Simon Lee, MD
- Kaitlin E. L’Italien, MD
- Eric A. Lloyd, MD

- May L. Mah, MD
- Patrick I. McConnell, MD
- Christopher T. McKee, DO
- Katherine M. Mizelle, MD
- Aymen N. Naguib, MD
- Deipanjan Nandi, MD
- Kathryn D. Nardell, MD
- Julie C. O’Donovan, MD
- Christina M. Phelps, MD
- Saurabh Rajpal, MD
- Kerry L. Rosen, MD
- Daniel G. Rowland, MD
- Aarthi Sabanayagam, MD
- Toshiharu Shinoka, MD, PhD
- Janet M. Simsic, MD
- Corey A. Stiver, MD
- Karen M. Texter, MD
- Peter D. Winch, MD, MBA
- Andrew R. Yates, MD
- Cody M. Young, DO

NATIONAL AND INTERNATIONAL REPUTATION

- Highlights
- Recruitment of Catherine Krawczeski, MD, as new chief of Cardiology and co-director of The Heart Center
  - Hosted 3DI3 Meeting, an annual international interventional cardiology meeting, highlighting 3D imaging techniques in catheterization
  - Funded 11 intramural projects and obtained extramural National Institutes of Health grants totaling \$2.3 million
  - Successful joint quality improvement metrics between Dayton Children’s Hospital and Nationwide Children’s Heart Center OPCA Joint Venture
  - Expanded regional outreach pediatric and adult congenital clinics with record volume in outpatient visits and diagnostic studies
  - Significantly improved patient access to clinic visits with decrease in wait time by modifying scheduling process and adding flexible clinic sessions

The Heart Center continues to grow in both volume and capabilities. In 2018, the Heart Transplant program saw a nearly 50% increase in both referrals and completed transplants. We implanted ventricular assist devices (VAD) for refractory heart failure in four patients awaiting transplant and were the first pediatric center in Ohio to implant the new generation HeartMate III™ VAD. We developed a comprehensive outpatient VAD program and successfully discharged our first VAD patient. We anticipate continued VAD program growth, meeting the needs of an increasing population of older pediatric and young adult patients with congenital heart disease, as well as being a research site for novel pediatric VAD designs. We have also begun a cardio-oncology program to provide ongoing cardiac care to long-term survivors of childhood cancers at risk for cardiomyopathy.

Our interventional cardiologists participate in multiple pivotal device trials, leading to approval of a new ASD occluder device (Cardioform ASD Occluder) and the first PDA device for premature infants (Piccolo). They continue a successful fetal cardiac intervention program through the Congenital Heart Collaborative (with University Hospitals Rainbow Babies and Children’s Hospital) and also perform pre-clinical research, implanting the first fully bioabsorbable tissue engineered pulmonary valve in an animal fetus via a percutaneous transcatheter approach. Through a collaboration among cardiology, interventional radiology and hematology, they are performing new services for patients with lymphatic disorders, including diagnosis via advanced imaging as well as interventional treatment.

Our electrophysiologists developed a collaborative inherited arrhythmia clinic, combining the expertise of specialists in cardiology, psychology and genetic counseling. They are working to develop appropriate use criteria for implantable cardioverter defibrillators in patients with Duchenne’s muscular dystrophy. As part of Project Adam Ohio, which is housed at Nationwide Children’s, they have met with multiple school districts in an attempt to ensure schools have the appropriate placement of and training in the use of automatic external defibrillators. Additionally, faculty are involved in several international multicenter research projects to advance the care for children with arrhythmias and continue research in the identification of arrhythmias in adults with congenital heart disease.

The Adult Congenital Heart Disease (ACHD) Program has been active with several research projects involving the use of ambulatory pulmonary hemodynamic invasive monitors for ACHD patients to better control heart failure and hospital admissions and currently has the world’s largest experience with the use of these devices.

The ACHD program has expanded their clinical outreach in several cities around Ohio including additional clinics in Dayton, Portsmouth and Zanesville. The ACHD cardiologists and fellows have presented at several national and international meetings this past year covering areas of research and clinical care including atrial septal defects and pulmonary hypertension, ACHD program accreditation, future care of ACHD, neurodevelopment and CHD, and published in several areas including racial disparities in lost to CHD care, executive functioning and CHD, patient reported outcomes with ACHD and depression and anxiety with ACHD.

Cardiothoracic Intensive Care Unit (CTICU) physicians are principal or co-investigators on five extramurally funded grants, one industry sponsored study and one intramural grant. In the last year, they authored 14 manuscripts published in peer-reviewed journals. Ten of the co-authored manuscripts were part of national multicenter studies, including National Emergency Airway Registry for Children (NEAR4KIDS), Therapeutic Hypothermia After Pediatric Cardiac Arrest (THAPCA) and Collaborative Pediatric Critical Care Research Network (CPCCRN). Additionally, seven abstracts were presented at national and international scientific meetings.

The Non-Invasive Imaging team co-hosted the inaugural Ohio Fetal Medicine Conference in April 2019 with the Congenital Heart Collaborative. The team remains active in research with three funded investigators and a dedicated imaging research coordinator. Advanced Cardiac Imaging (MRI and CT) continue to grow, both programmatically and in volume. In Cardiac CT, new techniques were begun that allow non-sedated imaging of young children with much lower radiation exposure. New programs introduced in cardiac MRI included myocardial stress perfusion imaging, free-breathing real time cine for accelerated imaging without sedation, high-resolution coronary MRI angiography and comprehensive myocardial characterization. Large animal cardiac imaging was also successfully implemented on the dedicated research magnet to support the tissue engineered vascular graft development group.

The Heart Center is currently engaged in 15 active quality improvement projects including major projects to improve communication between the CTICU and the acute care floor at the time of transfer and improving 30-day clinic access for patients. Families have reported higher satisfaction during their stay on the acute care floor and changes in the process by which patients are scheduled for clinic has resulted in a dramatic decrease in appointment wait times. These projects reflect the ongoing commitment of The Heart Center to improving the overall care experience for patients and their families.

The Center for Cardiovascular Research continues to grow its participation in NIH and industry-funded clinical trials. An area of interest is the management of patent ductus arteriosus (PDA), a common cardiovascular complication of preterm birth. Our team has been among the leaders in catheter-based closure of PDA in lower weight infants and were investigators in the Amplatzer Piccolo Occluder clinical trial that led to FDA approval of the device in 2019. In addition, we are participating in crucial NIH-funded interdisciplinary clinical research to determine whether and when a premature infant’s PDA will close on its own without intervention. Additionally, the center is participating as a site in several NIH and industry-funded clinical trials that total more than \$900,000 and include studies for market approval of drugs to treat complications of cardiac surgery requiring cardiopulmonary bypass or single ventricle congenital heart disease and transcatheter devices to non-invasively treat structural cardiac defects.

**Center for Cardiovascular Research:** See page 181 for information about this center in the Abigail Wexner Research Institute at Nationwide Children’s.

**GRANTS AWARDED TO HEART CENTER AND CARDIOVASCULAR RESEARCH FACULTY  
JULY 1, 2018 – JUNE 30, 2019**

\$3,290,050

**SELECTED PUBLICATIONS**

Buddhe S, **Cripe L**, Friedland-Little J, **Kertesz N**, Eghtesady P, Finder J, **Hor K**, Judge DP, Kinnett K, McNally EM, Raman S, Thompson WR, Wagner KR, Olson AK. Cardiac Management of the Patient with Duchenne Muscular Dystrophy. *Pediatrics*. 2018 Oct;142(Suppl 2):S72-S81.

**L’Italien K**, Conlon S, **Kertesz N**, **Bezold L**, **Kamp A**. Usefulness of Echocardiography in Children with New-Onset Supraventricular Tachycardia. *Journal of the American Society of Echocardiography: Official Publication of the American Society of Echocardiography*. 2018 Oct;31(10):1146-1150.

McElhinney DB, Sondergaard L, **Armstrong AK**, Bergersen L, Padera RF, Balzer DT, Lung TH, Berger F, Zahn EM, Gray RG, Hellenbrand WE, Kreutzer J, Eicken A, Jones TK, Ewert P. Endocarditis after Transcatheter Pulmonary Valve Replacement. *Journal of the American College of Cardiology*. 2018 Dec 4;72(22):2717-2728.

**Morrison AK**, Gowda C, Tumin D, **Phelps CM**, **Hayes D, Jr.**, Tobias J, **Gajarski RJ**, **Nandi D**. Pediatric Marginal Donor Hearts: Trends in US National Use, 2005-2014. *Pediatric Transplantation*. 2018 Aug;22(5):e13216.

Nealon E, Rivera BK, **Cua CL**, Ball MK, **Stiver C**, **Boe BA**, Slaughter JL, **Chisolm J**, Smith CV, Cooper JN, **Armstrong AK**, **Berman DP**, **Backes CH**. Follow-up after Percutaneous Patent Ductus Arteriosus Occlusion in Lower Weight Infants. *J Pediatr*. 2019 Jun 28. pii: S0022-3476(19)30687-0.

**Simsic JM**, **Phelps C**, Kirchner K, **Carpenito KR**, **Allen R**, **Miller-Tate H**, **Texter K**, **Galantowicz M**. Interstage Outcomes in Single Ventricle Patients Undergoing Hybrid Stage 1 Palliation. *Congenit Heart Dis*. 2018 Sep;13(5):757-763.

**FAST FACTS**

*July 2018 through June 2019*

**Heart Center Inpatient/Observation**

|                                                       |              |
|-------------------------------------------------------|--------------|
| Inpatient Discharges:.....                            | <b>803</b>   |
| Observation and Outpatient-in-a-Bed Discharges: ..... | <b>450</b>   |
| Total Discharges:.....                                | <b>1,253</b> |
| Average Length of Stay*:.....                         | <b>10.6</b>  |
| Average Daily Census*:.....                           | <b>23.2</b>  |
| Total Patient Days*: .....                            | <b>8,485</b> |

**Cardiac ICU**

|                               |              |
|-------------------------------|--------------|
| Inpatient Discharges:.....    | <b>795</b>   |
| Average Length of Stay*:..... | <b>5.3</b>   |
| Average Daily Census*:.....   | <b>11.5</b>  |
| Total Patient Days*: .....    | <b>4,211</b> |

**Heart Center Clinics**

|                                                |               |
|------------------------------------------------|---------------|
| Athens Cardiology Clinic Visits:.....          | <b>95</b>     |
| Blanchard Cardiology (PAA) Clinic Visits:..... | <b>12</b>     |
| Cardio Diagnostics (PAA) Clinic Visits:.....   | <b>2,152</b>  |
| Cardiology Clinic Visits:.....                 | <b>11,415</b> |
| Cardiothoracic Surgery Clinic Visits: .....    | <b>356</b>    |

|                                                          |              |
|----------------------------------------------------------|--------------|
| Chillicothe Cardiology Clinic Visits: .....              | <b>360</b>   |
| Dayton Cardiology (PAA) Clinic Visits:.....              | <b>229</b>   |
| Dublin Cardiology Clinic Visits:.....                    | <b>1,240</b> |
| Findlay Cardiology Clinic Visits:.....                   | <b>92</b>    |
| Kawasaki Clinic Visits: .....                            | <b>60</b>    |
| Lewis Center Cardiology Clinic Visits: .....             | <b>1,532</b> |
| Lima Cardiology (PAA) Clinic Visits:.....                | <b>452</b>   |
| Lima Memorial Cardiology (PAA) Clinic Visits: .....      | <b>7</b>     |
| Mansfield ACHD Clinic Visits: .....                      | <b>37</b>    |
| Mansfield Cardiology Clinic Visits: .....                | <b>296</b>   |
| Marietta Cardiology Clinic Visits:.....                  | <b>288</b>   |
| Marion Cardiology Clinic Visits:.....                    | <b>214</b>   |
| OSU Cardiology (PAA) Clinic Visits:.....                 | <b>69</b>    |
| Portsmouth Cardiology Clinic Visits:.....                | <b>263</b>   |
| Riverside Methodist Cardiology (PAA) Clinic Visits:..... | <b>78</b>    |
| Westerville Cardiology Clinic Visits:.....               | <b>461</b>   |
| Zanesville Cardiology Clinic Visits: .....               | <b>356</b>   |

*\*Excludes observation and outpatient-in-a-bed patients.*

CARDIOLOGY

Cardiology is a Section of the Department of Pediatrics and an integral part of The Heart Center at Nationwide Children’s Hospital. See page 43 for complete details.

FACULTY



Catherine D. Krawczeski, MD  
Division Chief, Cardiology



Robert J. Gajarski, MD, MHSA  
Section Chief, Cardiology

- Aimee K. Armstrong, MD
- Carl H. Backes, MD
- Darren P. Berman, MD
- Brian A. Boe, MD
- Jessica L. Bowman, MD
- Elisa A. Bradley, MD
- Steven C. Cassidy, MD
- John P. Cheatham, MD
- Linda H. Cripe, MD
- Clifford L. Cua, MD
- Curt J. Daniels, MD
- Timothy F. Feltes, MD
- Richard P. Fernandez, MD
- Jill A. Fitch, MD
- Jennifer Gauntt, MD
- Vidu Garg, MD
- Stephen A. Hart, MD

- Kan N. Hor, MD
- Anna N. Kamp, MD, MPH
- Naomi J. Kertesz, MD
- Omar M. Khalid, MD
- John P. Kovalchin, MD
- Anthony Y. Lee, MD
- Simon Lee, MD
- Eric A. Lloyd, MD
- Kaitlin E. L’Italien, MD
- May L. Mah, MD
- Katherine M. Mizelle, MD
- Deipanjan Nandi, MD
- Kathryn D. Nardell, MD
- Christina M. Phelps, MD
- Saurabh Rajpal, MD
- Kerry L. Rosen, MD
- Daniel G. Rowland, MD
- Aarthi Sabanayagam, MD
- Janet M. Simsic, MD
- Corey A. Stiver, MD
- Karen M. Texter, MD
- Andrew R. Yates, MD

GRANTS AWARDED TO HEART CENTER  
AND CARDIOVASCULAR RESEARCH FACULTY  
JULY 1, 2018 – JUNE 30, 2019

\$3,290,050

SELECTED HEART CENTER PUBLICATIONS

Buddhe S, **Cripe L**, Friedland-Little J, **Kertesz N**, Eghtesady P, Finder J, **Hor K**, Judge DP, Kinnett K, McNally EM, Raman S, Thompson WR, Wagner KR, Olson AK. Cardiac Management of the Patient with Duchenne Muscular Dystrophy. *Pediatrics*. 2018 Oct;142(Suppl 2):S72-S81.

**L’Italien K**, Conlon S, **Kertesz N**, **Bezold L**, **Kamp A**. Usefulness of Echocardiography in Children with New-Onset Supraventricular Tachycardia. *Journal of the American Society of Echocardiography : Official Publication of the American Society of Echocardiography*. 2018 Oct;31(10):1146-1150.

McElhinney DB, Sondergaard L, **Armstrong AK**, Bergersen L, Padera RF, Balzer DT, Lung TH, Berger F, Zahn EM, Gray RG, Hellenbrand WE, Kreutzer J, Eicken A, Jones TK, Ewert P. Endocarditis after Transcatheter Pulmonary Valve Replacement. *Journal of the American College of Cardiology*. 2018 Dec 4;72(22):2717-2728.

**Morrison AK**, Gowda C, Tumin D, **Phelps CM**, **Hayes D, Jr.**, Tobias J, **Gajarski RJ**, **Nandi D**. Pediatric Marginal Donor Hearts: Trends in US National Use, 2005-2014. *Pediatric Transplantation*. 2018 Aug;22(5):e13216.

Nealon E, Rivera BK, **Cua CL**, Ball MK, **Stiver C**, **Boe BA**, Slaughter JL, **Chisolm J**, Smith CV, Cooper JN, **Armstrong AK**, **Berman DP**, **Backes CH**. Follow-up after Percutaneous Patent Ductus Arteriosus Occlusion in Lower Weight Infants. *J Pediatr*. 2019 Jun 28. pii: S0022-3476(19)30687-0.

2018 – 2019 NATIONWIDE CHILDREN’S  
FELLOWSHIP PROGRAM

ADULT CONGENITAL HEART DISEASE

- Anudeep Dodeja, MD
- Marc Lee, MD

ADVANCED NONINVASIVE CARDIAC IMAGING

- Carmen Kiper, MD

PEDIATRIC CARDIOLOGY

- Julie Aldrich, MD
- Jeffrey Bennett, MD
- Jason Cole, MD
- Tyler W. Cunningham, MD
- Christina M. Fink, MD
- Emily Hayes, MD
- Brittney Hills, MD
- Hannah Jacobs, DO
- Erin Nealon, MD

CHILD AND FAMILY ADVOCACY

The Section of Child and Family Advocacy housed within the Center for Family Safety and Healing at Nationwide Children’s Hospital is home to a team of board-certified child abuse pediatricians and advanced-practice nurse practitioners who are nationally recognized child maltreatment experts with an emphasis on physical abuse, sexual abuse and medical child abuse.

The Center for Family Safety and Healing is a multidisciplinary organization that provides coordinated and comprehensive services in the prevention, diagnosis and treatment of family violence. As a national leader in this important work, a team of more than 120 professionals representing medicine, behavioral health, social services, law enforcement, prosecution and children services are co-located at the center to address the complex issues of family violence.

FACULTY



Megan M. Letson, MD, MEd  
Chief

- Farah W. Brink, MD
- Kristin G. Crichton, DO, MPH
- Catherine M. Huber, MD
- Jennifer J. Tscholl, MD

The Section of Child and Family Advocacy provides comprehensive evaluation and management of child maltreatment, offering inpatient and outpatient services. Key services include the Child Assessment Center, Fostering Connections Program, Non-Accidental Traumatic Brain Injury Clinic and inpatient consultations for suspected child maltreatment.

The Child Assessment Center offers a coordinated response to family violence for families through partnerships with law enforcement, children services and a range of community resources. Through a collaborative effort with the Emergency Department, we provide suspected child abuse assessments after clinic hours by utilizing on-call forensic interviewers and pediatric sexual assault nurse examiners in the emergency department setting.

As a clinical partnership with Franklin County Children Services, the Fostering Connections Program is offered at three different locations and serves as a medical home for children in out-of-home placement.

The section remains committed to providing quality educational experiences for trainees, including medical student and pediatric resident electives. Under the direction of Megan M. Letson, MD, MEd, the Child Abuse Pediatrics Fellowship is an Accreditation Council for Graduate Medical Education-accredited program and continues to attract excellent trainees. Additionally, in collaboration with Pediatric Emergency Medicine, we are one of a few programs nationally to offer a combined four-year Child Abuse Pediatrics and Pediatric Emergency Medicine Fellowship.

Members of the section continue to be recognized nationally, including representation on the American Board of Pediatrics Subboard on Child Abuse Pediatrics. Additionally, faculty continue a tradition of national speaking engagements. During the past year, faculty have presented at the San Diego International Conference on Child and Family Maltreatment, Huntsville International Symposium on Child Abuse, Pediatric Trauma Society Annual Meeting, and the American Burn Association.

GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019

\$1,437,429

SELECTED PUBLICATIONS

Bressler CJ, Letson MM, Kline D, McCarthy T, Davis J, Leonard JC. Characteristics of Neighborhoods Where Emergency Medical Services Encounter Children at Risk for Maltreatment. *Prehosp Emerg Care*. Feb 2019; 1-11.

Dillard R, Maguire-Jack K, Showalter K, Wolf KG, Letson MM. Abuse Disclosures of Youth with Problem Sexualized Behaviors and Trauma Symptomology. *Child Abuse Negl*. Feb 2019;88:201-211.

Lanata MM, Bressler CJ, McKnight LV, Sánchez PJ, Tscholl JJ, Kasick RT. A Case of Fever, Rash, and a Painful Limb in an Infant. *Clinical Pediatrics*. 2019 June;58(6): 711-714.

Makoroff KL, Letson MM (2019). "Adolescent Issues in Sexual Assault." In *Medical Evaluation of Child Sexual Abuse: A Practical Guide*, 4th edition. Edited by Finkel MA and Giardino AP (Itasca, IL: American Academy of Pediatrics, 2019), 197-209.

Tscholl, JJ, and Scribano P. "Intimate Partner Violence." In *A Practical Guide to the Evaluation of Child Physical Abuse and Neglect*, 3rd edition. Edited by Giardino, AP; Lyn MA; Giardino ER (New York, NY: Springer, 2019)

FAST FACTS

July 2018 through June 2019

|                                              |       |
|----------------------------------------------|-------|
| Clinic Visits: .....                         | 1,877 |
| Foster Care Clinic Visits: .....             | 1,378 |
| Sharon Woods Foster Care Clinic Visits:..... | 267   |
| Eastland Foster Care Clinic Visits:.....     | 220   |
| Inpatient Consults (Child Abuse Team):.....  | 547   |
| Non-Accidental TBI Clinic Visits: .....      | 59    |
| Total Clinic Visits:.....                    | 3,692 |

2018 – 2019 NATIONWIDE CHILDREN'S  
FELLOWSHIP PROGRAM

CHILD ABUSE PEDIATRICS

Colleen J. Bressler, MD (combined Child Abuse Pediatrics and Pediatric Emergency Medicine fellow)

Michelle Greene, DO (combined Child Abuse Pediatrics and Pediatric Emergency Medicine fellow)

CLINICAL INFORMATICS

The Division of Clinical Informatics at Nationwide Children’s Hospital aims to transform health care through design, implementation and optimization of information and communication systems. Our goal is to enhance patient care activities with safe and reliable information systems, improve individual and population health outcomes through the use of technology and digital tools, enable innovation and research across the institution, and empower our patients and families with the tools they need to engage effectively with their health care team and our health care system.

FACULTY



Jeffrey M. Hoffman, MD  
Chief

- Aarti R. Chandawarkar, MD
- Juan D. Chaparro, MD, MS
- Simon Lin, MD, MS, MBA
- Kathryn E. Nuss, MD
- Laura Rust, MD, MPH

The faculty and fellows in the Division of Clinical Informatics work to enhance the usability and effectiveness of our clinical information systems and to provide expert consultation to operational leaders, clinicians and clinical investigators across the organization. We collaborate closely with other divisions and disciplines to improve tools for clinical documentation, patient management, population health, information exchange with other providers and health systems, and data collection for quality improvement initiatives and research projects.

The division continues to participate in a multitude of quality and safety projects. A highlight of this work has been our recent implementation of an automated,

electronic inpatient sepsis detection tool embedded within the EHR, which has increased the time between emergent ICU transfers for severe sepsis or septic shock to over 180 days. We are continuing to refine the detection algorithm and clinical workflows toward our overall goal of eliminating these events altogether.

Over the past year, we have further enhanced our clinical decision support for opioid prescribing. Additional prescriber alerting and documentation tools, combined with deeper integration of Ohio’s controlled substance reporting system (OARRS), has facilitated optimal patient care while remaining compliant with new legal requirements.

Our work on EHR alert reduction is continuing, with new capabilities to elicit real-time end-user feedback on intrusive alerts. As a likely contributor to patient safety risks and potential staff burnout, alert fatigue is an ongoing challenge our division is actively combating. In early 2019, our efforts and leadership in this area led to the formation of a national Pediatric Decision Support Collaborative, linking clinical informatics experts from several major children’s hospitals to work together on tackling this important issue.

GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019

\$343,200

SELECTED PUBLICATIONS

Ballard DW, Kuppermann N, Vinson DR, Tham E, **Hoffman JM**, Swietlik M, Deaklyne Davies SJ, Alessandrini EA, Tzimenatos L, Bajaj L, Mark DG, Offerman SR, Chertipally UK, Paterno MD, Schaeffer MH, Richards R, Casper TC, Goldberg HS, Grundmeier RW, Dayan PS. Implementation of a Clinical Decision Support System for Children with Minor Blunt Head Trauma at Non-negligible Risk for Traumatic Brain Injuries. *Annals of Emergency Medicine*. 2019 May;73(5): 440-451.

Lloyd JK, Ahrens EA, Clark D, Dachenhaus T, **Nuss KE**. Automating a Manual Sepsis Screening Tool in a Pediatric Emergency Department. *Applied Clinical Informatics*. 2018 Oct;9(4): 803-808.

Sezgin E, **Lin S**. Technology-based Interventions, Assessments and Solutions for Safe Driving Training for Adolescents: Rapid Review. *JMIR Mhealth and Uhealth*. 2019 Jan;7(1): e11942.

Stukus D, Patrick M, **Nuss KE**. *Social Media for Medical Professionals – Strategies for Successfully Engaging in an Online World*. (Cham, Switzerland: Springer International Publishing AG, 2019), 221.

2018 – 2019 NATIONWIDE CHILDREN’S  
FELLOWSHIP PROGRAM

CLINICAL INFORMATICS

- Nasser Aljehani, MD
- Cory Hussain, MBBS
- Jennifer Lee, MD

COMPLEX CARE

The Complex Health Care Program at Nationwide Children’s Hospital provides comprehensive, coordinated and holistic care to children and adults with neurodevelopmental disabilities. For some patients with complex issues, we are their primary care doctor and “medical home.” For others, we partner with their medical home and specialists to provide expert neurodevelopmental care. In collaboration with other services, we participate in the Comprehensive Cerebral Palsy Program, the Interdisciplinary Feeding Program, the Interdisciplinary Spinal Muscular Atrophy Clinic, the Early Developmental Clinic, the Adult Down Syndrome Clinic at the Nisonger Center, and provide medical care to the residents of the Heinzerling Foundation.

FACULTY



Garey Noritz, MD  
*Chief*

- Rukshana Ahmed, MD
- Wendy Burdo-Hartman, MD
- Derek Fletcher, MD
- Elizabeth Lucas, MD
- Katherine Steingass, MD
- Joy Walton, MD

The Complex Care inpatient and outpatient programs are dedicated to providing coordinated primary and neurodevelopmental care to patients both inside and outside the hospital. Our goal is to make care in both areas family-centered, and the transition between them seamless.

The Cerebral Palsy Program at Nationwide Children’s is the lead site for the Cerebral Palsy Research Network. By linking 25 centers in the United States and Canada, we will improve treatments and outcomes for people with cerebral palsy through high-quality clinical research and quality initiatives. In partnership with the Early Development Clinic, we have improved the clinical transition for patients with cerebral palsy from infancy through adulthood, and we run one of the few adult cerebral palsy clinics in the United States.

The Comprehensive Pediatric Feeding Program at Nationwide Children’s treats children with feeding disorders as outpatients and several patients at a time in the intensive program, which is extremely successful in reducing the need for tube feeding.

Our faculty continue to be a sought-after resource for education, with invited lectures at the local, national and international levels. Our non-physician staff members are leaders in training their colleagues in nursing, nutrition, pharmacy, social work and therapy in the provision of family-centered care for children and adults with disabilities.

Members of our faculty have leadership positions at leading national organizations, including the American Academy of Pediatrics, the Society for Developmental and Behavioral Pediatrics, the Pediatric Feeding Consortium, and the American Academy for Cerebral Palsy and Developmental Medicine.

SELECTED PUBLICATIONS

**Clark T, DeChicco C.** Benefits of Implementing a Social Work Driven Medical Legal Partnership (MLP) Program in a Pediatric Hospital Cerebral Palsy (CP) and Complex Health Care Outpatient Setting. Society for Social Work Leadership in Health Care Annual Meeting, Portland OR. October 3, 2018.

**Durkin K,** Shepherd K, Alexy E, **Noritz G.** Effects of Zoledronic Acid on Children and Young Adults with Low Bone Mineral Density. American Academy for Cerebral Palsy and Developmental Medicine Annual Meeting, Cincinnati, OH. October 13, 2018.

**Noritz G,** Naprawa J, Apkon SD, Kinnett K, Racca F, Vroom E, et al. Primary Care and Emergency Department Management of the Patient with Duchenne Muscular Dystrophy. *Pediatrics.* 2018;142(Supplement 2):S90-S8.

**Noritz G.** The Moral Imperative of Home Health Care for Children: Beyond the Financial Case. *Pediatrics.* 2019 Jan;143(1). pii: e20182960.

FAST FACTS

July 2018 through June 2019

|                                                       |      |                                                         |       |
|-------------------------------------------------------|------|---------------------------------------------------------|-------|
| Inpatient Discharges:.....                            | 364  | Patient Days*:.....                                     | 2,402 |
| Observation and Outpatient-in-a-Bed Discharges: ..... | 24   | Inpatient Consults:.....                                | 68    |
| Average Length of Stay*:.....                         | 6.60 | Complex Health Care Clinic Visits: .....                | 3,303 |
| Average Daily Census*: .....                          | 6.58 | *Excludes observation and outpatient-in-a-bed patients. |       |

CRITICAL CARE MEDICINE

The Section of Critical Care Medicine at Nationwide Children’s Hospital provides in-house faculty coverage of the Pediatric Intensive Care Units (PICUs) 24 hours a day and is dedicated to the care of children who have, or are at risk for, life-threatening illnesses across the spectrum of pediatric disease. This service also contributes actively to the vital missions of research and advanced training in the field of pediatric critical care medicine.

This service cares for approximately 3,000 patients per year, covering up to 54 PICU beds at Nationwide Children’s and contributing to the coverage of the 20-bed cardiothoracic ICU. Therapies such as extracorporeal membrane oxygenation, high frequency oscillatory ventilation, and continuous renal replacement therapies are available at all times. We continue to boast one of the lowest rates of hospital-acquired infection and preventable harm of any PICU in the country. We also staff the Assessment and Consultation Team, a multidisciplinary rapid response team, and the Pediatric Analgesia and Sedation Service.

FACULTY



Mark W. Hall, MD, FAAP, FCCM  
Division Chief



Nadeem Khan, MD, FAAP  
Section Chief

- Onsy S. Ayad, MD, FAAP
- Richard J. Brill, MD, FAAP, MCCM
- Margaret A. Chase, MD
- Melissa G. Chung, MD
- Megan C. Daniel, MD

- Maria H. Estrada, DO, FAAP
- Jill A. Fitch, MD
- W. Joshua Frazier, MD
- Jennifer M. Gauntt, MD
- Samantha W. Gee, MD, FAAP
- Todd J. Karsies, MD, MPH
- Anthony Y. Lee, MD, FAAP
- Ada T. Lin, MD, FAAP
- Eric A. Lloyd, MD
- Marlina E. Lovett, MD
- Jeffrey E. Lutmer, MD
- Tensing Maa, MD, FAAP
- Christopher P. Montgomery, MD
- Jennifer A. Muszynski, MD, MPH
- Nicole F. O’Brien, MD
- Danna W. Qunibi, MD
- Claire A. Stewart, MD, MEd
- Markita L. Suttle, MD
- Joseph D. Tobias, MD
- Andrew R. Yates, MD

The section continues to be a leader in pediatric critical care research. In 2018, Nationwide Children’s continued its participation as one of only eight sites in the country in the NIH-funded Collaborative Pediatric Critical Care Research Network. Division Chief Mark W. Hall, MD, is a national leader in the field of immunobiology

research and led two multicenter clinical trials of immunostimulation in the setting of pediatric critical illness and injury in 2018. Dr. Nicole O’ Brien, an internationally-recognized expert in cerebral malaria, secured a major NIH award to study patterns of cerebral blood flow in children with malaria at two sites in sub-Saharan Africa. Other major research foci include *Staphylococcus aureus* microbiology, transfusion science, traumatic brain injury, antimicrobial use, medical education, and quality and safety. We participate in single- and multi-center research across the spectrum of pediatric critical illness. With this broad scientific portfolio, an *in situ* research laboratory within the PICU, and four divisional research coordinators, the section remains at the forefront of innovation in the field. The Division of Critical Care Medicine continued its trajectory of growth in 2018 with the addition of four talented new junior faculty members: Danna W. Qunibi, MD, and Megan C. Daniel, MD, (general pediatric critical care); Marlina E. Lovett, MD, (neurocritical care); and Jennifer M. Gauntt, MD, (cardiac critical care).

Our Accreditation Council for Graduate Medical Education-approved Pediatric Critical Care Medicine Fellowship provides rigorous clinical and academic training for the next generation of ICU faculty, accepting four fellows per class in our three-year program. The Critical Care Medicine faculty participate in instruction for the pediatric and surgical residency programs, as well as multiple other fellowship programs. A PICU elective is also provided for fourth-year medical students.

GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019

\$2,190,934

SELECTED PUBLICATIONS

**Karsies T,** Moore-Clingenpeel M, **Hall M.** Development and Validation of a Model to Predict Growth of Potentially Antibiotic-Resistant Gram Negative Bacilli in Critically Ill Children with Suspected Infection. *Open Forum Infect Dis.* 2018 Oct 24;5(11):ofy278.

Lind MM, Corridore M, Sheehan C, Moore-Clingenpeel M, **Maa T.** A Multidisciplinary Approach to a Pediatric Difficult Airway Simulation Course. *Otolaryngology Head Neck Surg.* 2018 Jul;159(1):127-135.

**O’Brien NE,** Mutatshi Taty T, Moore-Clingenpeel M, Bodi Mabila J, Mbaka Pongo J, Ambitapio Musungufu D, Uchama M, Yotebieng M. Transcranial Doppler Ultrasonography Provides Insights into Neurovascular Changes in Children with Cerebral Malaria. *J Pediatr.* 2018 Dec;203:116-124.e3.

**Muszynski JA,** Nofziger R, Moore-Clingenpeel M, Greathouse K, Anglim L, Steele L, Hensley J, Hanson-Huber L, Nateri J, Ramilo O, **Hall MW.** Early Immune Function and Duration of Organ Dysfunction in Critically Ill Septic Children. *American Journal of Respiratory and Critical Care Medicine.* 2018 Aug 1;198(3):361-369.

Nagpal A, Clingenpeel MM, Thakkar RK, Fabia R, **Lutmer J.** Positive Cumulative Fluid Balance at 72h is Associated with Adverse Outcomes Following Acute Pediatric Thermal Injury. *Burns.* 2018 Aug;44(5):1308-1316.

FAST FACTS

July 2018 through June 2019

|                               |        |
|-------------------------------|--------|
| PICU Admissions:.....         | 3,602  |
| Average Length of Stay*:..... | 4      |
| Average Daily Census*: .....  | 36     |
| Total Patient Days*: .....    | 13,091 |
| Inpatient Discharges:.....    | 3,611  |
| Number of Beds: .....         | 54     |

\*Excludes observation and outpatient-in-a-bed patients.

2018 – 2019 NATIONWIDE CHILDREN'S  
FELLOWSHIP PROGRAM

PEDIATRIC CRITICAL CARE MEDICINE

- Austin J. Biggs, MD
- Katherine E. Bline, MD
- Holly Gillis, MD
- Kelley Groves, MD
- Will Guider, MD
- Takaharu Karube, MD
- Taylor Nickerson, MD
- Ambrish Patel, MD
- Rachel S. Poeppelman, MD
- Trent Sims, DO
- Lara Srouji, MD
- Lauren Villo, MD

DERMATOLOGY

The Section of Dermatology at Nationwide Children’s Hospital sees outpatients from birth through age 21 for both common and rare disorders of the hair, skin and nails.

FACULTY



Patricia M. Witman, MD  
*Chief*

Esteban Fernández Faith, MD

Katya Harfmann, MD

Joy Lynn Mosser-Goldfarb, MD

The highlight of the 2018-2019 academic year for the Dermatology Section was the opening of our new clinic space at main campus on the third floor of the Outpatient Care Center. The new space was designed with the goal of improving the efficiency of clinic, while providing a more enjoyable space for pediatric patients and their families. While we continue to offer outpatient visits at the Canal Winchester *Close To Home*SM, Dublin *Close To Home*SM and Westerville Surgery Center, this additional space has improved access to Dermatology services for families who prefer to receive care at the main campus location. Dermatology subspecialty services including the Hemangioma and Vascular Anomalies Clinic and Hair Clinic are offered at this location as well as pulsed dye laser treatments for vascular birthmarks.

Dermatology was also able to open its first phototherapy unit at our main campus location. Phototherapy involves delivering a type of ultraviolet light to the skin and can be a helpful treatment for psoriasis, atopic dermatitis, vitiligo and other dermatologic skin concerns. This phototherapy unit was designed to both alleviate anxiety and optimize safety for our pediatric patients and has been very popular with our patients and their families.

In addition, our division is now offering expanded diagnostic patch testing for contact allergies. After careful review of those allergies most likely to occur in children as opposed to the general population, our Dermatology team has created a customized pediatric panel of contact allergens for which we offer testing. Additionally, our testing protocols are specifically designed with the pediatric patient in mind.

SELECTED PUBLICATIONS

Kilgallon K, Urs J, **Fernandez Faith E**. Visual Diagnosis: Severe Ulceronecrotic Eruption with Systemic Symptoms. *Pediatr Res*. 2018 Nov;39(11):e54-e56.

Lause M, Baker P, Erdem G, **Fernandez Faith E**. Enlarging Verrucous Plaques in a Teenager. *Pediatr Dermatol*. 2018 Sep;35(5):671-672.

Putterman E, Patel DP, Andrade G, **Harfmann KL**, Hogeling M, Cheng CE, Goh C, Rogers RS, Castelo-Soccio L. Severity of Disease and Quality of Life in Parents of Children with Alopecia Areata, Totalis, and Universalis: A Prospective, Cross-Sectional Study. *J Am Acad Dermatol*. 2019 May;80(5):1389-1394.

Yanes DA, **Fernandez Faith EF**. Nodular Scabies: A Persistent Nodular Eruption. *Dermatol Online J*. 2018 Aug 15;24(8). pii: 13030/qt5xd8t1t3.

| FAST FACTS                                        |        |
|---------------------------------------------------|--------|
| July 2018 through June 2019                       |        |
| Canal Winchester Dermatology Clinic Visits: ..... | 875    |
| Dermatology Clinic Visits: .....                  | 5,930  |
| Dublin Dermatology Clinic Visits: .....           | 2,958  |
| Westerville Dermatology Clinic Visits: .....      | 1,586  |
| Total Clinic Visits: .....                        | 11,349 |
| Inpatient Consults: .....                         | 199    |

DEVELOPMENTAL AND BEHAVIORAL PEDIATRICS

The mission of the Division of Developmental and Behavioral Pediatrics at Nationwide Children’s Hospital is to achieve best outcomes for children with developmental and behavioral needs through evidence-based, family-centered, interprofessional practice. Outpatient services include comprehensive care delivered by developmental and behavioral pediatricians and advanced nurse practitioners in partnership with pediatric psychology and other health care professionals. Areas of expertise include the evaluation and management of complex ADHD, Autism Spectrum Disorders, and developmental delay. Additional focus areas include myelomeningocele, neonatal follow-up, Down syndrome and Williams syndrome. The division often provides care in collaboration with programs through Nationwide Children’s Hospital’s Behavioral Health Services. See page 131 for details about Behavioral Health services.

FACULTY



Rebecca A. Baum, MD  
*Chief*

Lindsay Bartram, DO

Daniel L. Coury, MD

Anita R. Narayanan, MD

Patricia L. Nash, MD

Garey H. Noritz, MD

Katherine Steingass, MD

Jennifer Walton, MD, MPH

The Division of Developmental and Behavioral Pediatrics at Nationwide Children’s is led by Rebecca Baum, MD. An associate professor of pediatrics at The Ohio State University College of Medicine, Dr. Baum holds leadership positions in several national organizations, including the Society for Developmental Behavioral Pediatrics’ board of directors, the American Board of Pediatrics’ Developmental Behavioral Pediatrics Sub-board, and the American Academy of Pediatrics’ Committee on Psychosocial Aspects of Child and Family Health.

Faculty in the division contribute at the local and national levels to improve clinical outcomes and reduce

avoidable harm. Daniel L. Coury, MD, holds multiple national administrative and research roles, including medical directorship of the Autism Treatment Network. Anita R. Narayanan, MD, and Lindsay Bartram, DO, lead the division’s quality improvement efforts to reduce environmental stressors faced by Developmental and Behavioral Pediatrics patients, reduce missed appointments and improve transition to adult care. Jennifer Walton, MD, MPH, is co-director of the Nationwide Children’s Williams Syndrome Clinic and chair-elect of the pediatrics section of the National Medical Association. Katherine Steingass, MD, serves as medical director of the Nationwide Children’s Myelomeningocele Clinic and co-chair of the Early Childhood Special Interest Group for the Society for Developmental and Behavioral Pediatrics. Patricia L. Nash, MD, serves as medical director of the Nationwide Children’s Down Syndrome Program.

The division continues to support a robust fellowship program led by Dr. Katherine Steingass. The fellowship is integrated with The Ohio State University’s Leadership Education in Neurodevelopmental Disabilities program at the Nisonger Center, with Dr. Walton serving as the program’s associate director.

GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019  
\$252,216

.....

**SELECTED PUBLICATIONS**

**Bartram L, Lozano J, and Coury DL.** Aripiprazole for Treating Irritability Associated with Autism Spectrum Disorders. *Expert Opinion on Pharmacotherapy*. 2019 Jun 10. [Epub ahead of print]

**Baum RA,** Manda D, Brown CM, Anzeljc SA, King MA, Duby J. A Learning Collaborative to Improve Mental Health Service Delivery in Pediatric Primary Care. *Pediatric Quality & Safety*. 2018 Nov-Dec; 3(6):e119-123.

**Baum RA,** King MA, Wissow LS. Outcomes of a Statewide Learning Collaborative to Implement Mental Health Services in Pediatric Primary Care. *Psychiatric Services*. 2019 Feb 1;70(2):123-129.

Bellesheim K, Cole L, **Coury DL,** Yin L, Levy SL, Guinnee M, Klatka K, Malow B, Katz T, Taylor J, Sohl K. Family-Driven Goals Improve Sleep and Constipation in Children with Autism Spectrum Disorder. *Pediatrics*. 2018 Sep;142(3). pii: e20173225

Benjamin J, Groner J, **Walton J,** Noritz G, Gascon G, Mahan J. Learning in a Web-Based World: An Innovative Approach to Teach Physical Examination Skills in Patients with Neurodisability. *Acad Pediatr*. 2018 Aug;18(6):714-716.

Murray DS, Anixt J, **Coury DL,** Kuhlthau KA, Eskra D, Seide J, Kelly A, Lannon C. Transforming an Autism Pediatric Research Network into a Learning Health System: Lessons Learned. *Pediatric Quality & Safety*. 2019 Mar-April; 4(2):e152.

**FAST FACTS**

*July 2018 through June 2019*

Child Development Center Visits:.....**2,325**

Developmental Disabilities Clinic Visits:.....**110**

Myelomeningocele Clinic Visits: .....**667**

Developmental Behavioral Pediatrics Clinic Visits: ...**4,920**

**2018 – 2019 NATIONWIDE CHILDREN'S FELLOWSHIP PROGRAM**

**DEVELOPMENTAL BEHAVIORAL PEDIATRICS**

Lauren F. Lindle, MD

Juan Lozano, MD

Department of Pediatrics

.....

**EMERGENCY MEDICINE**

The Emergency Department at Nationwide Children’s Hospital is one of the nation’s highest-ranked and busiest pediatric emergency departments (based on Children’s Hospital Association benchmarking data and *Parents* magazine). Emergency Medicine features a Level I Pediatric Trauma Center and ED staffed by board-certified/eligible pediatric emergency medicine subspecialists 24 hours a day.

**FACULTY**



**Rachel M. Stanley, MD, MHSA**  
*Division Chief*



**Michael Stoner, MD**  
*Section Chief*

- Barbara Amakye, MD
- Srikanth Aravapalli, MD
- Terry Barber, MD
- Berkeley Bennett, MD
- Luciana Berg, MD
- Deborah Blackwell, MD
- Alan Bleiberg, MD
- Jessica Bockenstedt, MD
- Bema Bonsu, MD
- Brian Bowden, MD
- Mary Bowman, MD
- Beth Bubolz, MD
- Michael Chua, MD

- Beth Claxton, MD
- Daniel Cohen, MD
- Melanie Copenhaver, DO
- Kristol Das, MD
- Carrie DeHoff, MD
- Lori Deschene, MD
- Meghan Dishong, MD
- Michael Dunn, MD
- Meika Eby, MD
- Emile Elshammaa, MD
- Joelle Farlow, MD
- Rachel Feldkamp, MD
- Aarti Gaglani, MD
- Adam Garlock, MD
- Yaffa Gewirtz, MD
- Delia Gold, MD
- Angela Harris, MD
- Karla Hauersperger, MD
- Todd Holman, MD
- Daniela Humphrey, MD
- Maya Iyer, MD
- Iram Jafri, MD
- Shelsea Johnson, MD
- Muhammad Khan, MD
- Simmi Dogra Kulkarni, MD
- Catherine Lambert, MD
- Marc Leder, MD
- Julie Leonard, MD
- Seth Linakis, MD
- Julia Lloyd, MD
- Manuel Lugo, MD
- Timothy McClung, MD
- Ellen McManus, MD
- Jennifer Melvin, MD
- Leah Middelberg, MD

Leslie Mihalov, MD  
Jennifer Mitzman, MD  
Jennifer Mrozek, MD  
Kathy Nuss, MD  
Nkeiruka Orajiaka, MD  
Jimisha Patel, MD  
Michael Patrick, MD  
Jan Perry, MD  
Jonathan Price, MD  
Maegan Reynolds, MD  
Laura Rust, MD  
Daniel Scherzer, MD  
Betsy Schmerler, MD  
Emily Sentman, MD  
Bashar Shihabuddin, MD  
Sandra Spencer, MD  
Gregory Stewart, MD  
Kristin Stukus, MD  
Jerry Stultz, MD  
Bethany Uhl, MD  
Rishi Verma, MD  
Tracey Wagner, MD  
Jordee Wells, MD  
Jessica Wilson, MD  
Morgan Wurtz, MD  
Jennifer Wyse, MD  
Anita Yalamanchi, DO  
Megan Yanny, MD

The Emergency Department provides expertise in pediatric advanced life support and resuscitation, as well as evaluation and treatment in every area for acute medical and surgical conditions. Off-site urgent care services are provided at Nationwide Children’s *Close To Home*<sup>SM</sup> Centers in Canal Winchester, Dublin, East Columbus, Hilliard, Marysville and Westerville. The Emergency Department is a hub for medical education in the acute care of children, adolescents and selected adults. Medical students and more than 300 residents from Emergency Medicine, Family Practice, Internal Medicine/Pediatrics and Pediatrics programs are educated in all aspects of pediatric emergencies. In addition, Nationwide Children’s has a large, vibrant Pediatric Emergency Medicine Fellowship program. Members of the Section of Emergency Medicine are active leaders and participants in the residency program

at Nationwide Children’s and at The Ohio State University College of Medicine.

In addition to providing clinical, operational and educational excellence, Emergency Medicine has a strong history of clinical research. We lead the federally funded Great Lakes node of the Pediatric Emergency Care Applied Research Network (PECARN), a large 18-hospital research network. We have developed research collaborations with Columbus Department of Fire and other EMS agencies regionally and nationally. The section is committed to the ongoing improvement of health care delivery in the Emergency Department and in clinical outcomes.

**GRANTS AWARDED**  
**JULY 1, 2018 – JUNE 30, 2019**  
\$1,425,489

**SELECTED PUBLICATIONS**

Babcock L, Olsen CS, Jaffe DM, **Leonard JC**. Cervical Spine Study Group for the Pediatric Emergency Care Applied Research N. Cervical Spine Injuries in Children Associated with Sports and Recreational Activities. *Pediatr Emerg Care*. 2018 Oct;34(10):677-686.

Kuppermann N, Dayan PS, Levine DA, Vitale M, Tzimenatos L, Tunik MG, Saunders M, Ruddy RM, Roosevelt G, Rogers AJ, Powell EC, Nigrovic LE, Muenzer J, Linakis JG, Grisanti K, Jaffe DM, Hoyle JD, Greenberg R, Gattu R, Cruz AT, Crain EF, **Cohen DM**, Brayer A, Borgialli D, **Bonsu B**, Browne L, Blumberg S, Bennett JE, Atabaki SM, Anders J, Alpern ER, Miller B, Casper TC, Dean JM, **Ramilo O**, Mahajan P, Febrile Infant Working Group of the Pediatric Emergency Care Applied Research Network. A Clinical Prediction Rule to Identify Febrile Infants 60 Days and Younger at Low Risk for Serious Bacterial Infections. *JAMA Pediatr*. 2019 Apr 1;173(4):342-351.

**Spencer SP**, Karsies T. Audit-and-Feedback and Workflow Changes Improve Emergency Department Care of Critically Ill Children. *Pediatr Qual Saf*. 2019 Jan 9;4(1):e128.

**Stoner MJ**, Mahajan P, Bressan S, Lam SHF, Chumpitazi CE, Kornblith AE, **Linakis SW**, Roland D, Freedman SB, Nigrovic LE, Denninghoff K, Ishimine P, Kuppermann N. Pediatric Emergency Care Research Networks: A Research Agenda. *Acad Emerg Med*. 2018 Dec;25(12):1336-1344.

Whitfill T, Auerbach M, **Scherzer DJ**, Shi J, Xiang H, **Stanley RM**. Emergency Care for Children in the United States: Epidemiology and Trends Over Time. *J Emerg Med*. 2018 Sep;55(3):423-434.

**FAST FACTS**

*July 2018 through June 2019*

|                                                            |                |
|------------------------------------------------------------|----------------|
| ED Visits (Includes All Visits Regardless of Disposition): | <b>96,154</b>  |
| <b>Urgent Care Visits</b>                                  |                |
| Main Campus Urgent Care: .....                             | <b>49,057</b>  |
| Canal Winchester Urgent Care: .....                        | <b>17,162</b>  |
| Dublin Urgent Care: .....                                  | <b>11,981</b>  |
| East Broad Urgent Care: .....                              | <b>24,490</b>  |
| Hilliard Urgent Care: .....                                | <b>17,590</b>  |
| Marysville Urgent Care: .....                              | <b>10,408</b>  |
| Westerville Urgent Care: .....                             | <b>30,566</b>  |
| Total Urgent Care Visits:.....                             | <b>161,254</b> |

**2018 – 2019 NATIONWIDE CHILDREN’S FELLOWSHIP PROGRAM**

**PEDIATRIC EMERGENCY MEDICINE**

Renas Almubarak, MBBS  
Adjoa Andoh, MD  
Katherine Battisti, MD  
Bridget Bonaventura, MD  
Crista Cerrone, MD  
Michelle Greene, DO  
Elaise Hill, MD  
Nathan Jamieson, MD  
Christopher Jones, DO  
Seth Linakis, MD  
Austin Meggitt, MD  
Andrea Schweikert, MD  
Jason Toews, MD  
Kellya Ubokudom, DO  
Tracey Wagner, MD  
Jordee Wells, MD

**PEDIATRIC EMERGENCY MEDICINE/CHILD ABUSE PEDIATRICS**

Colleen Bressler, MD



*“We believe that use of such a tool and consequent high risk assessment at the initial diagnosis of type 1 diabetes may facilitate clinicians to identify alternative diabetes management pathways to optimize care.”*  
– Manmohan Kamboj, MD, FAAP, Chief of Endocrinology

## Endocrinology

### Risk Screening Tool for Pediatric Type 1 Diabetes Useful in Predicting Acute Health Care Utilization

*Study demonstrates the utility of a high risk assessment screening tool in differentiating between patients with versus patients without any acute health care utilization.*

The multidisciplinary Quality Improvement Team in the Section of Endocrinology at Nationwide Children’s Hospital, led by **Manmohan Kamboj MD, FAAP**, chief of Endocrinology, developed a brief risk screening tool evaluating patients with type 1 diabetes as a possible predictor of future poor diabetes care. A study was designed to determine whether this brief risk assessment tool can be used for risk stratification of patients and families at the time of the initial diagnosis of type 1 diabetes mellitus. The study also was used to determine whether the high risk assessment is associated with increased acute health care utilization and future glycemic control.

A total of 158 patients were included in the study. As explained by **Don Buckingham, MBOE, CPHQ**, lead coordinator, Quality Improvement Services at Nationwide Children’s, the data analysis validated the screening tool to be of greatest utility in differentiating patients with versus patients without any acute health care utilization with excellent discriminatory ability, sensitivity and specificity. He notes, “Use of statistical analysis tools helps families and hospitals build confidence in endocrinology assessment initiatives.”

Psychosocial and socioeconomic factors contribute to poor diabetes care in children and adolescents with type 1 diabetes. “These factors are important when treating the patient and family as a whole,” says **K. Ming Hong, MSW, LISW-S**, Clinical Services and Care Coordination at Nationwide Children’s. “This research exemplifies the important interdisciplinary team building among social work, quality improvement, and medical providers.”

“Our ability to identify needs early allows us to provide targeted interventions and resources that foster resiliency and coping while preventing future admissions and medical complications,” adds **Bethany Glick, MSSA, LISW-S**, Clinical Services and Care Coordination at Nationwide Children’s.

“We believe that use of such a tool and consequent high risk assessment at the initial diagnosis of type 1 diabetes may facilitate clinicians to identify alternative diabetes management pathways to optimize care,” says Dr. Kamboj.

**CITATION:**  
Glick BA, Hong KMC, Buckingham D, Moore-Clingenpeel M, Salvator A, Kamboj MK. Validation of a Risk Screening Tool for Pediatric Type 1 Diabetes Patients: A Predictor of Increased Acute Health Care Utilization. *Journal of Pediatric Endocrinology and Metabolism*. 2019 Sep 6. [Epub ahead of print]

ENDOCRINOLOGY

The Section of Endocrinology at Nationwide Children’s Hospital provides comprehensive primary and consultative services for the diagnosis and treatment of endocrine/hormone disorders and diabetes mellitus in children and adolescents. These include, but are not limited to, type 1 and type 2 diabetes mellitus, insulin resistance and prediabetes, obesity, metabolic syndrome, hypoglycemia, polycystic ovarian syndrome, disorders of growth and puberty, thyroid and adrenal gland disorders, disorders of bone metabolism, genetic syndromes with hormone disturbances, diabetes insipidus and differences of sexual development and gender identification.

FACULTY



**Manmohan K. Kamboj, MD**  
*Section Chief, Interim Division Chief*

- Sasigarn A. Bowden, MD
- Monika Chaudhari, MD
- Kajal Gandhi, DO
- Rohan K. Henry, MD, MS
- Robert P. Hoffman, MD
- Justin A. Indyk, MD, PhD
- Leena Mamilly, MD
- Leena Nahata, MD
- Kathryn Obrynba, MD
- Juan F. Sotos, MD (Emeritus)
- Aurelia C.H. Wood, MD

The Section of Endocrinology currently has 11 active pediatric endocrinologists, five advanced practitioners and four pediatric endocrinology fellows. The section presently conducts nearly 15,000 outpatient appointments per year. In 2018, there were over 300 patients diagnosed with new-onset diabetes, and approximately 1,900 patients with diabetes mellitus being followed at Nationwide Children’s on a regular basis.

The section collaborates closely with other disciplines to offer endocrine expertise in the multidisciplinary clinic format to facilitate patient care. At present, these include Metabolic Bone Disease, Cystic Fibrosis-Related Diabetes, Prader-Willi Syndrome Clinic, Bone Marrow Transplant Long-term Follow-up Clinic, Muscular Dystrophy Clinic, Thyroid Nodule/Cancer, Type 2 Diabetes Mellitus clinics, fertility consultations, Sickle Cell Clinic, Diabetes Adult Transition Clinic, and THRIVE (differences of sexual development).

The section maintains a robust quality improvement portfolio that includes over 15 active projects designed to achieve best outcomes for patients with diabetes mellitus and endocrine disorders. As a member of the National T1D Exchange QI Collaborative, the section participates in initiatives to further expand the reach of QI best practices nationally.

The Section of Endocrinology is a major referral center for children and adolescents in and beyond central Ohio and is a consultative resource for the Ohio Department of Health Newborn Screening Program for congenital hypothyroidism and congenital adrenal hyperplasia.

GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019

\$467,494

SELECTED PUBLICATIONS

**Bowden SA, Henry R.** Pediatric Adrenal Insufficiency: Diagnosis, Management and New Therapies. *Int J Pediatr.* 2018 Nov;2018:1739831.

**Copenhaver M, Yu CY, Hoffman RP:** Complement C3 and C4 and the Metabolic Syndrome. *Current Diabetes Rev.* 2019; 2019;15(1):44-48.

**Nahata L,** Caltabellotta N, Yeager ND, Lehmann V, Whiteside S, O’Brien S, Quinn GP, Gerhardt CA. Fertility Perspectives and Priorities Among Male AYAs in Cancer Survivorship. *Pediatric Blood and Cancer.* 2018 Jul;65(7):e27019.

**Obrynba, K, Hoffman RP, Repaske, DR, Anglin K, Kamboj MK.** No Central Adrenal Insufficiency Found in Patients with Prader-Willi Syndrome with Overnight Metyrapone Test. *J Pediatr Endocrinol Metab.* 2018 Jul;31(7):809-814.

Regelmann MO, **Kamboj MK,** Miller BS, Nakamoto JM, Sarafoglou K, Shah S, Stanley TL, Marino RS, on behalf of the Pediatric Endocrine Society Drug and Therapeutics & Rare Disorders Committee. Adrenoleukodystrophy: Guidance for Adrenal Surveillance in Males Identified by Newborn Screen. *J Clin Endocrinol Metab.* 2018 Nov;103(11):4324- 4331.

FAST FACTS

July 2018 through June 2019

|                                                       |     |                                                |       |
|-------------------------------------------------------|-----|------------------------------------------------|-------|
| Inpatient Discharges:.....                            | 337 | Dublin Endocrinology Clinic Visits: .....      | 1,575 |
| Observation and Outpatient-in-a-Bed Discharges: ..... | 248 | East Broad Endocrinology Clinic Visits: .....  | 750   |
| Total Discharges:.....                                | 585 | Endocrinology Clinic Visits: .....             | 9,734 |
| Average Length of Stay*:.....                         | 0.8 | Westerville Endocrinology Clinic Visits: ..... | 1,907 |
| Average Daily Census*: .....                          | 0.8 | Lima Endocrinology Clinic Visits: .....        | 78    |
| Patient Days*:.....                                   | 275 | Prader-Willi Clinic Visits: .....              | 109   |
| Inpatient Consults:.....                              | 455 |                                                |       |
| Canal Winchester Endocrinology Clinic Visits: .....   | 356 |                                                |       |

\*Excludes observation and outpatient-in-a-bed patients.

2018 – 2019 NATIONWIDE CHILDREN’S  
FELLOWSHIP PROGRAM

PEDIATRIC ENDOCRINOLOGY

- Cecilia Damilano, MD
- Alissa M. Guarneri, MD
- Ryan Heksch, MD
- Nisha Patel, MD
- Sunil Sinha, MD



*“We did find in some cases that there are fewer treatments for black children than white children, or for children with Medicaid than children with private insurance, but there are likely larger socioeconomic forces at work.”*  
– Jennifer Dotson, MD, MPH, Principal Investigator, Center for Innovation in Pediatric Practice

## *Gastroenterology, Hepatology and Nutrition*

### **Investigating Race, Insurance and ED Visits in Pediatric Crohn’s Disease**

In what may be the first nationally representative study evaluating the impact of race and insurance status on emergency department treatment for Crohn’s disease, a team from Nationwide Children’s Hospital found that black children and those insured by Medicaid make more repeat visits and receive somewhat fewer treatments than white and privately insured peers.

But in contrast to earlier literature demonstrating disparities in the kind of treatments received, adjusted analyses found no significant differences in the use of imaging, laboratory testing and medication among the populations. Small treatment differences were found when analyzing race and payor status separately, but controlling for one of those variables often mitigated the differences found with the other.

The study was published in *Inflammatory Bowel Diseases*.

“We did not always find that race or insurance explains differences in treatments for these patients with Crohn’s disease,” says **Jennifer Dotson, MD, MPH**, a gastroenterologist at Nationwide Children’s and principal investigator in the Center for Innovation in Pediatric Practice. “We did find in some cases that there are fewer treatments for black children than white children, or for children with Medicaid than children with private insurance, but there are likely larger socioeconomic forces at work.”

Among the possible explanations: children with lower socioeconomic status may use emergency services for routine care more frequently, receiving fewer services per emergency department visit, the authors suggest.

The study included records of 2,168 children with a diagnosis of Crohn’s disease; 77% were white and 23% were black. They made a total of 3,779 visits at 38 hospitals. White children were more likely to have private insurance and have a higher median neighborhood income.

Among children with repeat visits, 33% were black, 22% white; 27% had Medicaid, 21% private insurance. The findings highlight the need for strategies that address emergency department use for all patients, especially for those who do not have optimal access to health care, the authors write.

“We need to use this opportunity for better outpatient management of children with IBD, assuring that everyone receives the appropriate care when they need it, and that non-emergent problems are more effectively handled in the office setting,” says Dr. Dotson.

#### **CITATION:**

Dotson JL, Kappelman MD, Bricker J, Andridge R, Chisolm DJ, Crandall WV. Multicenter Evaluation of Emergency Department Treatment for Children and Adolescents with Crohn’s Disease according to Race/Ethnicity and Insurance Payor Status. *Inflammatory Bowel Diseases*. 2019 Jan 1;25(1):194-203.

GASTROENTEROLOGY, HEPATOLOGY AND NUTRITION

Consistently ranked as a top digestive disorders program by U.S. News & World Report, the Division of Gastroenterology, Hepatology and Nutrition at Nationwide Children’s Hospital provides comprehensive care for a broad range of gastrointestinal, liver, pancreatic and nutritional problems. The division strives for excellence in research, teaching and clinical care and maintains a team of physician-scientists committed to the creation of new knowledge in the discipline. Our physicians work with pediatric nurse practitioners to diagnose and treat gastrointestinal, pancreatic and liver disorders while collaborating with other specialists, such as dietitians, behavioral and developmental psychologists, and surgeons, to provide comprehensive, coordinated care for each child.

FACULTY



Carlo Di Lorenzo, MD  
Division Chief



Ivor D. Hill, MD  
Section Chief

- Neetu Bali, MD
- John A. Barnard, MD
- Brendan M. Boyle, MD, MPH
- Steve L. Ciciora, MD
- Molly C. Dienhart, MD
- Jennifer L. Dotson, MD, MPH
- Tracy R. Ediger, MD, PhD
- Steven H. Erdman, MD
- Cheryl E. Gariepy, MD
- Jonathan M. Gisser, MD

- Monique Goldschmidt, MD
- Jennifer Lee, MD
- Peter Lu, MD
- Ross Maltz, MD
- Ethan Mezoff, MD
- Carol J. Potter, MD
- John M. Russo, MD
- Ala K. Shaikhhkhalil, MD
- Karla K. Vaz, MD
- Alex Weymann, MD
- Kent C. Williams, MD
- Frederick W. Woodley, PhD
- Desale Yacob, MD

The Division of Gastroenterology, Hepatology and Nutrition at Nationwide Children’s provides comprehensive care through multiple multidisciplinary clinics and services for children from all over the world. It has consistently been ranked among the top programs in the country for the past 10 years by U.S. News & World Report and is nationally recognized for its expertise in a number of gastrointestinal disorders. The Motility Center remains a national leader in caring for children with neuro-gastrointestinal and functional disorders. Motility Center leadership includes Carlo Di Lorenzo, MD, chief of Gastroenterology, and Desale Yacob, MD, the center’s medical director, as well as Karla Vaz, MD, Neetu Bali, MD, and Peter Lu, MD. In partnership with the Center for Colorectal and Pelvic Reconstruction at Nationwide Children’s, the Motility Center provides an exceptionally high level of comprehensive medical and surgical services for children with complex motility disorders. The Inflammatory Bowel Disease Center at Nationwide Children’s, co-directed by Brendan Boyle, MD, and Jennifer Dotson, MD, is a leader in providing standardized care for children with Crohn’s disease and ulcerative colitis, and boasts one of the highest remission

rates in the country. The Intestinal Rehabilitation Service, led by Molly Dienhart, MD, and Ethan Mezoff, MD, follows a large cohort of children with intestinal failure and has some of the best outcomes in the country in the care of children with short bowel syndrome. The Celiac Disease Center, led by Tracy Ediger, MD, and Section Chief Ivor Hill, MD, is a leader in providing more standardized care to improve long-term outcomes for children with celiac disease. In addition, Steven Erdman, MD, is a world leader in the care of children with polyposis syndromes. The division also provides specialized care for children with esophageal eosinophilic disease, autism and gastrointestinal disorders, muscular dystrophy, pancreatic and biliary disorders, congenital heart diseases, cystic fibrosis and aero-digestive disorders. A comprehensive Liver Disease Center, including a liver transplant program, is led by Alex Weymann, MD, and includes hepatologists Cheryl Gariepy, MD, Monique Goldschmidt, MD, and Carol Potter, MD, and a highly skilled transplant surgeon, Ken Washburn, MD.

GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019

\$136,834

SELECTED PUBLICATIONS

**Dotson JL**, Kappelman MD, Bricker J, Andridge R, Chisolm DJ, Crandall WV. Multicenter Evaluation of Emergency Department Treatment for Children and Adolescents with Crohn’s Disease According to Race/Ethnicity and Insurance Payor Status. *Inflamm Bowel Dis*. 2019 Jan;25:194-203.

Serpico MR, **Maltz R**, Crandall W, Bricker J, **Dotson JL**, Kim SC, Boyle B. Thiopurine Optimization Through Combination with Allopurinol in Children with Inflammatory Bowel Diseases. *J Pediatr Gastroenterol Nutr*. 2018 Sep;67:341-345.

Sparks B, Cooper J, Hayes C, **Williams K**. Constipation in Children with Autism Spectrum Disorder Associated with Increased Emergency Department Visits and Inpatient Admissions. *J Pediatr*. 2018 Nov;202:194-198.

Thapar N, Saliakellis E, Benninga MA, Borrelli O, Curry J, Faure C, De Giorgio R, Gupte G, Knowles CH, Staiano A, Vandenplas Y, **Di Lorenzo C**. Paediatric Intestinal Pseudo-obstruction: Evidence and Consensus-based Recommendations from an ESPGHAN-Led Expert Group. *J Pediatr Gastroenterol Nutr*. 2018 Jun;66:991-1019.

**Williams KC**, Rogers LK, **Hill I**, **Barnard J**, **Di Lorenzo C**. PEG 3350 Administration Is Not Associated with Sustained Elevation of Glycol Levels. *J Pediatr*. 2018 Apr;195:148-153.e1.

FAST FACTS

July 2018 through June 2019

|                                                       |       |                                                   |        |
|-------------------------------------------------------|-------|---------------------------------------------------|--------|
| Inpatient Discharges:.....                            | 639   | Gastroenterology Clinic Visits:.....              | 16,010 |
| Observation and Outpatient-in-a-Bed Discharges: ..... | 408   | Mansfield Gastroenterology Clinic Visits: .....   | 300    |
| Total Discharges:.....                                | 1,047 | Schrock Road Gastroenterology Clinic Visits:..... | 145    |
| Average Length of Stay*:.....                         | 6.1   | Westerville Gastroenterology Clinic Visits:.....  | 1,186  |
| Average Daily Census*: .....                          | 10.7  | Lima Gastroenterology Clinic Visits:.....         | 352    |
| Patient Days*:.....                                   | 3,906 | Total GI Clinic Visits:.....                      | 19,506 |
| Total Surgical Procedures:.....                       | 3,475 |                                                   |        |
| Dublin Gastroenterology Clinic Visits:.....           | 1,452 |                                                   |        |
| GI Allergy Clinic Visits:.....                        | 61    |                                                   |        |

\*Excludes observation and outpatient-in-a-bed patients.

2018 – 2019 NATIONWIDE CHILDREN’S  
FELLOWSHIP PROGRAM

PEDIATRIC GASTROENTEROLOGY

- Zeyad Abdulkader, MD
- Colleen Flahive, MD
- Shivani Gupta, MD
- Rose Lee, MD
- Grant Morris, MD
- Salman S. Salman, MD

- Monica Shukla-Udawatta, MD
- Brandon Sparks, MD
- Nancy Swiader, DO

GI MOTILITY

- Danielle Orsagh-Yentis, MD

GENERAL PEDIATRICS

The Section of General Pediatrics at Nationwide Children’s Hospital includes community physicians in pediatrics and internal medicine/pediatrics who are affiliated with Nationwide Children’s. Many of these physicians participate in the Pediatric Education in Community Sites program that provides residents with a very different kind of outpatient experience than that of a traditional hospital-based practice. Beginning in their second year, each resident is assigned to an additional half-day continuity experience in a private practice. This offers thorough exposure to general pediatric practice and reinforces the relationship between Nationwide Children’s and the community physicians.



**Robert W. Snyder, MD**  
*Chief*

Wahida B. Abaza, MD  
Nikola T. Al-ain, MD  
Ilona B. Albrecht, DO  
Benjamin P. Almasanu, DO  
Mary S. Applegate, MD  
Nardia S. Ataman, MD  
Jennifer E. Bachman, MD  
Taylor A. Ballenger, MD  
Richard A. Baltisberger, MD  
Lauren C. Bar-Lev, MD  
Carrie J. Barnes-Mullett, MD  
Brent M. Barson, DO  
Ryan M. Barson, MD  
Courtney R. Bartsch, MD  
Steven M. Bass, DO  
Heather A. Battles, MD  
Stephen R. Bauer, DO  
Sarah A. Behrens, MD  
Anne M. Bever, MD  
Cynthia J. Black, MD  
Kathleen D. Blake, MD  
Kimberly K. Blazer, MD

Denise L. Blocker, MD  
Eileen C. Bolton, MD  
Wanda C. Boudinot, MD  
Sandra L. Boyle, MD  
Richard J. Breen, MD  
Steven Randall Brown, MD  
James A. Bryant, MD  
Michelle S. Buendia, MD  
Jennifer L. Burkam, MD  
Shari L. Burns, MD  
Bethany J. Caldwell, MD  
Mitchell R. Camp, MD  
Jennifer H. Campbell, MD  
Patricia A. Cannon, MD  
Stephen M. Canowitz, MD  
Ali M. Carine, DO  
Jennifer B. Carlos, MD  
Mary B. Cass, MD  
Benjamin W. Cole, MD  
Kathleen A. Costlow, MD  
Sidney L. Couling, MD  
Jeffrey W. Crecelius, MD  
Elizabeth A. Crickard, DO  
Ann M. Croft, MD  
Camilla Curren, MD  
Omolara Y. Dairo, MD  
Virginia K. De Verteuil, MD  
Amy E. Deibel, MD  
Antonio J. DelRosario, MD  
Traci A. DeVoe, MD  
Praveena V. Dhawale, MD  
Michael T. DiBartola, MD  
Kevin M. Dickerson, MD  
Bradley E. Dickson, MD

Dawn C. Dillinger, DO  
Julie K. Doering, MD  
Kent W. Doherty, DO  
Lorna F. Donovan, MD  
Dennis M. Doody, MD  
James R. Dorado, MD  
Julie M. Dunlea, MD  
Kimberly A. Eilerman, DO  
Alicia D. Fenn, MD  
Emily T. Ferguson, MD  
Lenora A. Fitton, DO  
John L. Fortney, MD  
Patricia A. Francis, MD  
Michael R. Franks, MD  
Brad E. Fuller, MD  
Kathleen T. Fulop, MD  
Patricia T. Gabbe, MD  
Raju R. Gaglani, MD  
Barbara B. Galantowicz, MD  
Jessica M. Gefvert, MD  
Monica C. Gilbert, MD  
Kathryn L. Ginocchi, MD  
Jumana C. Giragos, MD  
Charles M. Goddard, MD  
Erin L. Goist, MD  
Anna C. Gray, MD  
Emily K. Gray, MD  
Patrick J. Gross, DO  
Dawn S. Hackshaw, MD  
Dana L. Hamilton, DO  
Daniel J. Heinmiller, MD  
John S. Heintz, MD  
Lawrence P. Heiny, MD  
Megan E. Heitzman, MD

David E. Henderson, MD  
Christopher B. Houts, MD  
Elizabeth M. Jacob, MD  
Julie R. Javorek, MD  
Enaas F. Kasheer, MD  
Stephen L. Kebe, MD  
Lisa A. Kelch, MD  
Andrew M. Keller, MD  
Sara M. Kelly, MD  
Richard A. Kern, MD  
Cheryl K. Kirkby, MD  
Adam M. Kirkland, MD  
Elizabeth L. Kirkland, MD  
William E.C. Knobeloch, MD  
Irene P. Koesters, MD  
Stephen C. Koesters, MD  
Maureen P. Kollar, DO  
Andrew S. Korcal, MD  
Katherine J. Krueck, MD  
Justin K. Krueger, MD  
Lisa A. Krumm, MD  
Celina M. LaBrec-Salmons, MD  
Robert C. LaMonte, MD  
Kristina M. Lehman, MD  
Michael J. Leymaster, MD  
Bradley A. Lisko, MD  
Elizabeth A. Little, MD  
Anne D. Littleton, MD  
Michael C. Loar, MD  
William W. Long, MD  
Tricia W. Lucin, MD  
Eileen M. Maher, MD  
Michele V. Mahoney, MD  
Jason W. Mailloux, MD  
Gwynette M. Marschall, MD  
Jennifer J. Mastruserio, MD  
Derek A. McClellan, MD  
Donna J. McDonald, MD  
Meera R. Mehta, MD  
George M. Messick, MD  
Bruce P. Meyer, MD  
Leslie C. Meyers-Joseph, MD  
Cameron K. Miller, MD

Bruce R. Mirvis, MD  
Stacy L. Morran, MD  
Matthew J. Morrison, MD  
Mark A. Muresan, MD  
Jill A. Neff, DO  
Mary-Lynn Niland, MD  
Autumn M. O’Brien, MD  
Adebomi A. Omikunle, MD  
Janet S. Orr, MD  
Lilliam I. Ortiz, MD  
Laura E. Osthaus, MD  
Jennifer Killion Overbey, MD  
Melissa M. Parsons, MD  
Jacqueline S. Pennywitt, MD  
Michael A. Perry, MD  
Richard A. Petrella, MD  
Brad T. Pfau, MD  
Laura D. Phillips-Chou, MD  
Domenico Pietropaolo, MD  
Phyllis Jo Polas, DO  
L. Robert Polster, MD  
M. Bonnie Pugh, MD  
Blake J. Randolph, MD  
Barbara B. Rayo, MD  
Teresa R. Recker Gross, DO  
Robert D. Reis, MD  
Darryl A. Robbins, DO  
J. Tyler Rogers, MD  
Patricia A. Ryan, MD  
Purbi S. Sahai, MD  
Dhanawanti Sant, MD  
Timothy R. Savage, MD  
Erin K. Schaffner, MD  
Elizabeth A. Schloss, MD  
Dana J. Schultz, MD  
W. Andrew Searcy, MD  
Eileen H. Sheets, MD  
Larry M. Shepherd, MD  
Phillip N. Simon, MD  
Rebecca M. Slaunwhite, MD  
Robert W. Snyder, MD  
John P. Sotos, MD  
Brandi F. Spittler, DO

Donna L. Sterling, MD  
Nicholas S. Stevens, MD  
Wendy K. Stevens, MD  
Kathleen C. Stiles, MD  
Miller J. Sullivan, Jr., MD  
Nazhat Taj-Schaal, MD  
Ellen R. Tamburello, MD  
Katrina S. Tansky, MD  
Renee S. Taylor, MD  
Amy Rachelle A. Teleron-Khorshad, MD  
Timothy A. Teller, MD  
Mark A. Thoma, MD  
Craig R. Thompson, MD  
Kristin E. Thompson, MD  
John D. Toth, MD  
Bonny M. Tsai, MD  
Ahmed J. Turjoman, MD  
H. Scott Tyson, MD  
Sean M. Vellucci, MD  
Victoria N. Vinsant, MD  
Diana T. Wagner, MD  
Laura E. Walawender, MD  
James D. Ward, MD  
Lawrence B. Watkins, MD  
Olivia N. Westhoven, MD  
Ray S. Wheasler, III, MD  
Elizabeth R. Whitaker, MD  
Jennifer R. White, MD  
Matthew M. White, MD  
Wade W. Wilde, MD  
Kathleen M. Wodarczyk, MD  
Lindsay A. Wylie, MD  
Michelle E. Yaw, MD  
Becky Zhao, MD  
Rachel H. Zylberberg, MD

FAST FACTS

July 2018 through June 2019

|                                                       |     |                                                         |     |
|-------------------------------------------------------|-----|---------------------------------------------------------|-----|
| Inpatient Discharges:.....                            | 165 | Average Daily Census*: .....                            | 2.1 |
| Observation and Outpatient-in-a-Bed Discharges: ..... | 129 | Patient Days*:.....                                     | 777 |
| Total Discharges:.....                                | 294 | *Excludes observation and outpatient-in-a-bed patients. |     |
| Average Length of Stay*:.....                         | 4.7 |                                                         |     |

2018 – 2019 NATIONWIDE CHILDREN’S FELLOWSHIP PROGRAM

CLINICAL FELLOWSHIP IN QUALITY & SAFETY LEADERSHIP

Tara Cosgrove, MD  
Veronica M. Mruk, MD  
Anja Zann, MD

GENETIC AND GENOMIC MEDICINE

The mission of the Division of Genetic and Genomic Medicine at Nationwide Children’s Hospital is to deliver compassionate, family-centered care via genetic/genomic diagnostic and therapeutic services while providing counseling, education and advocacy to improve the lives of individuals with genetic conditions. We treat inborn errors of metabolism and genetic conditions across the ages from preconception and prenatal through childhood and well into adulthood. Clinical services are supported partly by the Ohio Department of Health as a Regional Genetics Center of the state of Ohio, Region IV. Research partners include the Steve and Cindy Rasmussen Institute for Genomic Medicine and Centers for Gene Therapy and Cardiovascular Research.

FACULTY



Kim L. McBride, MD, MS  
Division Chief



Dennis W. Bartholomew, MD  
Section Chief

FULL-TIME NATIONWIDE CHILDREN'S FACULTY

Scott E. Hickey, MD  
Kandamurugu (Murugu) Manickam, MD  
Mari Mori, MD  
Kristin Truxal, MD

PART-TIME NATIONWIDE CHILDREN'S FACULTY

Britton D. Rink, MD

Over the last year, our division has focused on increasing our ability to provide genetic services. We have greatly expanded our group of genetic counselors from 10 to 16, two of which are shared with the Steve and Cindy Rasmussen Institute for Genomic Medicine. Nationwide Children’s also has two genetic counselors in Hematology/Oncology, and four in the clinical labs of the Steve and Cindy Rasmussen Institute for Genomic Medicine). Service lines with assigned genetic counselors include Child Development Center, Complex Epilepsy, Heart Center and Neuromuscular Clinics. Multidisciplinary clinics with genetic counselors include Metabolic Bone, MDA, Spinal Muscular Atrophy, Cystic Fibrosis, Prader-Willi Syndrome, Williams Syndrome, 22q Deletion Syndrome, Myelomeningocele and THRIVE clinics. Our genetics nurse practitioner group of Melanie Goff, CPNP-PC, and Sarah Swager, CPNP-PC, has expanded with the addition of Stacie Leeper, CPNP-AC. We are also excited to welcome three geneticists: Mari Mori, MD, from Hasbro Children’s Hospital started January 2019. Bimal Chaudhari, MD, MPH, from our own Genetics training program started September 2019. Stephen G. Kaler, MD, from the National Institutes of Health started September 2019.

The residency program led, by Scott Hickey, MD, and assisted by Murugu Manickam, MD, and Dennis Bartholomew, MD, received accreditation for a third-year option of a funded Medical Biochemical Genetics fellowship starting in 2019.

Individuals of the division have been involved in setting national guidelines for many areas of clinical genetics, particularly in the utility of new genetic testing modalities. Faculty have presented at national and international meetings on 22q11 deletion syndrome (Dr. Hickey) and use of medical records analysis combined with genome sequencing in large populations (Dr. Manickam). A number of clinical research projects are led by faculty including hypophosphatasia (Dr. Hickey), Down syndrome (Dr. Manickam), and PKU (Dr. McBride).

GRANTS AWARDED TO  
CLINICAL AND RESEARCH FACULTY  
JULY 1, 2018 – JUNE 30, 2019

\$927,396

SELECTED PUBLICATIONS

Hershberger RE, Givertz MM, Ho CY, Judge DP, Kantor PF, **McBride KL**, Morales A, Taylor MRG, Vatta M, Ware SM; ACMG Professional Practice and Guidelines Committee. Genetic Evaluation of Cardiomyopathy: A Clinical Practice Resource of the American College of Medical Genetics and Genomics (ACMG). *Genet Med*. 2018 Sep;20(9):899-909.

**Manickam K**, Buchanan AH, Schwartz MLB, Hallquist MLG, Williams JL, Rahm AK, Rocha H, Savatt JM, Evans AE, Butry LM, Lazzeri AL, Lindbuchler DM, Flansburg CN, Leeming R, Vogel VG, Lebo MS, Mason-Suares HM, Hoskinson DC, Abul-Husn NS,

Dewey FE, Overton JD, Reid JG, Baras A, Willard HF, McCormick CZ, Krishnamurthy SB, Hartzel DN, Kost KA, Lavage DR, Sturm AC, Frisbie LR, Person TN, Metpally RP, Giovanni MA, Lowry LE, Leader JB, Ritchie MD, Carey DJ, Justice AE, Kirchner HL, Faucett WA, Williams MS, Ledbetter DH, Murray MF. Exome Sequencing-Based Screening for BRCA1/2 Expected Pathogenic Variants among Adult Biobank Participants. *JAMA New Open*. 2018 Sep 7;1(5):e182140.

Waggoner D, Wain KE, Dubuc AM, Conlin L, **Hickey SE**, Lamb AN, Martin CL, Morton CC, Rasmussen K, Schuette JL, Schwartz S, Miller DT; ACMG Professional Practice and Guidelines Committee. Yield of Additional Genetic Testing After Chromosomal Microarray for Diagnosis of Neurodevelopmental Disability and Congenital Anomalies: A Clinical Practice Resource of the American College of Medical Genetics and Genomics (ACMG). *Genet Med*. 2018 Oct; 20(10):1105-1113.

Waldrop MA, **Pastore M**, Schrader R, **Sites E**, **Bartholomew D**, Tsao CY, Flanigan KM. Diagnostic Utility of Whole Exome Sequencing in the Neuromuscular Clinic. *Neuropediatrics*. 2019 Apr;50(2):96-102.

FAST FACTS

July 2018 through June 2019

|                                                       |     |                                            |       |
|-------------------------------------------------------|-----|--------------------------------------------|-------|
| Inpatient Discharges:.....                            | 27  | Cardiogenetics Clinic Visits:.....         | 229   |
| Observation and Outpatient-in-a-Bed Discharges: ..... | 12  | Genetics (Main Campus) Clinic Visits:..... | 2,635 |
| Total Nationwide Children’s Discharges:.....          | 39  | Dublin Genetics Clinic Visits:.....        | 147   |
| Average Length of Stay*:.....                         | 3.0 | Lima Genetics Clinic Visits:.....          | 114   |
| Average Daily Census*: .....                          | 0.2 | Marietta Genetics Clinic Visits:.....      | 27    |
| Patient Days*:.....                                   | 82  | Westerville Genetics Clinic Visits:.....   | 138   |
| Inpatient Consults:.....                              | 273 | Zanesville Genetics Clinic Visits: .....   | 42    |
| <b>Outpatient Visits</b>                              |     |                                            |       |
| Athens Genetics Clinic Visits:.....                   | 21  |                                            |       |

\*Excludes observation and outpatient-in-a-bed patients.

2018 – 2019 NATIONWIDE CHILDREN’S  
FELLOWSHIP PROGRAM

MEDICAL GENETICS

Bimal Chaudhari, MD, MPH  
April Lehman, MD  
Sheri A. Poskanzer, MD  
Bianca Zapanata, MD

Department of Pediatrics

HEALTHY WEIGHT AND NUTRITION

The Center for Healthy Weight and Nutrition at Nationwide Children’s Hospital offers a comprehensive approach to weight management with programs for the prevention and treatment of children and young adults, aged 2 to 21 years, with obesity. The center’s mission is to empower children and families to establish a foundation for healthy lifestyles through clinical care, education, research, community engagement and advocacy.

FACULTY



**Ihuoma U. Eneli, MD, MS, FAAP**  
*Director*



**Marc P. Michalsky, MD, FACS, FAAP**  
*Surgical Director*

Eileen Chaves, PhD

Jane Hamel-Lambert, PhD

Belinda Mills, MD

Amy R. Sternstein, MD, FAAP

Dominique Williams, MD, MPH, FAAP, Dipl ABOM

The Center for Healthy Weight and Nutrition offers assessment clinics for evaluation of children and young adults with obesity, and a variety of multidisciplinary programs with a physician, psychologist, dietitian, physical therapist, and athletic trainer for intensive weight management. In addition, the center offers adolescent bariatric surgery and has obtained the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program certification.

As part of our commitment to the community, the center supports the Primary Care Obesity Network (PCON), a program within primary care pediatric practices that supports the health care provider on obesity treatment and prevention beyond the walls of a clinician’s office and into the community. We participate at several wellness community events including the Columbus Marathon, partners with after-school programs through the activities of our Fitness and Nutrition (FAN) club, the public health department, grocery stores and several community organizations. At the regional and national level, the center participates and provides leadership on the National Academy of Medicine (NAM) Roundtable on Obesity Solutions, the American Society for Metabolic and Bariatric Surgery (ASMBS), American Academy of Pediatrics Institute for Healthy Childhood Weight (IHCW), the Obesity Medicine Association (OMA) and the Ohio Chapter of American Academy of Pediatrics (OAAP). To enhance collaborative activities, the center hosts a biannual Symposium on Early Childhood Nutrition and Wellbeing.

The center remains committed to providing educational opportunities at all levels and in several multispecialty disciplines. These include a fourth-year medical student elective, a residency elective rotation, a childhood obesity and adolescent bariatric surgery fellowship, in addition to serving as an expert to obesity programs around the United States and internationally. The center has federal, industry and foundation research funding. It participates in two National Institutes of Health (NIH) multicenter studies on the long-term outcomes of adolescent bariatric surgery and the use of family behavioral therapy in the primary care setting to address childhood obesity.

GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019

\$1,084,717

.....

**SELECTED PUBLICATIONS**

Block JP, Bailey LC, Gillman MW, Lunsford D, Daley MF, **Eneli I**, Finkelstein J, Heerman W, Horgan CE, Hsia DS, Jay M, Rao G, Reynolds JS, Rifas-Shiman SL, Sturtevant JL, Toh S, Trasande L, Young J, Forrest CB, PCORnet Antibiotics and Childhood Growth Study Group. Early Antibiotic Exposure and Weight Outcomes in Young Children. *Pediatrics*. 2018 Dec;142(6). pii: e20180290.

**Eneli I**, Xu J, Webster M, McCagg A, Van Der Ploeg L, Garfield AS, Estrada E. Tracing the Effect of the Melanocortin-4 Receptor Pathway in Obesity: Study Design and Methodology of the TEMPO Registry. *Appl Clin Genet*. 2019 Jun 5;12:87-93.

Inge TH, Courcoulas AP, Jenkins TM, **Michalsky MP**, Brandr ML, Xanthakos SA, Dixon JB, Harmon CM, Chen MK, Xie C, Evans ME, Helmrath MA, Teen-LABS Consortium. Five-Year Outcomes of Gastric Bypass in Adolescents as Compared with Adults. *N Engl J Med*. 2019 May 30;380(22):2136-2145.

Pratt JSA, Browne A, Browne NT, Bruzoni M, Cohen M, Desai A, Inge T, Linden BC, Mattar SG, **Michalsky MP**, Podkameni D, Reichard KW, Stanford FC, Zeller MH, Zitsman J. ASMBs Pediatric Metabolic and Bariatric Surgery Guidelines, 2018. *Surg Obes Relat Dis*. 2018 Jul;14(7):882-901.

Woolford SJ, Hassink S, **Eneli I**. The Young Child with Severe Obesity: Commentary on the Characteristics of a Vulnerable Population and a Framework for Treatment. *Child Obes*. 2018 Oct;14(7):441-442.

**FAST FACTS**

*July 2018 through June 2019*

|                                                  |              |                                                |            |
|--------------------------------------------------|--------------|------------------------------------------------|------------|
| Bariatric Clinic Visits: .....                   | <b>564</b>   | Hilliard Healthy Weight Clinic Visits:.....    | <b>461</b> |
| Healthy Weight and Nutrition Clinic Visits:..... | <b>1,995</b> | Westerville Healthy Weight Clinic Visits:..... | <b>965</b> |





*Hematology, Oncology & Blood  
and Marrow Transplant*

**Ewing Sarcoma: Breaking Through the Therapeutic Ceiling**

A study led by researchers at Nationwide Children’s Hospital has found no biomarkers of sensitivity in Ewing sarcoma cell lines for the proposed therapeutic agent SP-2509, for the simple and surprising reason that every cell line tested had sensitivity to SP-2509.

This is good news for the newly opened Phase 1 clinical trial of the agent SP-2577, or Seclidemstat. And it appears to be a step toward finding a more targeted therapy for the aggressive tumors.

“I guess you could say that we failed to find what we were looking for. We actually haven’t found a patient-derived cell line that is resistant to the agent,” says **Stephen Lessnick, MD, PhD**, director of the Center for Childhood Cancer and Blood Diseases at Nationwide Children’s and senior author of the study. “Of course, that gives us great hope about the agent’s effectiveness against Ewing sarcoma.”

The study, published in *Molecular Cancer Therapeutics*, is part of an effort among Ewing sarcoma researchers and clinicians to move beyond traditional chemotherapies, which appear to have reached a “therapeutic ceiling” for the disease.

Those efforts have focused on the EWS/FLI chromosomal translocation, common to virtually every form of Ewing sarcoma and the driver of tumor development. While that mutation has proven difficult to target, the companion protein KDM1A (also known as lysine specific demethylase 1, or LSD1) can be targeted. KDM1A/LSD1 is overexpressed in a number of solid and hematological malignancies. The agent used in the recent study, SP-2509, is a KDM1A/LSD1 inhibitor.

The authors introduced SP-2509 to 17 Ewing sarcoma cell lines, and sensitivity was found in all of them. Of note, many cell lines were resistant to another KDM1A/LSD1 inhibitor, GSK-LSD1, suggesting that future Ewing sarcoma therapies based on GSK-LSD1 would be ineffective.

The researchers also investigated how SP-2509 targets KDM1A/LSD1; it seems to engage the endoplasmic reticulum stress response, leading to apoptosis.

A clinical trial of a therapy based on the inhibitor began recruiting patients in summer 2019. (Dr. Lessnick is a scientific advisor to Salarius Pharmaceuticals, the company behind the trial.)

**CITATION:**  
Pishas KI, Drenberg CD, Taslim C, Theisen ER, Johnson KM, Saund RS, Pop IL, Crompton BD, Lawlor ER, Tirode F, Mora J, Delattre O, Beckerle MC, Callen DF, Sharma S, Lessnick SL. Therapeutic Targeting of KDM1A/LSD1 in Ewing Sarcoma with SP-2509 Engages the Endoplasmic Reticulum Stress Response. *Molecular Cancer Therapeutics*. 2018 Sep;17(9):1902-1916.



*“I guess you could say that we failed to find what we were looking for.  
That gives us great hope about the agent’s effectiveness against Ewing sarcoma.”*  
– Stephen Lessnick, MD, PhD, Director, Center for Childhood Cancer and Blood Diseases

HEMATOLOGY, ONCOLOGY & BLOOD AND MARROW TRANSPLANT

The Hematology, Oncology & Blood and Marrow Transplant at Nationwide Children’s Hospital treats patients with any one of a full array of blood disorders, cancers, immunodeficiency disorders, bone marrow failure syndromes and inherited metabolic storage diseases. Our clinical team oversees the comprehensive evaluation, multidisciplinary diagnosis, treatment and long-term management of children, adolescents and young adults with blood disorders and cancer as well as other diseases treated by cellular therapies. In addition to clinical care, through our integrated programs within the Abigail Wexner Research Institute’s Center for Childhood Cancer and Blood Diseases, the Steve and Cindy Rasmussen Institute for Genomic Medicine and the Biopathology Center at Nationwide Children’s, we seek to transform the way patients with cancer and blood disorders are cared for by fully integrating research, cutting-edge therapies and multidisciplinary teams.

FACULTY



Timothy P. Cripe, MD, PhD  
Division Chief



Randal S. Olshefski, MD  
Section Chief

- Mohamed AbdelBaki, MD
- Rolla F. Abu-Arja, MD
- Anthony N. Audino, MD
- Jeffery J. Auletta, MD
- Rajinder P. Bajwa, MD, MBBS
- Susan E. Creary, MD
- Amy L. Dunn, MD
- Jonathan L. Finlay, MB, ChB

- Molly Gardner, PhD
- Cynthia A. Gerhardt, PhD
- Terri L. Guinipero, MD
- Jennifer Hansen-Moore, PhD
- Amanda Jacobson-Kelly, MD
- Bryce A. Kerlin, MD
- Riten Kumar, MD
- Dean Lee, MD, PhD
- Kathleen L. Lemanek, PhD
- Steve Lessnick, MD, PhD
- Erin Meyer, DO, MPH
- Sarah H. O’Brien, MD, MS
- Diana S. Osorio, MD
- Veronika Polishchuk, MD
- Mark A. Ranalli, MD
- Hemalatha G. Rangarajan, MD
- Suzanne M. Reed, MD
- Ryan D. Roberts, MD, PhD
- Melissa J. Rose, DO
- Claire Russell, PhD
- Bhuvana A. Setty, MD
- Nilay D. Shah, MD
- Natalie Slone, DO
- Keri A. Streby, MD
- Kathryn Vannatta, PhD
- Elizabeth Varga, MS, LGC
- Susan I. Vear, MD
- Anthony D. Villella, MD
- Nicholas D. Yeager, MD

- Tammi K. Young-Saleme, PhD
- Kristin Zajo, MS, LGC

FELLOWS

First Year

- Ashleigh Kussman, MD
- Lynda Villagomez, MD

Second Year

- Jennifer Belsky, DO
- Kyle Davis, MD
- Brian Tullius, MD

Third Year

- Richard Graham, MD
- Margaret Lamb, MD
- Priyal Patel, DO

Fourth Year (BMT)

- Nabanita Bhunia, MBBS

Fourth Year (Neuro-Oncology)

- Vibhuti Agarwal, MD

Fourth Year (Sarcoma)

- Mary Francis Wedekind, DO

Through research, patient care and psychosocial support, the Division of Hematology, Oncology & Blood and Marrow Transplant provides a strong foundation for our patients, families and care teams. For the past six years, we have been ranked in the top 10 of U.S. News & World Report, most recently ranking in the top four. Our discoveries, clinical trials and new treatments offer new hope for patients and families affected by cancers and hematologic diseases not only at Nationwide Children’s but around the world.

In 2018, we announced a partnership with The Ohio State University Wexner Medical Center and the Arthur G. James Cancer Hospital and Richard J. Solove Research Institute to bring the first proton therapy treatment facility to central Ohio.

Proton therapy is an advanced type of radiation treatment that uses protons instead of photons to kill cancer cells. Proton therapy can be used alone or in combination with other therapies to treat brain cancer, lymphoma, retinoblastomas and sarcomas in children.

Children are vulnerable to the long-term side effects of radiation, including growth abnormalities, cognitive impairment, heart damage and other complications such as radiation-induced secondary cancers later in life. Studies have suggested that proton therapy may cause fewer side effects than traditional radiation,

since doctors can better control where the proton beams deposit their energy. This makes it an important treatment option for certain pediatric cancers.

The Division of Hematology, Oncology & Blood and Marrow Transplant continues to prioritize quality improvement to achieve best outcomes for its patients. Our multidisciplinary quality improvement teams have achieved significant reductions in preventable harm. Since 2016, interventions have yielded a 30% reduction in administration adverse drug events and a 65% reduction in health care acquired respiratory infections.

Through our preeminent clinical and research programs, our division has realized growth in referrals from patients from across the globe. Division Chief Tim Cripe, MD, traveled to Dubai in early 2019 to highlight the world-class care available at Nationwide Children’s and to develop relationships with medical professionals in the Middle East. We also host International Tumor Boards with countries in Latin America.

Through our clinical and research work, we are driven to remain on the cutting edge of solutions for our patients worldwide. With more than 100 clinical trials, we continue to collaborate in an effort to advance pediatric care.

**Center for Childhood Cancer:** See page 182 for information about the Center for Childhood Cancer in the Abigail Wexner Research Institute at Nationwide Children’s Hospital.

GRANTS AWARDED TO CENTER AND DIVISION CLINICAL AND RESEARCH FACULTY  
JULY 1, 2018 – JUNE 30, 2019

\$15,617,978

SELECTED PUBLICATIONS

Angus SP, **Oblinger JL**, Stuhlmiller TJ, DeSouza PA, Beauchamp RL, Witt L, Chen X, Jordan JT, Gilbert TSK, Stemmer-Rachamimov A, Gusella JF, Plotkin SR, Haggarty SJ, **Chang LS**, Johnson GL, Ramesh V; Children’s Tumor Foundation Synodos for NF2 Consortium. EPH Receptor Signaling as a Novel Therapeutic Target in NF2-deficient Meningioma. *Neuro-Oncology*. 2018 Aug 2;20(9):1185-1196.

Carpenter SL, Goldman J, Sherman AK, Selewski DT, **Kallash M**, Tran CL, Seamon M, Katsoufis C, Ashoor I, Hernandez J, Supe-Markovina K, D’alessandri-Silva C, DeJesus-Gonzalez N, Vasylyeva TL, Formeck C, Woll C, Gbadegesin R, Geier P, Devarajan P, **Smoyer WE**, **Kerlin BA**, Rheault MN. Association of Infections and Venous Thromboembolism in Hospitalized Children with Nephrotic Syndrome. *Pediatric Nephrology*. 2019 Feb;34(2):261-267.

Pecker LH, Patel N, **Creary S**, Darbari A, Meier ER, Darbari DS, Fasano RM. Diverse Manifestations of Acute Sickle Cell Hepatopathy in Pediatric Patients with Sickle Cell Disease: A Case Series. *Pediatric Blood Cancer*. 2018 Aug;65(8):e27060.

Pishas KI, Drenberg CD, Taslim C, **Theisen ER**, Johnson KM, Saund RS, Pop IL, Crompton BD, Lawlor ER, Tirode F, Mora J, Delattre O, Beckerle MC, Callen DF, Sharma S, **Lessnick SL**. Therapeutic Targeting of KDM1A/LSD1 in Ewing Sarcoma with SP-2509 Engages the Endoplasmic Reticulum Stress Response. *Molecular Cancer Therapy*. 2018 Sep; 17(9):1902-1916.

Poznanski SM, Nham T, Chew MV, **Lee AJ**, Hammill JA, Fan IY, Butcher M, Bramson JL, Lee DA, Hirte HW, Ashkar AA. Expanded CD56superbrightCD16+ NK Cells from Ovarian Cancer Patients Are Cytotoxic against Autologous Tumor in a Patient-Derived Xenograft Murine Model. *Cancer Immunology Research*. 2018 October 6(10):1174.

**Rangarajan HG**, Smith LC, **Stanek JR**, Hall M, **Abu-Arja R**, **Auletta JJ**, **O'Brien SH**. Increased Health Care Utilization and Costs during Allogeneic Hematopoietic Cell Transplantation for Acute Leukemia and Myelodysplastic Syndromes in Adolescents and Young Adults Compared with Children: A Multicenter Study. *Biology Blood Marrow Transplant*. 2019 May;25(5):1031-1038.

Saini S, **Folta AN**, Harsh KL, **Stanek JR**, **Dunn AL**, **O'Brien SH**, **Kumar R**. Anti-Factor Xa-Based Monitoring of Unfractionated Heparin: Clinical Outcomes in a Pediatric Cohort. *Journal of Pediatrics*. 2019 Jun;209:212-219.e1.

FAST FACTS

July 2018 through June 2019

|                                                       |       |                                                     |        |
|-------------------------------------------------------|-------|-----------------------------------------------------|--------|
| Inpatient Discharges:.....                            | 1,380 | BMT Long-term Follow-up Clinic Visits:.....         | 72     |
| Observation and Outpatient-in-a-Bed Discharges: ..... | 255   | Anticoagulation Clinic Visits: .....                | 238    |
| Total Discharges: .....                               | 4,893 | Dublin Hematology Clinic Visits:.....               | 124    |
| Patient Days*:.....                                   | 8,285 | East Broad Sickle Cell Clinic Visits: .....         | 133    |
| Average Length of Stay*:.....                         | 6.0   | Mansfield Hematology/Oncology Clinic Visits:.....   | 38     |
| Average Daily Census*: .....                          | 22.7  | Chillicothe Hematology/Oncology Clinic Visits:..... | 38     |
| Inpatient Consults:.....                              | 565   | Dayton Hematology/Oncology Clinic Visits:.....      | 3      |
| Total Surgical Procedures: .....                      | 838   | Zanesville Hematology/Oncology Clinic Visits: ..... | 61     |
| BMT Transplants:.....                                 | 53    | Surgical Oncology Clinic Visits: .....              | 95     |
| Apheresis and Photopheresis Procedures:.....          | 840   | Hematology/Oncology Clinic Visits: .....            | 10,294 |
| BMT Clinic Visits: .....                              | 3,325 | Portsmouth Hematology/Oncology Clinic Visits:.....  | 32     |

\*Excludes observation and outpatient-in-a-bed patients.

Department of Pediatrics

HOSPITAL PEDIATRICS AND ADULT HOSPITAL MEDICINE

The Section of Hospital Pediatrics at Nationwide Children’s Hospital, which also includes newborn and adult hospital medicine, is home to a diverse group of physicians who specialize in the care of hospitalized newborns, children, adolescents and adults. The section supports Nationwide Children’s commitment to providing the highest quality care to all children and their families regardless of ability to pay, and specifically aims to set the standard in the provision of high-value, quality inpatient care, the intentional and thoughtful education of future generations of doctors, and the production of useful and influential clinical, educational and quality improvement research.

FACULTY



**Ryan S. Bode, MD**  
*Division and Section Chief*

- Seth Agyeman-Berko, PA
- Sean Ankrom, MD
- Joshua D. Black, MD
- Carrie Cacioppo, MD
- Sharon Clark, MD
- Samuel W. Dudley, MD
- Lauren Finnegan, NP
- Emily Graham, MD
- Rakhi Gupta-Basuray, MD
- Allison C. Heacock, MD
- Shawn Jacquemin, MD
- Rena Kasick, MD
- Jillian S. Kunar, DO
- Stephanie Kwon, DO
- Stephanie Lauden, MD
- Kristina Lehman, MD
- Kristen S. Lewis, MD
- Nancy N. Liao, MD

- Beth W. Liston, MD, PhD
- Jamie R. Macklin, MD
- Kathleen Matic, MD
- Daniel J. McFarlane, MD
- Gerd B. McGwire, MD, PhD
- Lucas V. McKnight, MD
- Christy Mulligan, MD
- Saji Perera, MD
- Michael Perry, MD
- Laura Plachta, MD
- Charles R. Redman, MD
- Allison Rossetti, MD
- Christine A. Schmerge, MD
- Eric R. Schumacher, DO, MBA
- Claire Sevov, MD
- Catherine C. Sinclair, MD
- Melissa L. Skaug, MD
- Isaac Spears, MD
- Ansley Splinter, MD
- Anuja Sriparameswaran, MD
- Devon Swick, DO
- Kimberly M. Tartaglia, MD

The Section of Hospital Pediatrics and Adult Hospital Medicine provides inpatient care across the continuum to patients and families at Nationwide Children’s. Newborn hospitalists manage full-term and late preterm newborns and the associated common conditions, including hyperbilirubinemia, feeding and nutrition, infections, neonatal abstinence syndrome, and newborn screening and anticipatory guidance. Pediatric hospitalists provide inpatient care

for common pediatric illnesses such as bronchiolitis, asthma and failure to thrive as well as undifferentiated and/or multisystem diseases, coordinating and facilitating care and ensuring a safe transition back to primary care providers. In addition, in conjunction with the Section of Child Psychiatry, hospitalists work collaboratively to provide medical care for children and adolescents facing acute mental health crises. Internal medicine-trained adult hospitalists serve as consultants for adult patients with congenital and childhood-onset chronic illnesses admitted to Nationwide Children’s.

The section experienced significant growth and program development in all facets — clinical, educational, safety, quality improvement and research. Clinical encounters and average daily census increased over the prior academic year while overall length of stay decreased by 10%. We were successful in adding four new faculty members. We have expanded our clinical scope and expertise with increasing consultation roles, including partnering with critical care physicians in our hospital’s rapid response team.

Pediatric hospital medicine has recently been officially recognized by the American Board of Pediatrics as a board-certified specialty. With this in mind and building for our future, we began our Pediatric Hospital Medicine Fellowship Program in July 2018 – we now have two fellows, a program coordinator and are preparing for program accreditation.

The section is involved in a multitude of patient safety and quality improvement initiatives with demonstrated outcomes that include:

- Clinical pathway development (e.g., acute gastroenteritis, seizure, urinary tract infection) to ensure evidence-based practice with optimization of value and patient outcomes.
- Optimization of discharge throughout and efficiency while minimizing preventable readmissions – with realized improvements in the percent of discharges by noon.
- Enhanced patient and family experience through family-centered rounds and communication interventions.
- Enhanced patient safety, including 24/7 in-house attending coverage and the innovative “Safety Officer and Watchstander Program” aimed at identifying at-risk hospitalized patients and preventing unrecognized clinical deterioration on the floor.

The Section of Hospital Pediatrics is also dedicated and committed to the education of future pediatricians with an emphasis and excellence in the clinical teaching for both medical students and family practice and pediatric residents. Faculty serve as important mentors for these learners in their educational, clinical, research and professional development. Our faculty continue to get recognized on an annual basis with prestigious teaching awards, including being ranked as the number-one inpatient rotation this past academic year by the pediatric residents.

SELECTED PUBLICATIONS

Allen EA, Montgomery T, Ayres G, Cooper J, Gillespie J, Gleeson SP, Groner J, Hersey S, **McGwire G**, Rowe C, Snyder D, Stukus D, Stukus K, Timan C, Wegener N, Brill RJ. Quality Improvement Driven Reduction in County-wide, Medicaid Acute Asthma Healthcare Utilization. *Acad Pediatr*. 2019;19(2):216-226.

Bartman T, Bertoni B, Merandi J, Brady M, **Bode R**. Patient Safety: What is Working and Why? *Curr Treat Options Ped*. 2019;5(2):131-144.

Lanata M, Bressler, C, **McKnight L**, Sánchez P, Tscholl J, Kasick R. A Case of Fever, Rash, and a Painful Limb in an Infant. *Clinical Pediatrics*. 2019; 58(6):711–714.

**Liao N**, Mahan JD, Scherzer R. The Pediatric Match Frenzy: An Overview and an Approach for Mentoring Medical Students. *Acad Pediatr*. 2019 Jun 12. pii: S1876-2859(19)30294-3.

FAST FACTS

July 2018 through June 2019

|                                          |       |
|------------------------------------------|-------|
| Inpatient Discharges: .....              | 2,535 |
| Observation Discharges: .....            | 3,634 |
| Total Discharges: .....                  | 6,169 |
| Average Length of Stay*: .....           | 4     |
| Average Daily Census*: .....             | 25    |
| Patient Days*: .....                     | 9,254 |
| Complex Health Care Clinic Visits: ..... | 3,303 |

\*Excludes observation and outpatient-in-a-bed patients.





*“It appears that higher RSV loads trigger a more robust immune response.”*  
– Asuncion Mejias, MD, PhD, Principal Investigator, Center for Vaccines and Immunity

## *Infectious Diseases*

### **Understanding Viral Load Dynamics Can Help Inform RSV Treatment Decisions**

Respiratory syncytial virus (RSV) lower respiratory tract infection is a leading cause of hospitalization and mortality in infants worldwide, but a vaccine has not yet been developed, in part due to the incomplete understanding of RSV pathogenesis.

While investigating the relationship between RSV viral loads and disease severity in infants, researchers at Nationwide Children’s Hospital found that higher viral loads at presentation and a faster and consistent viral load decline were associated with less severe RSV disease.

“This is counterintuitive because you would expect that greater amount of virus in nasal secretions during the acute infection would be associated with more severe disease, but this is not the case with RSV. It appears that higher RSV loads trigger a more robust immune response, then in turn is associated with better outcomes,” says **Asuncion Mejias, MD, PhD**, senior author of the study and principal investigator in the Center for Vaccines and Immunity at the Abigail Wexner Research Institute at Nationwide Children’s.

The findings, published in the *Journal of Infectious Diseases*, were from a prospective study conducted at Nationwide Children’s that included 150 children who were less than 2 years of age: 39 outpatients with mild RSV disease and 111 inpatients with severe RSV bronchiolitis. The study compared viral loads and disease severity among outpatients and inpatients in the ward and the pediatric intensive care unit (PICU).

When adjusting for age, the team found that results were reproducible and that infants of similar ages with RSV infection and a mild disease phenotype had higher RSV loads at presentation than their counterparts with severe RSV infection. Additionally, after excluding infants treated with steroids, those hospitalized in the ward had also higher viral loads than those in the PICU with more severe disease.

“In the inpatient setting, patients that received systemic steroids, which are not routinely indicated for the management of RSV infection, cleared the virus at a slower pace and had worse outcomes,” says **Octavio Ramilo, MD**, chief of Infectious Diseases and principal investigator in the Center for Vaccines and Immunity at Nationwide Children’s. “This observation is specifically relevant for children with severe RSV infection hospitalized in the PICU, for whom treatment with steroids should be avoided.”

#### **CITATION:**

Garcia-Mauriño C, Moore-Clingenpeel M, Thomas J, Mertz S, Cohen DM, Ramilo O, Mejias A. Viral Load Dynamics and Clinical Disease Severity in Infants with Respiratory Syncytial Virus Infection. *J Infect Dis*. 2019 Apr 8;219(8):1207-1215.

INFECTIOUS DISEASES

The specialists in the Division of Infectious Diseases at Nationwide Children’s Hospital provide expertise in the diagnosis and management of children with all types of acute and chronic infections in both immune-competent and compromised children. Our physicians provide direct care for patients admitted to the Nationwide Children’s Infectious Diseases Unit and clinical consultation for patients with complicated infectious diseases throughout the hospital, in close partnership with their primary care teams. We have developed close clinical and research collaborations with physicians in Hematology, Oncology & Blood and Marrow Transplant, Pediatric Critical Care, Cardiology, Lung, Heart and Liver Transplantation, Neonatology and the various surgical departments in order to optimize the infectious diseases-related care of patients. Patients are also evaluated in the ambulatory setting following referral to the Infectious Diseases, Tuberculosis, Neonatology/Infectious Disease, Host Defense, and the Family AIDS Clinic Education Services (FACES) Program Clinics located on the Nationwide Children’s main campus. Additionally, our division offers consults to external providers and their patients through the Nationwide Children’s Hospital Physician Consult and Transfer Center. Research is conducted through the division and in collaboration with our colleagues from the Clinical Microbiology Laboratory, the Center for Microbial Pathogenesis, the Center for Vaccines and Immunity and other centers in the Abigail Wexner Research Institute at Nationwide Children’s, as well as national and international collaborators.

FACULTY



Octavio Ramilo, MD  
Division Chief



William J. Barson, MD  
Section Chief

FULL-TIME NATIONWIDE CHILDREN’S FACULTY

Monica Ardura, DO, MSCS

Jeffrey Auletta, MD

Michael T. Brady, MD

Megan Brundrett, MD

Kevin Cassady, MD

Juan Chaparro, MD

Guliz Erdem, MD

Charitha Gowda, MD, MPH

Jonathan R. Honegger, MD

W. Garrett Hunt, MD, MPH, DTM&H

Su Jin Joo, MD

Maria Asuncion Mejias, MD, PhD, MSCS

Christopher Ouellette, MD

Pablo J. Sánchez, MD

Masako Shimamura, MD

Eunkyung Song, MD

Rebecca Wallihan, MD

Matthew Washman, MD, MPH

Joshua Watson, MD

CLINICAL MICROBIOLOGY

Amy Leber, PhD

Director

Huanyu Wang, PhD

Assistant Director

OSU-AFFILIATE FACULTY

Susan L. Koletar, MD

Carlos Malvestutto, MD, MPH

David A. Wininger, MD

The Division of Infectious Diseases continues to expand clinical activities to patients with complex infections in different settings across the hospital, including the specialized Infectious Diseases Inpatient Unit, the Infectious Diseases Consult Service, and in a number of specialized outpatient clinics (General ID, Host Defense, HIV, Neonatology/Infectious Disease, Kawasaki and PANDAS). With plans to add a nurse practitioner, we continue to expand our team to optimize the preventative and therapeutic care of immunocompromised children through our Host Defense Program.

This year we welcomed two new faculty members, Matthew Washam, MD, as the new chief of Epidemiology and Infection Prevention, and Su Jin Joo, MD. Dr. Joo will work with Joshua Watson, MD, the director of our Antimicrobial Stewardship Program, to advance the program’s goals to optimize antibiotic therapy in both inpatient and outpatient settings. Jonathan Honegger, MD, through the Hepatitis C Clinic, will soon begin treating children with hepatitis C infections. Pablo Sanchez, MD, through the Neonatology/Infectious Disease Clinic, is caring for the increasing number of children with infection due to CMV and syphilis. We continue to strengthen our research collaborations with colleagues in the Center for Microbial Pathogenesis and the Center for Vaccines and Immunity in the Abigail Wexner Research Institute, as well as the Clinical Microbiology Laboratory. We have established clinical translational research programs regarding a variety of conditions, including hepatitis (Jonathan Honegger, MD; Chris Walker, PhD; Charitha Gowda, MD), adenovirus (Amy Leber, PhD; Eunkyung Song, MD), cytomegalovirus (Pablo Sanchez, MD; Asuncion Mejias, MD; Masako Shimamura, MD), pneumococcus (William Barson, MD; Guliz Erdem, MD), tuberculosis and Global Health (W. Garrett Hunt, MD), RSV-vaccine development (Asuncion Mejias, MD; Octavio Ramilo, MD; Mark Peeples, PhD), pediatric pneumonia (Rebecca Wallihan, MD; Octavio Ramilo, MD), and translational and diagnostic/therapeutic clinical trials aimed to

optimize clinical outcomes in immunocompromised hosts (Monica Ardura, MD; Jeffrey Auletta, MD; Christopher Ouellette, MD; Masako Shimamura, MD; Eunkyung Song, MD).

**Research:** See page 188 for information about the Center for Microbial Pathogenesis, and page 192 for the Center for Vaccines and Immunity, in the Abigail Wexner Research Institute at Nationwide Children’s Hospital.

GRANTS AWARDED TO ALL INFECTIOUS DISEASES CLINICAL AND RESEARCH FACULTY  
JULY 1, 2018 – JUNE 30, 2019

\$15,079,619

SELECTED PUBLICATIONS

Auletta JJ, Sánchez PJ, Meyer EK, O’Donnell LC, Cassady KA, Ouellette CP, Hecht S, Diaz A, Pavlek LR, Salamon DP, Gallagher CL, Bradbury H, Wellfley SL, Magers J, Armbruster DL, Lamb MG, Nakkula RJ, Bosse K, Lee DA. Adjuvant Haploidentical Virus-Specific T Lymphocytes for Treatment of Disseminated Adenovirus Infection in a Premature Infant. *J Allergy Clin Immunol.* 2019;144(2):594-597.

Eid AJ, Ardura MI; AST Infectious Diseases Community of Practice. Human Parvovirus B19 in Solid Organ Transplantation: Guidelines from the American Society of Transplantation Infectious Diseases Community of Practice. *Clin Transplant.* 2019 Apr 11:e13535.

Li M, Boddeda SR, Chen B, Zeng Q, Schoeb TR, Velazquez VM, Shimamura M. NK Cell and Th17 Responses are Differentially Induced in Murine Cytomegalovirus Infected Renal Allografts and Vary According to Recipient Virus Dose and Strain. *Am J Transplant.* 2018 Nov;18(11):2647-2662.

Tomatis Souverbielle C, Feister J, Leber A, Salamon D, Mejias A, Ramilo O, Erdem G. Routine Blood, Cerebrospinal Fluid and Non Sterile Superficial Sites PCR Testing for Enteroviruses in Young Febrile Infants. *Lancet Infect Dis.* 2019;19:239.

Wallihan R, Suarez N, Cohen D, Marcon M, Mejias AM, Moore-Clingenpeel M, Ramilo O. Molecular Distance to Health Transcriptional Score for Assessment of Disease Severity in Children Hospitalized with Community-Acquired Pneumonia. *Front Cell Infect Microbiol.* 2018 Oct 30;8:382.

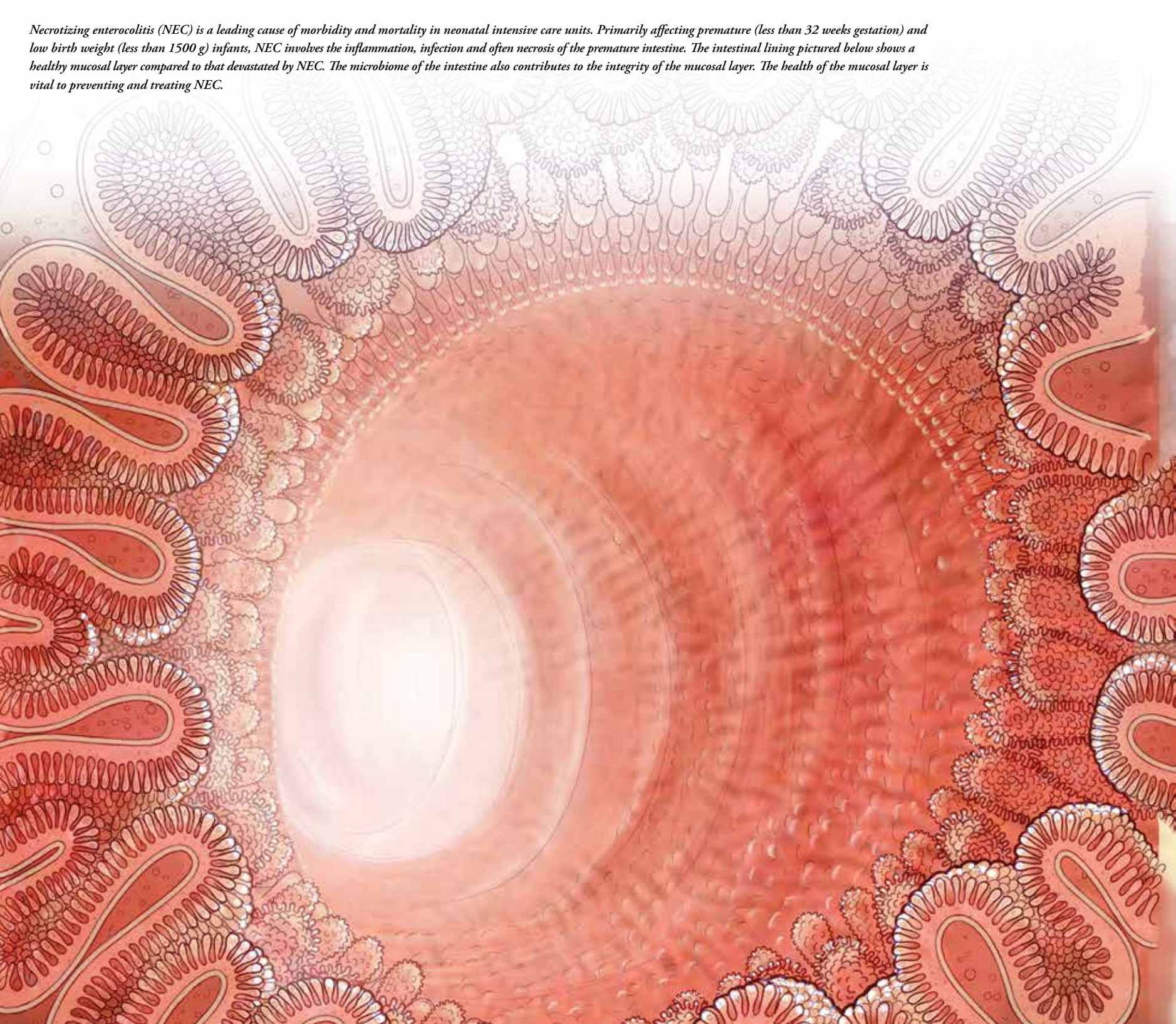
| FAST FACTS                                              |       |
|---------------------------------------------------------|-------|
| July 2018 through June 2019                             |       |
| Inpatient Discharges:.....                              | 2,884 |
| Observation and Outpatient-in-a-Bed Discharges: .....   | 446   |
| Total Discharges:.....                                  | 3,330 |
| Average Length of Stay*:.....                           | 2     |
| Average Daily Census*: .....                            | 18    |
| Patient Days*:.....                                     | 6,711 |
| Inpatient Consults:.....                                | 669   |
| Infectious Disease Clinic Visits:.....                  | 1,339 |
| Immunodeficient Clinic Visits:.....                     | 2,273 |
| <b>Tuberculosis Clinic Visits</b>                       |       |
| Dublin Tuberculosis Clinic Visits:.....                 | 42    |
| Hilltop Tuberculosis Clinic Visits:.....                | 37    |
| Northland Tuberculosis Clinic Visits:.....              | 151   |
| Sharon Woods Tuberculosis Clinic Visits: .....          | 73    |
| Tuberculosis Clinic Visits:.....                        | 702   |
| *Excludes observation and outpatient-in-a-bed patients. |       |

2018 – 2019 NATIONWIDE CHILDREN’S  
FELLOWSHIP PROGRAM

**PEDIATRIC INFECTIOUS DISEASES**  
 Dana Danino, MD (Host Defense Fellowship)  
 Alejandro D. Diaz, MD  
 Shaina Hecht, MD  
 Aspasia Katragkou, MD  
 Mariana Lanata, MD  
 Stephanie Smith, MD  
 Jeanette Taveras, DO



Necrotizing enterocolitis (NEC) is a leading cause of morbidity and mortality in neonatal intensive care units. Primarily affecting premature (less than 32 weeks gestation) and low birth weight (less than 1500 g) infants, NEC involves the inflammation, infection and often necrosis of the premature intestine. The intestinal lining pictured below shows a healthy mucosal layer compared to that devastated by NEC. The microbiome of the intestine also contributes to the integrity of the mucosal layer. The health of the mucosal layer is vital to preventing and treating NEC.



## Neonatology

### Enhanced Biofilm Formulation May Increase Protection Against NEC

Pathogenic microbes form fortress-like biofilms making them resistant to the immune system and current antimicrobials.

But what if biofilms could be used for good? Researchers at Nationwide Children’s Hospital are investigating how. They have designed a delivery system to treat premature infants with necrotizing enterocolitis (NEC) that may have applications beyond the neonatal intensive care unit (NICU).

Researchers at Nationwide Children’s from Pediatric Surgery and the Center for Microbial Pathogenesis had already shown that that a formulation of *Lactobacillus reuteri* biofilm grown on microspheres protect against experimental NEC. A new iteration of the technology may help further reduce its incidence.

“NEC is a devastating problem for premature infants. Despite decades of research, 10% of infants born under 1500 grams will develop NEC, and mortality remains as high as 30% for these babies,” says **Gail Besner, MD**, chief of Pediatric Surgery at Nationwide Children’s.

The newest results, reported in *American Journal of Physiology*, shows a single dose *L. reuteri* biofilm microspheres enhanced with sucrose or maltose not only reduced the incidence of NEC in animals but also improved animal survival, reduced intestinal mucosal barrier breakdown and limited intestinal inflammation.

Microspheres loaded with maltose also augmented the persistence of numerous *Lactobacillus* species in the intestinal tract and shifted the gut microbiome to be more similar to that of breast-fed babies.

“Given the microbiome disruption observed in preterm infants who go on to develop NEC, a treatment that preserves the microbiome holds great promise as an intervention to prevent NEC,” says Dr. Besner, who is also a principal investigator in the Center for Perinatal Research at Nationwide Children’s. “Furthermore, our novel probiotic delivery system limits the expansion of pathogenic bacteria such as *Enterobacter* species, providing further evidence that it attenuates detrimental NEC-induced dysbiosis.”

“As we continue to learn more about the microbiome and its relationship to health and disease, probiotic administration may play an increasingly important role in disease prevention and management,” she adds.

Drs. Besner, Steve Goodman, PhD, Michael Bailey, PhD, and Lauren Bakaletz, PhD are the scientific founders of a preclinical stage company – Scioto Biosciences – created to bring microbiome therapeutics to the marketplace. They are currently in talks with the U.S. Food and Drug Administration to design a clinical trial to test the delivery system in humans.

**CITATION:**  
Olson JK, Navarro JB, Allen JM, McCulloh CJ, Mashburn-Warren L, Wang Y, Varaljay VA, Bailey MT, Goodman SD, Besner GE. An Enhanced *Lactobacillus reuteri* Biofilm Formulation that Increases Protection against Experimental Necrotizing Enterocolitis. *American Journal of Physiology – Gastrointestinal and Liver Physiology*. 2018 Sep 1;315(3):G408-G419.



“Despite decades of research, 10% of infants born under 1500 grams will develop NEC, and mortality remains as high as 30% for these babies.”  
– Gail Besner, MD

NEONATOLOGY

Nationwide Children’s Hospital is home to the largest network of clinical neonatal care in the United States. The Section of Neonatology at Nationwide Children’s is an integral component of the neonatal program, which includes a full range of family-centered newborn care and innovative clinical and translational research programs, conducted through the Division of Neonatology and in collaboration with the Center for Perinatal Research in the Abigail Wexner Research Institute at Nationwide Children’s.

FACULTY



**Leif D. Nelin, MD**  
*Division Chief*



**Kristina M. Reber, MD**  
*Associate Division Chief*



**Edward G. Shepherd, MD**  
*Section Chief*



**Sudarshan Jadcherla, MD**  
*Associate Division Chief for Academics*

FULL-TIME NATIONWIDE CHILDREN’S FACULTY

- Ehab I. Ahmed, MD
- Carl H. Backes, MD
- Molly K. Ball, MD
- Roopali V. Bapat, MD
- Thomas Bartman, MD, PhD
- Kristen L. Benninger, MD
- Elizabeth M. Bonachea, MD
- Erica Braswell, MD
- Bernadette Chen, MD
- Jana Erner, MD
- Omid Fathi, MD
- Ish Gulati, MD
- Jennifer Haase, MD
- Jason Kovalcik, MD
- J. Wells Logan, MD
- Susan K. Lynch, MD
- Nathalie Maitre, MD, PhD
- Daniel Malleske, MD
- Mohannad Moallem, MD
- Craig A. Nankervis, MD
- Mary L. Neel, MD

- Ahmed Osman, MD
- Pablo J. Sanchez, MD
- Amy L. Schlegel, MD
- Ruth B. Seabrook, MD
- Vanessa L. Shanks, MD
- Jonathan L. Slaughter, MD, MPH
- Michael R. Stenger, MD
- Maria M. Talavera, DO
- Christopher J. Timan, MD
- Jennifer K. Trittmann, MD, MPH
- Sreekanth K. Viswanathan, MD
- Sheria D. Wilson, MD

COMMUNITY-BASED FACULTY

- Craig W. Anderson, MD
- Sarah J. Corriveau, MD
- Joshua H. Goldberg, MD
- Barry Halpern, MD
- Nancy B. Hansen, MD
- Jeffrey S. Keyes, MD
- Corin Cozzi Linsey, MD
- Wendy A. Luce, MD
- Benjamin A. McDonald, MD
- Randy R. Miller, MD
- Richard Moraille, MD
- Apurwa S. Naik, MD
- Juli M. Richter, MD
- John H. Seguin, MD
- Teresa L. Seto, MD
- Michael Shoemaker, MD
- Gary E. Snyder, MD
- Anthony R. Theile, DO
- Allison Vasileff, MD
- Natalie O. White, DO
- Jonathan R. Wispe, MD

NEONATOLOGY ADMINISTRATION

- Lee Ann Wallace, MBA, BSN, RN, NEA-BC  
*Vice President Neonatal Services*
- Lawrence Baylis, MHA  
*Service Line Administrator*

Heather Larson  
*Business Manager*

NEONATAL SERVICES DIRECTORS

- Renee Gardikes-Gingery, MSN, RN
- Marissa Larouere, RN, BSN, MBA
- Winifred Payne, MSN, RN, NEA-BC

DIRECTOR OF NEONATAL ADVANCED PRACTITIONERS

Erin Keels, DNP, APRN, NNP-BC

The Section of Neonatology is dedicated to providing integrated perinatal care and research throughout the patient life cycle to reduce infant mortality and morbidities so that children are able to reach their full potential. To achieve this, the section not only provides outstanding neonatal care, but also has implemented a variety of innovative, unique programs that bring together multidisciplinary groups to provide advanced clinical care and research targeting the most common and most debilitating causes of mortality and morbidity in these babies. These programs include the comprehensive Center for Bronchopulmonary Dysplasia, the Infant Feeding Disorders Program, the Small Baby Program, the Congenital Infections Program and the Neurodevelopmental Follow-up Program. The Center for Bronchopulmonary Dysplasia has the only dedicated unit (C4A) for the care of infants with BPD in the country. The BPD unit draws patients from all over the United States including as far away as California, Oregon and Utah. The BPD unit has excellent outcomes including a very low mortality rate and tracheostomy rate. Furthermore, we recently examined neurodevelopmental outcomes and found that 56% of patients have no evidence of neurodevelopmental impairment, despite the fact that 78% of the patients in this cohort had severe BPD. The Infant Feeding Disorders Program provides advanced care and treatment to optimize outcomes for infants with feeding disorders. The Infant Feeding Disorders Program’s ongoing QI initiative — the feeding enhancement program — has significantly and sustainably shortened the length of time for preterm infants to achieve full oral feeds, which has resulted in a significant and sustained shorter length of stay. The Small Baby Program continues to positively impact the outcomes of extremely preterm infants (those born at <27 weeks gestation). This year the small baby program published results demonstrating that a more conservative approach to the patent ductus arteriosus was associated with improved survival and no increase in morbidities. The Congenital Infections Program is a multidisciplinary program targeting babies born with congenital viral infections, and this

year implemented universal screening for congenital cytomegaloviral infections in the Nationwide Children’s Neonatal Network. Finally, for our patients to reach their full potential requires longer term outpatient neurodevelopmental care available through our Neonatal Follow-up Program, which was the first program in the United States to implement the international guidelines for early diagnosis and intervention for cerebral palsy.

**Perinatal Research:** See page 190 for information about the Center for Perinatal Research in the Abigail Wexner Research Institute at Nationwide Children’s.

**GRANTS AWARDED TO NEONATOLOGY  
CLINICAL AND RESEARCH FACULTY  
JULY 1, 2018 – JUNE 30, 2019**

\$6,540,917

**2018 – 2019 NATIONWIDE CHILDREN’S  
FELLOWSHIP PROGRAM**

**SELECTED PUBLICATIONS  
NEONATAL-PERINATAL MEDICINE**

Julie A. Dillard, MD  
Maria Ferrara, MD  
Avante D. Milton, MD

Leeann R. Pavlek, MD  
Christopher Regan, DO  
Kristopher C. Rosburg, MD  
Hevil Shah, MD

Lindsey Korbel, MD  
Alexandra Medoro, MD  
Amy Brown, MD

**Backes CH,** Söderström F, Ågren J, Sindelar R, Bartlett CW, Rivera BK, Mitchell CC, Frey HA, **Shepherd EG, Nelin LD,** Normann E. Outcomes Following a Comprehensive Versus a Selective Approach for Infants Born at 22 Weeks of Gestation. *J Perinatol.* 2019 Jan;39(1):39-47.

Cantey JB, Pyle AK, Wozniak PS, Hynan LS, **Sánchez PJ.** Early Antibiotic Exposure and Adverse Outcomes in Preterm, Very Low Birth Weight Infants. *J Pediatr.* 2018 Dec;203:62-67.

Ezenwa B, **Pena E, Schlegel A, Bapat R, Shepherd EG, Nelin LD.** Effects of Practice Change on Outcomes of Extremely Preterm Infants with Patent Ductus Arteriosus. *Acta Paediatr.* 2019 Jan;108(1):88-93.

**Neel ML,** Yoder P, Matusz PJ, Murray MM, Miller A, Burkhardt S, Emery L, Hague K, Pennington C, Purnell J, Lightfoot M, **Maitre NL.** Randomized Controlled Trial Protocol to Improve Multisensory Neural Processing, Language and Motor Outcomes in Preterm Infants. *BMC Pediatr.* 2019 Mar 19;19(1):81.

Prabhakar V, Hasenstab K, Osborn E, Wei L, **Jadcherla SR.** Pharyngeal Contractile and Regulatory Characteristics are Distinct during Nutritive Oral Stimulus in Preterm Born Infants: Implications for Clinical and Research Applications. *Neurogastro Motil.* 2019 May 26; e13650.

**CLINICAL FAST FACTS**

*July 2018 through June 2019*

**Main Campus**

Inpatient Discharges:..... **1,051**  
Observation and Outpatient-in-a-Bed Discharges: ..... **15**  
Total Discharges:..... **1,066**  
Average Length of Stay\*:..... **37.0**  
Average Daily Census\*: ..... **106.4**  
Patient Days\*:..... **38,843**  
Fetal Medicine Collaborative Clinic Visits: ..... **199**  
Neonatology Clinic Visits:..... **3,693**  
Neonatology BPD Clinic Visits: ..... **1,041**  
Neonatal Abstinence Syndrome Clinic Visits: ..... **166**

**Newborn Intensive Care Unit  
at Riverside Methodist Hospital**

Total Discharges:..... **554**  
Average Length of Stay\*:..... **23.3**  
Average Daily Census\*: ..... **35.4**  
Patient Days\*:..... **12,928**

**Newborn Intensive Care Unit at Grant Medical Center**

Total Discharges:..... **231**  
Average Length of Stay\*:..... **21.0**  
Average Daily Census\*: ..... **13.3**  
Patient Days\*:..... **4,851**

**Newborn Intensive Care Unit at Doctor's Hospital West**

Total Discharges: ..... **116**

Average Length of Stay\*:..... **15.8**  
Average Daily Census\*: ..... **5.0**  
Patient Days\*:..... **1,829**

**Newborn Special Care Nursery  
at Dublin Methodist Hospital**

Total Discharges:..... **159**  
Average Length of Stay\*:..... **8.3**  
Average Daily Census\*: ..... **3.6**  
Patient Days\*:..... **1,327**

**Newborn Intensive Care Unit at St. Ann’s Hospital**

Total Discharges:..... **306**  
Average Length of Stay\*:..... **17.6**  
Average Daily Census\*: ..... **14.8**  
Patient Days\*:..... **5,388**

**Newborn Intensive Care Unit at  
The Ohio State University Wexner Medical Center**

Inpatient Discharges:..... **714**  
Total Discharges:..... **715**  
Observation and Outpatient-in-a-Bed Discharges: ..... **1**  
Average Length of Stay\*:..... **18.2**  
Average Daily Census\*: ..... **35.5**  
Patient Days\*:..... **12,975**  
Patient Days\*:..... **13,867**

*\*Excludes observation and outpatient-in-a-bed patients.*



## Nephrology

### Common Clinical Markers Predict End-stage Renal Disease in Children with Obstructive Uropathy

Frequently measured clinical markers can predict end-stage renal disease in children with obstructive uropathy, a multicenter, collaborative study in *Pediatric Nephrology* shows.

Obstructive uropathy is a “blanket diagnosis,” explains **Daryl McLeod, MD**, a member of the Section of Urology at Nationwide Children’s. The term encompasses several complications that can occur during fetal development or after birth that impede urine flow and can ultimately injure the kidneys.

“A lot of damage has already occurred to the kidneys and urinary tract before we are able to intervene,” says Dr. McLeod. “We need a better way to identify which kids are going to have a worse course than others because up to 40 or 50% of these kids end up requiring dialysis or kidney transplant.”

“This study looks at a large prospective cohort of children with obstructive uropathy and identifies distinguishing features in their urine testing and serum chemistries that predict future need for renal replacement therapy,” says **Brian Becknell, MD, PhD**, a member of the Division of Nephrology and principal investigator in the Center for Clinical and Translational Research at Nationwide Children’s.

The researchers performed a retrospective review of data from the longitudinal dataset called CKiD, Chronic Kidney Disease in Children. After matching children who received renal replacement therapy with children who did not, the researchers found that all markers demonstrated some predictive value either at baseline, over time, or both.

The markers studied included: glomerular filtration rate, urine protein/Cr, urine microalbumin/Cr, serum hemoglobin, serum phosphate, serum albumin and serum CO<sub>2</sub>.

“This study had a lot of heterogeneity with regard to diagnosis,” says Dr. Becknell, who is also an assistant professor at The Ohio State University College of Medicine. “These kids might have had an obstruction, but we don’t know the level of that obstruction or the manner in which it was managed. That’s a really big deal. We need more uniform diagnostic groups of children to see how well these vital markers really perform. Then, we can ask how well they perform five, 10 or 15 years out; because in certain instances, children may require renal replacement therapy as adolescents instead of in the first several years of life.”

**CITATION:**  
McLeod DJ, Ching CB, Sebastião YV, Greenberg JH, Furth SL, McHugh KM, Becknell B. Common Clinical Markers Predict End-Stage Renal Disease in Children with Obstructive Uropathy. *Pediatric Nephrology*. 2019 March; 34(3):443-448.

*“This study looks at a large prospective cohort of children with obstructive uropathy and identifies distinguishing features in their urine testing and serum chemistries that predict future need for renal replacement therapy.”*

– Brian Becknell, MD, PhD Principal Investigator, Center for Clinical and Translational Research



NEPHROLOGY

The Division of Nephrology at Nationwide Children’s Hospital provides specialized primary and consultative care for children with kidney and urinary tract problems through age 21. Disorders treated include acute kidney injury, chronic kidney disease, congenital anomalies of the kidneys and urinary tract, glomerular disorders, tubular disorders, urinary tract infection, kidney stones, electrolyte disorders, hypertension and metabolic bone disease. A full range of renal replacement therapy services are available, including hemodialysis, peritoneal dialysis, continuous renal replacement therapy and kidney transplantation.

FACULTY



John David Spencer, MD  
Division Chief



Hiren P. Patel, MD  
Section Chief

- Brian Becknell, MD, PhD
- Ray Bignall II, MD
- Mahmoud Kallash, MD
- John D. Mahan, MD
- William E. Smoyer, MD
- Beth A. Vogt, MD

In 2018, the Division of Nephrology welcomed two new nephrologists – Ray Bignall II, MD, and Beth A. Vogt, MD. Dr. Bignall is a junior nephrologist with a national reputation in patient advocacy and is actively involved in both the American Society of Nephrology and American Society of Pediatric Nephrology Public

Policy Committees. Locally, Dr. Bignall is actively involved in the Healthy Neighborhoods Healthy Families initiative. Dr. Vogt is a senior nephrologist and nationally recognized educator who routinely lectures for the American Academy of Pediatrics. Dr. Vogt serves as the director of our acute and chronic dialysis program.

The Division of Nephrology continues to work closely and in collaboration with multiple clinical and surgical divisions. Clinical operations in the combined Urology-Nephrology Clinic have nearly doubled. While doing so, we have standardized clinical care for children with urinary tract obstruction and integrated preclinical and translational research efforts into nearly every patient visit. Additionally, we have increased patient volumes in our multidisciplinary Metabolic Bone Clinic as well as the Lupus Clinic, which is managed in collaboration with the Division of Rheumatology.

The Division of Nephrology maintains an active and highly-funded research program in the Abigail Wexner Research Institute. Three of our physician-scientists maintain actively funded National Institutes of Health (NIH) research programs. Additionally, our division participates in over 40 IRB-approved clinical and translational studies that are supported by five new clinical research coordinators. These studies investigate mechanisms and outcomes of urinary tract infection, obstructive uropathy, chronic kidney disease, bacterial peritonitis, renal transplantation, glomerular diseases, metabolic bone disorders and medical education. Many of these studies are performed in conjunction with the Pediatric Nephrology Research Consortium. John D. Mahan, MD, serves as this consortium’s president. This past year, William E. Smoyer, MD, received added funding to spearhead the Cure Glomerulonephropathy Network (CureGN), a multi-center study funded by the NIH to identify markers of glomerular disease and evaluate how new therapies impact disease progression. Also, Brian Becknell, MD, PhD, was awarded the prestigious American Society of Nephrology Normal Siegal Research Award to examine the role of the uroplakin plaque in obstructive kidney disease.

Research done by the clinical and research faculty was presented at several national academic meetings, including the American Society of Nephrology Kidney Week, the Pediatric Academic Societies meeting, and multiple specialized international research symposia. Nephrology faculty had over 30 unique, peer-reviewed publications, some of which are highlighted here.

**Research:** See page 183 for information about the Center for Clinical and Translational Research in the Abigail Wexner Research Institute at Nationwide Children’s.

**GRANTS AWARDED**  
**JULY 1, 2018 – JUNE 30, 2019**  
\$973,520

SELECTED PUBLICATIONS

Eichler T, Bender K, Murtha MJ, Schwartz L, Metheny J, Solden L, Jaggers RM, Bailey MT, Gupta S, Mosquera C, Ching C, La Perle K, Li B, **Becknell B, Spencer JD**. Ribonuclease 7 Shields the Kidney and Bladder from Invasive Uropathogenic Escherichia coli Infection. *J Am Soc Nephrol*. 2019 Aug;30(8):1385-1397.

Jackson AR, Li B, Cohen SH, Ching CB, McHugh KM, **Becknell B**. The Uroplakin Plaque Promotes Renal Structural Integrity During Congenital and Acquired Urinary Tract Obstruction. *Am J Physiol Renal Physiol*. 2018 Oct 1;315(4):F1019-F1031.

**Kallash M, Smoyer WE, Mahan JD**. Rituximab Use in the Management of Childhood Nephrotic Syndrome. *Front Pediatr*. 2019 May 10;7:178.

Murtha MJ, Eichler T, Bender K, Metheny J, Li B, Schwaderer AL, Mosquera C, James C, Schwartz L, **Becknell B, Spencer JD**. Insulin Receptor Signaling Regulates Renal Collecting Duct and Intercalated Cell Antibacterial Defenses. *J Clin Invest*. 2018 Dec 3;128(12):5634-5646.

Pottanat ND, Brook AC, Bartosova M, Cortado H, Gupta S, Li B, Jackson AR, Vonau M, Cohen S, Ferrara M, Ching CB, **Spencer JD, Brauner A, Fraser DJ, Schmitt CP, Eberl M, Ayoob R, Becknell B**. Analysis of the Ribonuclease A Superfamily of Antimicrobial Peptides in Patients Undergoing Chronic Peritoneal Dialysis. *Sci Rep*. 2019 May 23;9(1):7753.

FAST FACTS

July 2018 through June 2019

|                                                       |     |                                                         |       |
|-------------------------------------------------------|-----|---------------------------------------------------------|-------|
| Inpatient Discharges:.....                            | 174 | Patient Days*:.....                                     | 847   |
| Observation and Outpatient-in-a-Bed Discharges: ..... | 102 | Nephrology Clinic Visits: .....                         | 4,002 |
| Total Discharges:.....                                | 276 | Dublin Nephrology Clinic Visits: .....                  | 294   |
| Average Length of Stay*:.....                         | 4.9 | Kidney Transplants: .....                               | 6     |
| Average Daily Census*: .....                          | 2.3 | *Excludes observation and outpatient-in-a-bed patients. |       |

2018 – 2019 NATIONWIDE CHILDREN’S FELLOWSHIP PROGRAM

PEDIATRIC NEPHROLOGY

- Jessica M. Greco, MD (Medicine/Pediatrics)
- Reeti Kumar, MD (Pediatrics)
- Emily Stonebrook, MD (Pediatrics)
- Jason P. Thomas, MD (Pediatrics)



*“Good evidence exists that lower socioeconomic status and poverty are associated with a greater incidence, frequency and severity of stroke and worse outcomes in adults, So, it seemed obvious that we should ask this question in children.”*

– Warren Lo, MD, Director, Stroke Clinic

## Neurology

### Lower Socioeconomic Status Is Associated With Worse Childhood Arterial Ischemic Stroke Outcomes

An international study found that low household income is associated with poorer arterial ischemic stroke (AIS) outcomes in pediatric patients. This trend held true even when children from lower- and middle-income countries were excluded.

Senior author **Warren Lo, MD**, a member of the Division of Neurology at Nationwide Children’s Hospital, collaborated on the study with colleagues at the Hospital for Sick Children in Toronto and the University of California San Francisco.

“Good evidence exists that lower socioeconomic status and poverty are associated with a greater incidence, frequency and severity of stroke and worse outcomes in adults,” says Dr. Lo. “So, it seemed obvious that we should ask this question in children.”

The study included 355 children at 37 international centers in 9 countries between 2010 and 2014. Lower annual family income was associated with worse patient outcome. Very-low-income patients (<\$10,000) had more than 3 times the risk for worse 1-year outcomes compared with high-income children (>\$100,000).

Income did not correlate with the receipt of rehabilitation services, although the quality and frequency of services received was not assessed. Further, low income and decreased consciousness at presentation were highly correlated so that decreased consciousness was excluded from the analysis. This association, however, suggests that children from very-low-income families may have been far sicker at the time of presentation.

While the authors were not able to identify the cause for worse outcome after stroke in very-low-income children, they suggest that examination of unmeasured variables such as nutritional status could help clarify this relationship and warrant further investigation.

Dr. Lo, who is director of the Stroke Clinic at Nationwide Children’s and professor of Pediatrics at The Ohio State University College of Medicine, speculates that children who are extremely poor may have less access to high-quality health care, preventative health care and/or adequate vaccination. Previous studies found that children who were under-vaccinated were at a higher risk for developing stroke than children who were fully-vaccinated. Additionally, after a stroke, their parents may not have the resources or time to take off from work to commit to chronic rehabilitation if necessary.

The new publication was part of the larger, National Institutes of Health-funded Vascular Effects of Infection in Pediatric Stroke (VIPS) project for which Dr. Lo was a site investigator.

**CITATION:**  
Jordan LC, Hills NK, Fox CK, Ichord RN, Pergami P, deVeber GA, Fullerton HJ, Lo W, For the VIPS Investigators. Socioeconomic Determinants of Outcome after Childhood Arterial Ischemic Stroke. *Neurology*. 2018 Aug 7; 91(6): e509-e516.

NEUROLOGY

The Division of Neurology providers at Nationwide Children’s Hospital deliver comprehensive care for children with a wide variety of disorders. These include simple and complex epilepsy, primary and secondary headache and migraine, tics and movement disorders, muscular dystrophy, spinal muscular atrophy and neuropathy. In order to correctly identify and safely treat these children, state-of-the-art neurophysiological diagnostic testing and intraoperative monitoring is used. Our mission is to achieve the best outcomes for all children and adolescents with neurological illness.

FACULTY



Anne M. Connolly, MD  
Division Chief



Anup D. Patel, MD  
Section Chief

- Dara Albert, DO
- William D. Arnold, MD
- Kristen Arredondo, MD
- Shawn Aylward, MD
- Melissa Chung, MD
- Emily De Los Reyes, MD
- John L. Eickholt III, MD
- Kevin Flanigan, MD
- Mariam L. Freimer, MD
- Melissa Hutchinson, MD
- Monica P. Islam, MD
- Latif Khuhro, MD

- Neil Kulkarni, MD
- Lenora Lehwald, MD
- Warren D. Lo, MD
- Jennifer McKinney, MD
- Jerry Mendell, MD
- John Mytinger, MD
- Adam Ostendorf, MD
- Ann Pakalnis, MD
- Margie Ream, MD, PhD
- Sean Rose, MD
- Zarife Sahenk, MD, PhD
- Laurel Slaughter, MD
- Chang-Yong Tsao, MD
- Jaime-Dawn Twanow, MD
- Jorge Vidaurre, MD
- Megan Waldrop, MD
- Pedro Weisleder, MD, PhD

Anne M. Connolly, MD, joined Nationwide Children’s Hospital in early 2019 as Neurology division chief as well as a member of the Center for Gene Therapy. An internationally recognized expert in pediatric neuromuscular disease and neuroimmunology, Dr. Connolly has served as a national thought leader for multiple foundation and government agency efforts to improve outcomes in children with neuromuscular disorders.

We lost a spectacular colleague and friend with the death of Howard Jacobs, MD. His commitment to the advancement of care of children with headache will be deeply missed.

In summer 2019 we welcomed three new faculty members. Mellissa Hutchinson, MD, will lead our new Neuroimmunology Program, and Kristin Arredondo, MD, and Neil Kulkarni, MD, both join our busy epilepsy and general child neurology sections.

In 2019 the U.S. Food and Drug Administration approved gene transfer for infants with spinal muscular atrophy (SMA), and ongoing research continues to develop gene therapy to older children with SMA, Duchenne and other forms of muscular dystrophy.

This past year remained busy for the section with 30 physicians, and 10 advanced health care providers. Members of the section oversee comprehensive programs for children with epilepsy, headache, movement disorders, neurodegenerative disorders and neuromuscular diseases. For children with complex disorders we use a multidisciplinary clinical approach. These clinics include the first Batten Disease Center of Excellence, the first Pediatric Intracranial Hypertension (pseudotumor cerebri) Clinic, and the first PPMD Duchenne muscular dystrophy center. Additional ongoing multidisciplinary programs include the Brain Tumor Program, Cerebrovascular Disease Clinic, Concussion Clinic, Epilepsy Clinic, Epilepsy Surgery Program, Muscular Dystrophy Clinic, Spinal Muscular Atrophy Clinic, Stroke Clinic and Tuberous Sclerosis Clinic.

The section offers outstanding residency and fellowship programs. The Child Neurology Residency program (certified by Accreditation Council for Graduate Medical Education) recently expanded to five residents per year with options for clinical- or research-focused educational tracks. Neurology also offers fellowship training in clinical

neurophysiology, gene therapy, headache, neuromuscular disease and stroke. Faculty members conduct both basic and clinical research and publish numerous journal articles and book chapters.

**Research:** See page 184 for information about the Center for Gene Therapy in the Abigail Wexner Research Institute at Nationwide Children’s.

**Neurosurgery:** See page 144 to learn about the Division of Neurosurgery at Nationwide Children’s.

**GRANTS AWARDED TO CENTER FOR GENE THERAPY AND NEUROLOGY CLINICAL AND RESEARCH FACULTY JULY 1, 2018 – JUNE 30, 2019**  
\$15,622,507

SELECTED PUBLICATIONS

**Connolly AM**, Zaidman CM, Golumbek PT, Craddock MM, **Flanigan KM**, Kuntz NL, Finkel RS, McDonald CM, Iannaccone ST, Anand P, Siener CA, Florence JM, Lowes LP, Alfano LN, Johnson LB, Nicorici A, Nelson LL, **Mendell JR**; MDA DMD Clinical Research Network. Twice-Weekly Glucocorticosteroids in Infants and Young Boys with Duchenne Muscular Dystrophy. *Muscle Nerve*. 2019 Jun;59(6):650-657.

**Islam MP**, Herman GE, **de los Reyes EC**. Language Regression in an Atypical SLC6A1 Mutation. *Semin Pediatric Neurology*. 2018 July;26:25-27.

**Jacobs H**, **Pakalnis A**. Premonitory Symptoms in Pediatric Migraine. *Pediatr Neurol*. 2019 Aug;97:26-29.

Jordan LC, Hills NK, Fox CK, Ichord RN, Pergami P, deVeber GA, Fullerton HJ, **Lo W**, for the VIPS Study Group. Socioeconomic Determinants of Outcome after Childhood Arterial Ischemic Stroke. *Neurology*. 2018; 91(6): e509-e516.

Pindrik J, Hoang N, Smith L, Halverson M, Wojnaroski M, McNally K, Gedela S, **Ostendorf AP**. Preoperative Evaluation and Surgical Management of Infants and Toddlers with Drug-Resistant Epilepsy. *Neurosurg Focus*. 2018 Sep;45(3):E3.

| CLINICAL FAST FACTS                                     |        |
|---------------------------------------------------------|--------|
| July 2018 through June 2019                             |        |
| <b>Neurology</b>                                        |        |
| Inpatient Discharges:.....                              | 631    |
| Observation and Outpatient-in-a-Bed Discharges: .....   | 902    |
| Total Discharges:.....                                  | 1,533  |
| Average Length of Stay*:.....                           | 2.8    |
| Average Daily Census*:.....                             | 4.8    |
| Patient Days*:.....                                     | 1,737  |
| Inpatient Consults:.....                                | 968    |
| Blanchard Neurology (PAA) Visits:.....                  | 3      |
| Complex Concussion Clinic Visits:.....                  | 423    |
| Stroke Clinic Visits:.....                              | 226    |
| Dublin Neurology Clinic Visits: .....                   | 3,142  |
| East Broad Neurology Clinic Visits: .....               | 991    |
| Findlay Neurology Clinic Visits: .....                  | 83     |
| Heinzerling Neurology Clinic Visits:.....               | 44     |
| Neurology Clinic Visits: .....                          | 9,532  |
| New Albany Neurology Clinic Visits:.....                | 7      |
| Westerville Neurology Clinic Visits: .....              | 1,898  |
| Total Neurology Clinic Visits.....                      | 16,349 |
| <b>Neuromuscular Disorders</b>                          |        |
| MDA Clinic Visits:.....                                 | 628    |
| Westerville Neuromuscular Clinic Visits: .....          | 23     |
| Neuromuscular Disorders Clinic Visits: .....            | 843    |
| Spinal Muscular Atrophy Clinic Visits: .....            | 169    |
| Total Neuromuscular Clinic Visits.....                  | 1,663  |
| *Excludes observation and outpatient-in-a-bed patients. |        |

2018 – 2019 NATIONWIDE CHILDREN’S RESIDENCY AND FELLOWSHIP PROGRAM

RESIDENCY PROGRAMS

**CHILD NEUROLOGY**  
Daniel Clark, MD  
Alexandra B. Kornbluh, MD  
Matthew Martin, MD  
Thomas Murray, DO  
Lisa Pabst, MD  
Melissa D. Squires, MD  
Whitney Woodhull, MD

FELLOWSHIP PROGRAMS

**GENE TRANSFER FELLOWSHIP**  
Nicolas Abreu, MD

**NEUROMUSCULAR GENETIC THERAPEUTICS**  
Renatta Knox, MD, PhD

**CLINICAL NEUROPHYSIOLOGY**  
Stephanie Ahrens, DO  
Daniel Freedman, DO



PEDIATRIC PSYCHOLOGY AND NEUROPSYCHOLOGY

Pediatric Psychology and Neuropsychology is a Section of the Department of Pediatrics at Nationwide Children’s Hospital that concentrates clinical services in three primary areas: Pediatric Psychology provides specialized assessment and intervention services that focus on the relationship between cognitive, social and emotional functioning and physical health, typically for children with co-occurring medical conditions (e.g., cancer, diabetes, sickle cell disease); Pediatric Neuropsychology performs specialized evaluations for children and adolescents with a range of medical and neurological disorders that impact thinking or behavior (e.g., brain tumors, epilepsy, seizure disorders, traumatic brain injury); and Intellectual and Developmental Disability Psychology provides specialized assessment and intervention services for children and adolescents impacted by various genetic and neurodevelopmental disabilities, including autism spectrum disorders. See page 131 for details and for information about all Behavioral Health services.

FACULTY



Eric M. Butter, PhD  
Chief

- Charles Albright, PhD
- Jessica Bailey, PhD
- Amy E. Baughcum, PhD
- Doug Bodin, PhD
- Shalonda Brooks, PhD
- Catherine Butz, PhD
- Jennifer E. Cass, PhD
- Eileen Chaves, PhD
- Sarah Connolly, PhD
- Andrea Coppens, PhD
- Canice Crerand, PhD
- Nicole Dempster, PhD
- Robert M. Dempster, PhD
- Jackie Doxie-King, PhD
- Christine Eichelberger, PhD
- Jenny Evans, PhD

- Lauren Fishbein, PhD
- Anya Froelich, PsyD
- Lauren Garbacz, PhD
- Molly Gardner, PhD
- Cynthia A. Gerhardt, PhD
- Alana Goldstein-Leever, PhD
- Amy Hahn, PhD
- Jane Hamel-Lambert, PhD
- Jennifer Hansen, PhD
- Sharnita Harris, PhD
- Rebecca Hellenthal, PhD
- Jessica Hoehn, PhD
- Ariana Hoet, PhD
- Kristen E. Hoskinson, PhD
- Cody Hostutler, PhD
- Parker Huston, PhD
- Cara Inglis, PsyD
- Jamie Jackson, PhD
- Katie Johanning Gray, PhD
- Chrissie Koterba, PhD
- Ashley Kroon Van Diest, PhD
- Elizabeth Kryszak, PhD
- Kathleen L. Lemanek, PhD
- Ann Levine, PhD
- Catrina Litzenburg, PhD
- Barbara Mackinaw-Koons, PhD
- Laura M. Mackner, PhD

- Marilee Martens, PhD
- Kelly A. McNally, PhD
- Margaret Mehling, PhD
- David Michalec, PhD
- Alana Moses, PhD
- James A. Mulick, PhD
- Caroline Murphy, PhD
- Emily Newton, PhD
- Megan Norris, PhD
- Jessica Palila, PhD
- Ari Rabkin, PhD
- Natalie Raff, PhD
- Whitney Raglin-Bignall, PhD
- Courtney Rice, PsyD
- Claire Russell, PhD
- Marilyn Sampilo, PhD
- Jessica Scherr, PhD
- Rose Schroedl, PhD
- Ashley Showalter, PhD
- Micheline Silva, PhD
- Tyanna Snider, PsyD
- Janet Souder, PsyD
- Jack H. Stevens, PhD
- Karen Tabern, PhD
- H. Gerry Taylor, PhD
- Kristen Trott, PhD
- Natalie Truba, PhD
- Kathryn A. Vannatta, PhD
- Lindsey Vater, PhD
- Sarah N. VerLee, PhD
- Jonathan Wilkins, PhD
- Mary Wojnaroski, PhD
- Jacqueline Wynn, PhD
- Heather L. Yardley, PhD
- Tammi K. Young-Saleme, PhD

GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019  
\$828,018

SELECTED PUBLICATIONS

**Dempster N**, Cua C, Wernovsky G, Caris E, Neely T, Allen R, **Butz C**. Children with Hypoplastic Left Heart Syndrome Have Lower Quality of Life Than Healthy Controls and Children with Other Illnesses. *Cardiol Young*. 2018 Jan;28(1):21-26.

Pindrik J, Hoang N, Smith L, Halverson M, **Wojnaroski M**, **McNally K**, Gedela S, Ostendorf AP. Preoperative Evaluation and Surgical Management of Infants and Toddlers with Drug-Resistant Epilepsy. *Neurosurg Focus*. 2018 Sep;45(3):E3.

Shahidullah JD, **Hostutler CA**, Foreman S. (2019). Ethical Considerations in Medication-related Roles for Pediatric Primary Care Psychologists. *Clinical Practice in Pediatric Psychology*. 2019 Jun.

Wade SL, Cassidy AE, **McNally KA**, Kurowski BG, Kirkwood MW, Stancin T, **Taylor HG**. A Randomized Comparative Effectiveness Trial of Family-Problem-Solving Treatment for Adolescent Brain Injury: Parent Outcomes From the Coping with Head Injury through Problem Solving (CHIPS) Study. *J Head Trauma Rehabil*. 2019 Apr 25. [Epub ahead of print]

FAST FACTS

July 2018 through June 2019

|                                                                       |        |
|-----------------------------------------------------------------------|--------|
| Inpatient Consultations: .....                                        | 4,162  |
| Psychology Clinic Visits: .....                                       | 11,570 |
| Psychology Medical Clinic Visits/Outpatient Consultation Visits:..... | 14,822 |

PHYSICAL MEDICINE AND REHABILITATION

The Section of Physical Medicine and Rehabilitation at Nationwide Children’s Hospital specializes in the diagnosis and management of children with physically disabling conditions. Our physicians are board-certified specialists in Physical Medicine and Rehabilitation with additional certification in pediatric rehabilitation medicine and are members of the departments of Pediatrics, and Physical Medicine and Rehabilitation at The Ohio State University College of Medicine. In addition, Carl D. Gelfius, MD, is board certified in electrodiagnostic medicine. Carl D. Gelfius, MD, Karl Klamar, MD, and Reginald D. Talley, MD, are board certified in brain injury medicine.

FACULTY



Michelle A. Miller, MD  
Chief

- Rosalind J. Batley, MD
- Carl D. Gelfius, MD
- Karl W. Klamar, MD
- Wilawan Nopkhun, MD
- Jonathan S. Pedrick, MD
- Nathan S. Rosenberg, MD
- Reginald D. Talley, MD

Physical Medicine and Rehabilitation was actively involved in the teaching of medical students, medical residents and fellows over the past year. We now offer a pediatric rehabilitation rotation to the Physical Medicine and Rehabilitation residents from Larkin Community Hospital. Presentations on pediatric rehabilitation, concussion, neuromuscular disorders, musculoskeletal disorders, spasticity management and pediatric traumatic brain injury were made at local, regional and national levels.

Clinically, we provide services to the multidisciplinary brachial plexus team, the wheelchair seating and equipment clinic, and the EMG laboratory. We also continue services to our CARF (Commission on Accreditation of Rehabilitation Facilities)-accredited

inpatient rehabilitation unit, the inpatient consult service and the following outpatient clinics: general rehabilitation, myelomeningocele, botulinum toxin, concussion, rehabilitation follow-up, neuro-oncology, and non-accidental traumatic brain injury.

SELECTED BOOK CHAPTER

Collier T, Gelfius CD, Woodbury S. "Electrodiagnostic Testing in the Pediatric Patient." In: Mitra R ed. *Principles of Rehabilitation Medicine*. McGraw Hill: New York, NY: 2018.

| FAST FACTS                                              |       |
|---------------------------------------------------------|-------|
| July 2018 through June 2019                             |       |
| Inpatient Discharges:.....                              | 134   |
| Observation and Outpatient-in-a-Bed Discharges: .....   | 1     |
| Total Discharges:.....                                  | 135   |
| Average Length of Stay*:.....                           | 18.8  |
| Average Daily Census*: .....                            | 6.9   |
| Patient Days*:.....                                     | 2,514 |
| Inpatient Consults:.....                                | 437   |
| Number of Beds: .....                                   | 12    |
| Physical Medicine Clinic Visits:.....                   | 6,081 |
| Myelomeningocele (Spina Bifida) Clinic Visits: .....    | 669   |
| School-based Seating Clinic Visits:.....                | 6     |
| *Excludes observation and outpatient-in-a-bed patients. |       |

2018 – 2019 NATIONWIDE CHILDREN'S FELLOWSHIP PROGRAM

PEDIATRIC REHABILITATION MEDICINE

- Elizabeth A. Barton, MD
- Amy Hiller, DO

PRIMARY CARE PEDIATRICS

Pediatricians in the Division of Primary Care Pediatrics at Nationwide Children’s Hospital staff the 13 Nationwide Children’s Hospital Primary Care Centers located throughout the Columbus area. A multidisciplinary staff provides comprehensive primary care services for a diverse and underserved population of patients.

FACULTY



Alex R. Kemper, MD, MPH, MS  
Division Chief



Dane A. Snyder, MD  
Section Chief

- Mary Ann Abrams, MD
- Oghenevwirotor Akpovwa, MD
- Razan Alkhoury, MD
- Akua A. Amponsah, MD
- Kristen Beck, MD
- Stefanie R. Bester, MD
- Sara Bode, MD
- Megan Brundrett, MD
- Nicole V. Caldwell, MD
- Jennifer Carney, MD
- Milagro P. Castaneda-Viduarre, MD
- Aarti Chandawarkar, MD

- Linda E. Chun, MD
- Katharine Coffman, MD
- Duane R. Copenheaver, DO
- Jessica Cunningham, MD
- Kimberly Dean, MD
- Emily A. Decker, MD
- Tanya Dedyo, MD
- Robyn Dennis, MD
- Sarah Denny, MD
- Ihuoma U. Eneli, MD
- Ashley Fernandes, MD
- Susan Friedman, MD
- Sean P. Gleeson, MD
- M. Jane Goleman, MD
- Judith A. Groner, MD
- Uma Gupta, MD
- Malika Haque, MD
- Laura Hart, MD
- Stephen J. Hersey, MD
- Lisa Humphrey, MD
- Aurelia J. Jackson, MD
- Sinimol James, MD
- Angela V. Jones, MD
- Tabitha Jones-McKnight, DO
- Ranee M. Jostpille, MD
- Tatyana Karakay, MD
- Amrik Singh Khalsa, MD
- Jack A. Kopechek, MD
- Alicia Kuper, DO
- Mary Kay Kuzma, MD
- Jonathan T. Lucas, MD
- Shengyi Mao, MD

Laura Martin, MD  
Lucas McKnight, MD  
Douglas J. McLaughlin, MD  
Melissa A. Meyer, MD  
Belinda M. Mills, MD  
Alana Milton, MD  
Asma Mobin-Uddin, MD  
Mary A. Nelin, MD  
Barbara Oettgen, MD  
Michele Oyortey, MD  
Cheryl B. Pippin, MD  
Quiana Pollock, MD  
Alexander T. Rakowsky, MD  
Jessica Retzke, MD  
Jennifer Ricciardo, MD  
Nathan Richards, MD  
Richard E. Rodenberg Jr., MD  
Allison Rossetti, MD  
Sara Schroder, MD  
Amina Smajlovic, MD  
Kimberly Stettler, MD  
Lisa Stone, DO  
Melissa Swanson, MD  
Patricia Temple Gabbe, MD  
Olivia W. Thomas, MD  
Gina R. Thompson, DO  
Jagadisharaje K. Urs, MD  
Caroline Weingart, MD  
Rachael Zanotti-Morocco, DO  
Elizabeth Zmuda, DO

The Primary Care Centers provide comprehensive care primarily for children from birth to 21 years of age. Available services include preventive care, chronic disease management, and acute care, with both scheduled and same-day walk-in access. In addition to pediatricians and pediatric nurse practitioners, the clinics include a wide array of other individuals to support the needs of patients and their families, including health coaches, pharmacists, psychologists and social workers.

The division’s quality improvement initiatives continue to focus on improving care for patients with a broad array of conditions, including anemia, asthma, attention deficit-hyperactivity disorder, depression and obesity. The division also focuses on ensuring all children and adolescents receive timely preventive services, including well-child visits and immunizations. Two important areas of this work include safe sleep for infants and HPV vaccination in adolescents. In 2019, the Primary Care Network was awarded the Ohio Patient Safety Institute’s Primary Care Patient Safety Best Practice Award for improving provider-patient continuity. The division also houses the Center for Healthy Weight and Nutrition, a national model for multidisciplinary comprehensive care for obese children and adolescents.

The Division of Primary Care Pediatrics provides training and education for The Ohio State University College of Medicine students, as well as residents in Pediatrics, Family Medicine and combined Internal Medicine-Pediatrics. Research focuses on a broad range of preventive services, smoking cessation, obesity prevention and treatment, health literacy, and transition from pediatric to adult health care services.

**GRANTS AWARDED**  
**JULY 1, 2018 – JUNE 30, 2019**  
\$3,032,170

**SELECTED PUBLICATIONS**

**Goleman MJ**, Dolce M, Morack J. Quality Improvement Initiative to Improve Human Papillomavirus Vaccine Initiation at 9 Years of Age. *Academ Pediatr*. 2018;18(7):769-772.

**Hart LC**, van Tillburg MAL, Campbell R, Falsowski RA, Nazareth M, Ndugga M, Coltrane C, Diaz-Gonzalez de Ferris M. Association of Youth Health Care Transition Readiness to Role Overload among Parents of Children with Chronic Illness. *Child Care Health Dev*. 2019;45:577-584.

**Khalsa AS**, Woo JG, Kharofa RY, Geraghty SR, DeWitt TG, Copeland KA. Parental Intuitive Eating Behaviors and Their Association with Infant Feeding Styles among Low-Income Families. *Eat Behav*. 2019;32:78-84.

**Snyder DA, Thomas OW, Gleeson SP**, Stukus DR, Jones LM, Regan C, Shamansky A, Allen ED. Reducing Emergency Department Visits Utilizing a Primary Care Asthma Specialty Clinic in a High-Risk Patient Population. *J Asthma*. 2018;55(7):785-794.

Walley SC, Wilson KM, Winicoff P, **Groner J**. A Public Health Crisis: Electronic Cigarettes, Vape, and JUUL. *Pediatrics*. 2019;143(6):e20182741.

**FAST FACTS**

*July 2018 through June 2019*

|                                                              |                |
|--------------------------------------------------------------|----------------|
| <b>Main Campus</b>                                           |                |
| On-site Primary Care Visits:.....                            | <b>26,229</b>  |
| Urgent Care Visits: .....                                    | <b>49,057</b>  |
| <b>Primary Care Network</b>                                  |                |
| Physician Care Center Visits: .....                          | <b>167,814</b> |
| Unique Patients Treated in Entire Primary Care Network:..... |                |
| .....                                                        | <b>82,638</b>  |

**2018 – 2019 NATIONWIDE CHILDREN’S FELLOWSHIP PROGRAM**

**ACADEMIC GENERAL PEDIATRICS**  
Meredith Merkley, DO



*“Many of our patients with pulmonary concerns may use home oxygen therapy at some point in their treatment. We’re proud of Dr. Hayes’ leadership in bringing these important recommendations to providers.”*

– Karen S. McCoy, MD, Division Chief, Pulmonary Medicine

## Pulmonary Medicine

### Panel Publishes First-Ever Clinical Guidelines for Home Oxygen Therapy in Children

The American Thoracic Society (ATS) authorized a panel of experts to develop the first national clinical practice guidelines for home oxygen therapy in children, and published the recommendations in 2019.

“Home oxygen is often needed for children with chronic lung and pulmonary vascular diseases,” says **Don Hayes, Jr., MD, MS, MEd**, chair of the working group and lead author on the document. “However, there is a striking lack of empirical evidence regarding its implementation, monitoring and discontinuation in children. These guidelines, developed by a panel of highly respected experts, offer an evidence-based approach to using home oxygen to benefit pediatric patients.”

To assist in determining which children should receive home oxygen, the expert panel completed a meta-analysis and defined chronic hypoxemia in the pediatric population.

The following recommendations are based on the panel’s confidence in the estimated effects, the balance of benefits and potential harms, patient values and preferences, and cost and feasibility. The report is in the *American Journal of Respiratory and Critical Care Medicine*.

The guidelines strongly suggest the use of home oxygen therapy for the following patient populations:

- Children with cystic fibrosis complicated by severe chronic hypoxemia
- Children with bronchopulmonary dysplasia complicated by chronic hypoxemia
- Children with sleep-disordered breathing complicated by chronic hypoxemia who cannot tolerate treatment
- Children with sickle cell anemia complicated by chronic hypoxemia
- Children with pulmonary hypertension without congenital heart disease complicated by chronic hypoxemia
- Children with interstitial lung disease complicated by severe chronic hypoxemia

Home oxygen therapy is conditionally recommended, or applicable in most situations, in the following cases:

- Patients with cystic fibrosis and mild hypoxemia and dyspnea on exertion
- Patients with sleep disordered breathing complicated by severe nocturnal hypoxemia who cannot tolerate positive airway pressure therapy or are awaiting surgical treatment of the disordered breathing
- Patients with sickle cell disease complicated by severe chronic hypoxemia
- Patients with interstitial lung disease with mild chronic hypoxemia and either dyspnea on exertion or desaturation during sleep or exertion

Critical to optimal benefit, oxygen equipment should be an appropriate size for children and function properly, the guidelines say. Oxygen therapy should be titrated to maintain an oxygen saturation level greater than 90% at all times and providers should use pulse oximetry to titrate and monitor therapy.

**CITATION:**  
Hayes D Jr, Wilson KC, Krivchenia K, Hawkins SMM, Balfour-Lynn IM, Gozal D, Panitch HB, Splaingard ML, Rhein LM, Kurland G, Abman SH, Hoffman TM, Carroll CL, Cataletto ME, Tumin D, Oren E, Martin RJ, Baker J, Porta GR, Kaley D, Gettys A, Deterdine RR, American Thoracic Society Assembly on Pediatrics. Home Oxygen Therapy for Children: An Official ATS Clinical Practice Guideline. *American Journal of Respiratory Critical Care Medicine*. 2019 Feb 1;199(3):e5-e23.

PULMONARY MEDICINE

The mission of the Division of Pulmonary Medicine at Nationwide Children’s Hospital is to provide outstanding clinical care for children and adults with congenital respiratory disorders, including asthma, cystic fibrosis (CF), sleep-related breathing disorders, lung transplant, advanced lung disease care and management of chronic mechanical ventilation. The care model is multidisciplinary. Our mission also includes education of medical and allied health professional trainees and involvement in cutting-edge clinical, basic and translational research.

FACULTY



**Karen S. McCoy, MD**  
*Division Chief*



**Richard D. Shell, MD**  
*Section Chief*

- Elizabeth D. Allen, MD
- Don Hayes Jr., MD, MS
- John Heintz, MD
- Melissa Holtzlander, MD
- Stephen E. Kirkby, MD
- Benjamin T. Kopp, MD
- Kavitha Kotha, MD
- Katelyn Krivchenia, MD
- Anne E. May, MD
- Sabrina Palacios, MD
- Alpa V. Patel, MD

- Grace R. Paul, MD
- Swaroop Pinto, MD
- Shahid I. Sheikh, MD
- Mark L. Splaingard, MD
- Rohan A. Thompson, MD
- Lisa Ulrich, MD

Pulmonary Medicine clinicians provide care at the Nationwide Children’s main campus in Columbus and at regional Ohio locations in Westerville, Dublin and Lima *Close To Home*SM Centers. Our 19 physicians collaborate to complete over 10,000 outpatient visits at these four locations. Ranked in the top seven by U.S. News & World Report, the program excels in patient care, training programs and research.

The cornerstone of the Division of Pulmonary Medicine is our nationally recognized Cystic Fibrosis Care Center, which is a designated Therapeutic Development Center site. The center collaborates with our colleagues in Endocrinology, Gastroenterology, Hepatology, Otolaryngology, Psychology, and Psychiatry to provide the best clinical outcomes for our pediatric and adult CF patients. A strong collaboration, Cure CF Columbus (C3), has also formed with clinicians and researchers at The Ohio State University and is funded as a Research and Development Program through the Cystic Fibrosis Foundation. This work is focused on immune dysfunction and infection in CF.

Huge advances have been made with our most unstable patients with asthma. In our Complex Asthma Clinic, we collaborate with our school-based asthma therapy (SBAT) program to provide quality medical care and consistent treatment therapies. A reduction in urgent care and emergency department visits by these medically fragile patients is a noticeable benefit of these two programs.

Our nationally accredited Cardiopulmonary Rehabilitation Program is led by our team of physicians, dietitians, respiratory, massage and exercise therapists, social workers, and nurses to provide our patients with the tools necessary to resume normal living after a serious cardiopulmonary event or if they become deconditioned. As evidence of our center having helped hundreds of patients regain their independence, we received reaccreditation in 2016 by the American Association of Cardiovascular and Pulmonary Rehabilitation.

The division also has a robust quality improvement portfolio, conducts clinical and translational research with a broad group of basic-science collaborators and

exhibits steadily climbing research productivity with numerous faculty publications.

**GRANTS AWARDED**  
**JULY 1, 2018 – JUNE 30, 2019**  
\$1,504,445

SELECTED PUBLICATIONS

**Krivchenia K**, Hawkins SM, Iyer NP, **Hayes D Jr**, Deterding RR, Ruminjo J, Thomson CC. 2019 Clinical Practice Guideline Summary for Clinicians: Home Oxygen Therapy for Children. *Am Thorac Soc*. 2019 Jul;16(7):781-785.

**Kopp BT**, Thompson R, Kim J, Konstan R, Diaz A, Smith B, Shrestha C, Rogers LK, Hayes D Jr, Tumin D, Woodley FW, Ramilo O, Sanders DB, Groner JA, Mejias A. Secondhand Smoke Alters Arachidonic Acid Metabolism and Inflammation in Infants and Children with Cystic Fibrosis. *Thorax*. 2019 Mar;74(3):237-246.

| FAST FACTS                                             |        |
|--------------------------------------------------------|--------|
| July 2018 through June 2019                            |        |
| Inpatient Discharges:.....                             | 1,195  |
| Observation and Outpatient-in-a-Bed Discharges*:....   | 2,364  |
| Total Discharges:.....                                 | 3,559  |
| Average Length of Stay†:.....                          | 5.9    |
| Average Daily Census†:.....                            | 19.4   |
| Patient Days†:.....                                    | 7,099  |
| Inpatient Consults:.....                               | 385    |
| CF with Endo Clinic Visits:.....                       | 46     |
| Complex Asthma-Pulmonary Clinic Visits:.....           | 89     |
| Cystic Fibrosis Patients:.....                         | 565    |
| Dublin Pulmonary Clinic Visits: .....                  | 611    |
| Lima Memorial Pulmonary Clinic Visits: .....           | 48     |
| Lima Pulmonary Clinic Visits:.....                     | 243    |
| Lung Transplant Clinic Visits: .....                   | 119    |
| Pulmonary Clinic Visits: .....                         | 7,577  |
| Pulmonary Rehab Clinic Visits: .....                   | 771    |
| Total Pulmonary Clinic Visits: .....                   | 12,445 |
| Westerville Pulmonary Clinic Visits: .....             | 2,376  |
| Dublin Pulmonary Diagnostics Clinic Visits: .....      | 16     |
| Pulmonary Diagnostics Clinic Visits: .....             | 262    |
| Westerville Pulmonary Diagnostics Clinic Visits: ..... | 18     |
| Total Pulmonary Diagnostics Clinic Visits:.....        | 296    |

\*Excludes sleep studies.  
†Excludes observation and outpatient-in-a-bed patients.

SLEEP DISORDERS CENTER



**Mark L. Splaingard, MD**  
*Medical Director*

- A. Latif Khuhro, MD
- Robert Kowatch, MD, PhD
- Lenora M. Lehwald, MD

- Anne May, MD
- Grace Paul, MD
- Swaroop Pinto, MD
- Jack Stevens, PhD
- Rohan Thompson, MD

Accredited by the American Association of Sleep Medicine, the Sleep Disorders Center at Nationwide Children’s Hospital provides inpatient and outpatient consultations and treatment for children with a wide variety of sleep-related problems. Most referrals are for evaluation of abnormal breathing during sleep. Other symptoms may include insomnia, unusual movements at night and excessive daytime sleepiness. As part of the Sleep Medicine Fellowship Program at The Ohio State University College of Medicine, the center provides two months of clinical training to sleep medicine fellows each year, which includes didactic lectures, supervised

clinical experience and interpretation of infant and child polysomnographic studies.

The Sleep Disorders Center participates in the training of medical students, residents in Pediatrics, Neurology, Otolaryngology, Physical Medicine and Rehabilitation, and Radiology, as well as pediatricians, psychiatrists and graduate students at The Ohio State University. Over the past 12 years, 45 sleep medicine and pediatric subspecialty fellows have completed required rotations in pediatric sleep medicine at the center. Center physicians lecture widely throughout The Ohio State University on a variety of topics, including sleep and performance. In 2018, the center performed over 2,100 polysomnographic studies and evaluated over 1,250 children in outpatient sleep clinics. The center has 23 registered polysomnographic technicians and two full-time pediatric nurse practitioners. At Nationwide Children’s, pediatric subspecialists in pulmonology, neurology and psychiatry, who are also board certified in sleep medicine, review all polysomnographic studies to determine both diagnosis and potential therapies that would benefit each child. Further evaluation and treatment is available through the outpatient Sleep Disorders Clinic.

Staff of the Sleep Disorders Center collaborated on research projects with Nationwide Children’s investigators from Anesthesiology, Critical Care, Gastroenterology, Endocrinology, Neonatology, Neurology, Otolaryngology, Pediatric Surgery, Psychiatry, Psychology, Pulmonary, Plastic Surgery, the Center for Injury Research and Policy at Nationwide Children’s, and the Department of Mathematics at The Ohio State University. Recently completed studies by pediatric sleep medicine faculty include outcomes of different teaching formats for behavioral treatment of insomnia in toddlers and young children, improvement in quality of reporting results of sleep studies to parents and ability of different types of smoke alarms to awaken children during sleep.

SELECTED PUBLICATIONS

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Hayes D Jr, Wilson KC, Krivchenia K, Hawkins SMM, Balfour-Lynn IM, Gozal D, Panitch HB, **Splaingard ML**, Rhein LM, Kurland G, Abman SH, Hoffman TM, Carroll CL, Cataletto ME, Tumin D, Oren E, Martin RJ, Baker J, Porta GR, Kaley D, Gettys A, Deterding RR. Home Oxygen Therapy for Children. An Official American Thoracic Society Clinical Practice Guideline. *Am J Respir Crit Care Med*. 2019 Feb 1;199(3):e5-e23.

Ruda JM, Payne L, **May A, Splaingard M**, Lemle S, Jatana KR. Improving Communication Delay of Outpatient Sleep Study Results to Pediatric Otolaryngology Patients and Families. *Otolaryngol Head Neck Surg*. 2019 May;160(5):791-798.

Smith GA, Chounthirath T, **Splaingard M**. Effectiveness of a Voice Smoke Alarm Using the Child’s Name for Sleeping Children: A Randomized Trial. *J Pediatr*. 2019 Feb;205:250-256.

**Stevens J**, Splaingard D, Webster-Cheng S, Rausch J, **Splaingard M**. A Randomized Trial of a Self-Administered Parenting Intervention for Infant and Toddler Insomnia. *Clin Pediatr (Phila)*. 2019 Jun;58(6):633-640.

FAST FACTS

July 2018 through June 2019

|                                        |       |
|----------------------------------------|-------|
| Main Campus Sleep Clinic Visits:.....  | 361   |
| Dublin Sleep Clinic Visits: .....      | 462   |
| Westerville Sleep Clinic Visits: ..... | 480   |
| Total Sleep Clinic Visits: .....       | 1,303 |

2018 – 2019 NATIONWIDE CHILDREN’S FELLOWSHIP PROGRAM

PEDIATRIC PULMONOLOGY

- Anas Al-Turki, MD
- Courtney A. Gushue, DO
- Michelle Hjelm, MD
- Daniel Malleske, MD
- Robin Ortenberg, MD
- Ben Wisniewski, MD

Department of Pediatrics

RHEUMATOLOGY

Pediatric Rheumatology at Nationwide Children’s Hospital provides comprehensive, compassionate, evidence-based clinical care to children with musculoskeletal and rheumatic diseases, conducts research on these diseases, and educates students, residents, fellows and pediatricians. The division is involved in several quality improvement projects to improve outcomes for children with rheumatic disease and partners with patients and families in these efforts.

FACULTY



Stacy Payne Ardoin, MD, MS  
Chief

- Shoghik Akoghlanian, MD
- Fatima Barbar-Smiley, MD
- Kyla Driest, MD
- Gloria C. Higgins, MD (Emeritus)
- Edward Oberle, MD
- Vidya Sivaraman, MD
- Cagri Toruner, MD

The Pediatric Rheumatology Clinic at Nationwide Children’s serves children with diseases, including juvenile idiopathic arthritis, systemic lupus erythematosus, juvenile dermatomyositis, spondyloarthropathy, vasculitis, scleroderma, autoimmune inflammatory conditions and painful musculoskeletal problems. The clinic conducts more than 6,100 outpatient visits annually. Our fellowship includes two categorical pediatric fellows and one internal medicine-pediatrics fellow. This year, we established a multidisciplinary Hypermobility Clinic with collaborators from Occupational Therapy, Physical Therapy, Psychology and Social Work. Edward Oberle, MD, leads our Musculoskeletal Ultrasound Clinic. Our multidisciplinary Lupus Clinic continues to expand its referral base. Our close collaborations with adult rheumatology at The Ohio State University and with multiple pediatric subspecialists at Nationwide Children’s promote collaborative clinical care and research.

Rheumatology is engaged in clinical and basic science research projects and participates in several national and international collaborative studies of childhood rheumatic diseases. Basic scientist Chack-Yung Yu, DPhil, has an appointment in Rheumatology focusing on the relationship between complement genetics and rheumatic diseases. Rheumatology participates in the Childhood Arthritis and Rheumatology Research Alliance and Pediatric Rheumatology Collaborative Study Group clinical research networks. We also participate in the quality improvement initiative, Pediatric Rheumatology Care and Outcomes Improvement Network.

GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019

\$114,832

SELECTED PUBLICATIONS

**Ardoin SP**, Daly RP, Merzoug L, Tse K, Ardan K, Arkin L, Knight A, Rubinstein T, Ruth N, Wenderfer SE, Hersh AO; Childhood Arthritis and Rheumatology Research Alliance and Lupus Foundation of America. Research Priorities in Childhood-Onset Lupus: Results of a Multidisciplinary Prioritization Exercise. *Pediatr Rheumatol Online J*. 2019 Jul 1;17(1):32.

Sarkissian A, **Sivaraman V**, Bout-Tabaku S, **Ardoin SP**, Moore-Clingenpeel M, Mruk V, Steigelman H, Morris K, Bowden SA. Bone Turnover Markers in Relation to Vitamin D Status and Disease Activity in Adults with Systemic Lupus Erythematosus. *Lupus*. 2019 Feb;28(2):156-162.

Savelli SL, Roubey RAS, Kitzmiller KJ, Zhou D, Nagaraja HN, Mulvihill E, **Barbar-Smiley F, Ardoin SP**, Wu YL, Yu CY. Opposite Profiles of Complement in Antiphospholipid Syndrome (APS) and Systemic Lupus Erythematosus (SLE) Among Patients with Antiphospholipid Antibodies (aPL). *Front Immunol*. 2019 May 7;10:885.

FAST FACTS

July 2018 through June 2019

|                                                       |     |                                               |       |
|-------------------------------------------------------|-----|-----------------------------------------------|-------|
| Inpatient Discharges:.....                            | 95  | Inpatient Consults:.....                      | 119   |
| Observation and Outpatient-in-a-Bed Discharges: ..... | 84  | Main Campus Rheumatology Clinic Visits: ..... | 5,099 |
| Total Discharges:.....                                | 179 | Dublin Rheumatology Clinic Visits:.....       | 969   |
| Average Length of Stay*:.....                         | 4.1 | Total Rheumatology Clinic Visits: .....       | 6,068 |
| Average Daily Census*: .....                          | 1.1 |                                               |       |
| Patient Days*:.....                                   | 390 |                                               |       |

\*Excludes observation and outpatient-in-a-bed patients.

2018 – 2019 NATIONWIDE CHILDREN’S FELLOWSHIP PROGRAM

PEDIATRIC RHEUMATOLOGY

Ohoud Al-Ahmed, MD  
Christine Bacha, MD  
Laura R. Ballenger, MD  
Evan Mulvihill, MD  
Veronica Mruk, MD

Department of Pediatrics

SPORTS MEDICINE

Sports Medicine at Nationwide Children’s Hospital includes a team of experts who specialize in the treatment and prevention of sports-related injuries in the pediatric and adolescent athlete. The focus of the department is prevention, diagnosis and treatment of youth and adolescent sports injuries, including concussions.

FACULTY



Thomas L. Pommering, DO  
Chief

Steven C. Cuff, MD  
Drew Duerson, MD  
Anastasia N. Fischer, MD  
James P. MacDonald, MD  
Jonathan Napolitano, MD  
Reno Ravindran, MD  
Richard E. Rodenberg, MD  
Amy E. Valasek, MD

We provide team-centered sports medicine care. Our clinical staff works with the athlete’s team, which includes the patient, family, athletic trainer, school nurse, coach and primary care physician, to assist in the recovery of the injury, development of a treatment plan and recommendations for successful participation in future sports activities. Our department also helps patients navigate their care through our partners in other departments within Nationwide Children’s including Radiology, Orthopaedics, Physical Therapy, Cardiology, Healthy Weight and Nutrition, Pulmonary Medicine, Neuropsychology/Psychology, Emergency Medicine, Primary Care, Sports Nutrition, Education and any other necessary outside services.

Highlights:

- Provided care for just under 16,000 patients at our eight locations
- Provided medical services at more than 2,100 events, affecting more than 200,000 athletes
- Developed an Adaptive Sports Medicine Program for athletes with special physical needs
- Served as team physicians for Ohio Dominican University and several central Ohio high schools and middle schools
- Faculty named over 50 times in publications, abstracts and national podium and poster presentations

Services available at Nationwide Children’s Sports Medicine include:

- Diagnosis and treatment of all sports-related injuries
- Sports Concussion Clinic
- Adaptive Sports Medicine Clinic
- Limb Deformity Clinic in collaboration with Orthopaedics
- Point of service musculoskeletal ultrasound for diagnostic and therapeutic treatment
- Injury rehabilitation
- Specialized rehabilitation and injury prevention programs for swimmers, throwers, dancers, runners, and athletes in other sports
- Sports Nutrition Counseling
- Sports Performance Training
- Play Strong (supervised exercise program for children with medical conditions)
- Sports Medicine Fellowship Training Program
- Central Ohio EMS Community Outreach and Education for Care of Athletes Injured on the Field of Play

- Partnerships with schools, and youth and club sport organizations
- Coordination of care with patient’s primary care physician and other Nationwide Children’s services; educational resources and training to physicians, athletic trainers, school nurses, patients/families and coaches

**SELECTED PUBLICATIONS**

**Cuff S, Pommering T.** Fracture, Sternum. *The 5-Minute Sports Medicine Consult, 3rd Edition.* (Philadelphia, PA: Lippincott Williams & Wilkens 2019); p. 236-237.

Faigenbaum AD, Rial Rebullido T, **MacDonald JP.** The Unsolved Problem of Paediatric Physical Inactivity: It’s Time for a New Perspective. *Acta Paediatr.* 2018 Nov; 107(11): 1857-1859.

Logan K, **Cuff S;** Council on Sports Medicine & Fitness. Organized Sports for Children, Preadolescents and Adolescents. *Pediatrics.* 2019 May 20. pii: e20190997.

Shapiro SJ, **Napolitano JT,** Wojewnik B. “Lumbosacral Instability.” In *Musculoskeletal Sports and Spine Disorders: A Comprehensive Guide.* Edited by Khan SB, Xu RY. (New York: Springer International Publishing; 2018), 451-455.

**Valasek AE,** Young JA, Huang L, Singichetti B, Yang J. Age and Sex Differences in Overuse Injuries Presenting to Pediatric Sports Medicine Clinics. *Clin Pediatr (Phila).* 2019 Jun;58(7):770-777.

Young JA Schaefer M, **Fischer A.** Challenges of Menstrual Dysfunction Screening Using the Pre-participation Physical Examination: A Pilot Study. *Clin Pediatr (Phila).* 2018 Oct;57(12):1465-1467.

FAST FACTS

July 2018 through June 2019

|                                                      |       |                                                                  |       |
|------------------------------------------------------|-------|------------------------------------------------------------------|-------|
| Canal Winchester Sports Medicine Clinic Visits:..... | 1,682 | Top 10 Principal Final Diagnoses at the Sports Medicine Clinics: |       |
| Dublin Sports Medicine Clinic Visits:.....           | 3,961 | Concussion:.....                                                 | 2,031 |
| East Broad Sports Medicine Clinic Visits:.....       | 937   | Ankle Injury/Pain: .....                                         | 1,662 |
| Hilliard Sports Medicine Clinic Visits: .....        | 1,276 | Low Back Injury/Pain:.....                                       | 1,337 |
| Marysville Sports Medicine Clinic Visits: .....      | 638   | Knee Pain: .....                                                 | 1,072 |
| New Albany Sports Medicine Clinic Visits: .....      | 1,373 | Patellofemoral: .....                                            | 998   |
| Sports Medicine Clinic Visits:.....                  | 1,785 | Muscle/Tendon Strain:.....                                       | 854   |
| Westerville Sports Medicine Clinic Visits:.....      | 4,760 | Tendonitis:.....                                                 | 843   |
|                                                      |       | Apophysitis:.....                                                | 721   |
|                                                      |       | Stress Fracture: .....                                           | 680   |
|                                                      |       | Dislocation/Subluxation:.....                                    | 679   |
|                                                      |       | Spondylolysis/Spondylolisthesis: .....                           | 522   |

2018 – 2019 NATIONWIDE CHILDREN’S FELLOWSHIP PROGRAM

PEDIATRIC SPORTS MEDICINE

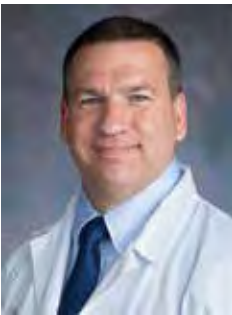
Cole Budinsky, MD

Department of Pediatrics

TOXICOLOGY

The Section of Toxicology at Nationwide Children’s Hospital provides teaching, patient care and research to improve the outcome for poisoned patients. We provide medical supervision for the Central Ohio Poison Center and the toxicology consult service in the treatment of poisoned patients and management of adverse drug reactions. Our research investigates drug and toxicant effects, as well as poison prevention and population-based poison control. We provide important consultation resources to hospital-based and community physicians across Ohio, supporting them as they continue to treat poisoned patients in their own communities.

FACULTY



Marcel J. Casavant, MD, FACEP, FACMT, FAACT Chief

Hannah L. Hays, MD, FACEP

Michael T. Kelley, MD, MPH, FACMT

Jason Russell, DO

Henry Spiller, MS, DABAT

Medical and pharmacy students, and physicians from emergency medicine, pediatrics, internal medicine, pediatric emergency medicine and child abuse training programs benefit from rotations with the Section of Toxicology and the Central Ohio Poison Center (COPC). We teach the public through frequent media interviews and programs. We also help local, county and state governments and agencies prepare to respond effectively to mass-casualty events and to terrorism involving biological, chemical and radiological hazards. The section is an important resource for Ohio’s childhood lead poisoning prevention program.

COPC serves the citizens of 64 Ohio counties. Specially trained, certified nurses and pharmacists handle poison-exposure cases from the public, health care professionals, health departments and emergency medical services. Certified by the American Association of Poison Control Centers, COPC has been improving care of poisoned patients for 61 years.

With our nationally-recognized Be Poison Smart!® public education program, COPC works to reduce the incidence of childhood poisonings throughout Ohio. Our Be Poison Wise!SM program helps older adults prevent poison exposures and medication mistakes. COPC plays an important role in toxicosurveillance, communications and emergency professional education in preparation for and during a community disaster.

Research to describe important poisoning hazards and to reduce the incidence of poisoning is conducted with the Center for Injury Research and Policy in the Abigail Wexner Research Institute at Nationwide Children’s Hospital.

GRANTS AWARDED JULY 1, 2018 – JUNE 30, 2019

\$390,894

SELECTED PUBLICATIONS

Eluri M, **Spiller HA, Casavant MJ, Chounthirath T,** Conner K, Smith G. Analgesic-Related Medication Errors Reported to U.S. Poison Control Centers. *Pain Medicine.* 2018 Dec;19(12):2357-2370.

Gaw C, **Spiller HA, Casavant MJ, Chounthirath T, Smith G.** Safety Interventions and Liquid Laundry Detergent Packet Exposures. *Pediatrics* 2019 Jul;144(1).

Kamboj A, **Spiller HA, Casavant MJ, Chounthirath T, Smith G.** Ocular Exposures Reported to the United States Poison Control Centers. *Ophthalmic Epidemiology* 2019 Apr;26(2):84-94.

**Spiller HA, Ackerman P,** Spiller N, **Casavant MJ.** Sex- and Age-Specific Increases in Suicide Attempts by Self-Poisoning in the United States Among Youth and Young Adults from 2000 to 2018. *The Journal of Pediatrics* 2019 Jul;(210):201-208.

FAST FACTS

July 2018 through June 2019

|                                          |               |
|------------------------------------------|---------------|
| Inpatient Toxicology Consults: .....     | <b>224</b>    |
| Toxicology Clinic Visits: .....          | <b>8</b>      |
| Peer Consults: .....                     | <b>2,072</b>  |
| Toxicology Poison Center Consults: ..... | <b>3,920</b>  |
| Poison Control Exposure Cases: .....     | <b>38,873</b> |

Department Report

ANESTHESIOLOGY AND PAIN MEDICINE

The Department of Anesthesiology and Pain Medicine at Nationwide Children’s Hospital consists of fellowship-trained, board-certified pediatric anesthesiologists. The department provides anesthesiology and pain-management services for pediatric patients of all ages, from neonates through adolescents, requiring all types of surgical procedures, procedural sedation outside the operating room, acute and chronic pain management, and palliative care.

FACULTY



Joseph D. Tobias, MD  
Chief

- Graciela Argote-Romero, MD
- Rita Banoub, MD
- Ralph Beltran, MD
- Tarun Bhalla, MD
- Jason Bryant, MD
- Candice Burrier, MD
- Gregory Cambier, MD
- Richard Cartabuke, MD
- Kristin Chenault, MD
- Marco Corridore, MD
- Olamide Dairo, MD
- Elisabeth Dewhirst, MD
- Ajay D’Mello, MD
- Sujana Dontukurthy, MD
- Nicole Elsey, MD
- Seth Hayes, MD
- Renee Heng, MD
- Sarah Khan, MD
- Senthil G. Krishna, MD
- David Martin, MD

- Gregory Maves, MD
- Christopher McKee, DO
- Renata Miketic, MD
- Alok Moharir, MD
- Aymen Naguib, MD
- Vanessa Ng, MD
- Vidya Raman, MD
- Leila Reduque, MD
- Lance Relland, MD
- Devin Sanders, MD
- Brian Schloss, MD
- Erica Sivak, MD
- Ashley Smith, MD
- Timothy Smith, MD
- Ahsan Syed, MD
- Arlyne Thung, MD
- Joshua Uffman, MD
- Giorgio Veneziano, MD
- Brittany Willer, MD
- Peter Winch, MD

The Department of Anesthesiology and Pain Medicine includes 43 pediatric anesthesiologists and 47 certified registered nurse anesthetists who provide care at 43 sites per day. Last year, the department provided anesthetic care and sedation services for more than 38,500 procedures. Members of the faculty are fellowship-trained in pediatric anesthesiology and board certified in anesthesiology and pediatric anesthesiology by the American Board of Anesthesiology. Additional board certification is held in pediatric critical care medicine (two faculty); pain medicine (eight faculty); and general pediatrics (four faculty). An attending pediatric anesthesiologist is present in the hospital at all times for emergency cases. We have a division of cardiac anesthesia

that includes six physicians dedicated to the care of patients with acquired and congenital heart disease. We also have an active acute pain service that provides pain management services, including patient-controlled analgesia and regional anesthesia. The department also provides palliative care and hospice services with four full-time palliative care physicians.

The fellowship program provides subspecialty training in pediatric anesthesiology for fellows in both an ACGME-accredited program and international fellows from all over the world. The current international fellows are from Saudi Arabia and Japan. Advanced subspecialty training is offered in pediatric cardiac anesthesia, pediatric regional anesthesia, acute pain management, chronic pain management and palliative care.

Departmental research initiatives are led by a Vice-Chair for Academic Affairs and supported by a PhD research scientist, two full-time clinical research nurses, a data analyst and two research associates. The department participates in an active clinical research program with numerous ongoing prospective investigations in various areas of pediatric anesthesiology, including novel approaches to airway management, perioperative implications of comorbid conditions including obstructive sleep apnea, the use of novel pharmacologic agents in the pediatric population, outcomes following solid organ transplantation and quality improvement initiatives. The department published more than 60 manuscripts in peer-reviewed journals and presented more than 60 abstracts at national meetings last year.

We anticipate the upcoming year will see continued growth of our surgical and procedural sedation volumes as well as expansion of our solid organ transplantation program. We also expect continued growth of chronic pain initiatives including expansion of palliative care services and the development of an inpatient rehabilitation program for pediatric patients with complex pain issues.

SELECTED PUBLICATIONS

Akateh C, Tumin D, Beal EW, Mumtaz K, **Tobias JD**, Hayes D Jr, Black SM. Change in Health Insurance Coverage After Liver Transplantation Can Be Associated with Worse Outcomes. *Dig Dis Sci*. 2018 Jun;63(6):1463-1472.

Hakim M, Anderson BJ, Walia H, Tumin D, Michalsky MP, **Syed A, Tobias JD**. Acetaminophen Pharmacokinetics in Severely Obese Adolescents and Young Adults. *Pediatr Anesth*. 2019 Jan;29:20-26.

**Krishna SG, Bryant JF, Tobias JD**. Management of the Difficult Airway in the Pediatric Patient. *J Pediatr Intensive Care*. 2018 Sep;7(3):115-125.

Trifa M, Tumin D, Whitaker EE, **Bhalla T**, Jayanthi VR, **Tobias JD**. Spinal Anesthesia for Surgery Longer Than 60 Min in Infants: Experience from the First 2 Years of a Spinal Anesthesia Program. *J Anesth*. 2018 Aug;32:637-640.

**Uffman JC**, Tumin D, **Beltran RJ, Tobias JD**. Severe Outcomes of Pediatric Perioperative Adverse Events Occurring in Operating Rooms Compared to Off-Site Anesthetizing Locations in the Wake-Up Safe Database. *Pediatr Anesth*. 2019 Jan;29:38-43.

**Winch PD**, Tumin D, Moore J, Vizzini SJ, Berman DP, **Naguib AN**. Pediatric Pulmonary Artery Rehabilitation: A Review of Our Experience and a Novel Approach Using Bronchial Blockers. *Pediatr Cardiol*. 2018 Aug;39:1236-1241

Department Report

PATHOLOGY AND LABORATORY MEDICINE

The Department of Pathology and Laboratory Medicine at Nationwide Children’s Hospital provides a wide range of pediatric diagnostic services for hospitalized and ambulatory infants, children and adolescent patients. Laboratory services are provided through the main campus Anatomic and Clinical Pathology laboratories as well as multiple outpatient/reference laboratory testing facilities, Nationwide Children’s *Close To Home*<sup>SM</sup> and Urgent Care centers, and our freestanding Emergency Department.

FACULTY



**Shamlal Mangray, MB, BS**  
*Section Chief Anatomic Pathology & Interim Chief*



**Kathleen K. Nicol, MD**  
*Section Chief Clinical Pathology & Interim Medical Director*

- Roshini Abraham, PhD
- Michael Arnold, MD, PhD
- Peter B. Baker III, MD
- Daniel R. Boue, MD, PhD
- Fang Bu, MD
- Dustin Bunch, PhD
- Catherine Chung, MD
- Miriam R. Conces, MD
- Bonita R. Fung, MD
- Sophonie Jean, PhD
- Samir Kahwash, MD

- Selene Koo, MD, PhD
- Amy L. Leber, PhD
- Huifei Liu, MD, PhD
- Rachel Mariani, MD
- Erin K. Meyer, DO, MPH
- Christopher R. Pierson, MD, PhD
- Amy L. Pyle-Eilola, PhD
- Nilsa Del Carmen Ramirez-Milan, MD
- Diana Thomas, MD
- Huanyu Wang, PhD

AFFILIATED FACULTY

Biochemical Genetics

- Dennis W. Bartholomew, MD
- Kim L. McBride, MD, MS

Steve and Cindy Rasmussen Institute for Genomic Medicine Clinical Laboratory

- Maria Alfaro, PhD
- Catherine Cottrell, PhD
- Julie M. Gastier-Foster, PhD
- Kristy Lee, PhD
- Ruthann B. Pfau, PhD
- Shalini C. Reshmi, PhD

Neuromuscular Pathology

- Zarife Sahenk, MD, PhD

Nationwide Children’s Hospital’s laboratory services include more than 25 pathologists and doctoral scientists with subspecialty expertise in pediatric pathology and laboratory medicine. This professional staff is supported by more than 400 technical staff who provide 24/7 coverage in critical patient care areas. As an integral part of Nationwide Children’s operations, our team provides

specimen collection and diagnostic services in multiple service centers across Ohio.

In 2018, Anatomic Pathology processed more than 10,000 surgical cases, 1,500 cytology specimens and 90 autopsies. Clinical laboratories performed more than 3.1 million tests in various subspecialty areas. We participated in multiple quality and service improvement projects. As part of our core mission, we were actively involved in undergraduate and graduate medical education, and our faculty served in multiple leadership roles locally and on the national scene. Faculty highlights include the recruitment of Roshini Abraham, PhD, as the director of a newly developed Primary Immunodeficiency Testing Lab, which was also recognized by the Jeffrey Modell Foundation. She also serves as director of Faculty Affairs for the department. Two board-certified hematopathologists were added to our staff and they serve as directors in the clinical lab, Huifei Liu, MD, (director of Flow Cytometry) and Rachel Mariani, MD, (director of Hemostasis and Thrombosis). Miriam R. Conces, MD, is the newly appointed director of Electron Microscopy and Immunopathology. We also added expertise in the areas of Dermatopathology and Neuropathology when Catherine Chung, MD, and Diana Thomas, MD, respectively, joined our faculty.

Our commitment to academic pathology continued with more than 50 publications and numerous local and national presentations. The faculty served on more than 50 extramural research grants and continued to play a key role in various national activities of the Children’s Oncology Group.

GRANTS AWARDED  
JULY 1, 2018– JUNE 30, 2019

\$746,255

SELECTED PUBLICATIONS

Hayes D Jr, Nicholson KL, Miller R, Nance AE, Kirkby SE, Parker W, **Baker PB**. Quality Improvement Initiative for Assessing Allografts after Lung Transplantation. *Pediatr Qual Saf*. 2019 Mar 27;4(2):e146.

Riaz IB, Faridi W, Patnaik MM, **Abraham RS**. A Systematic Review on Predisposition to Lymphoid (B and T cell) Neoplasia in Patients with Primary Immunodeficiencies and Immune Dysregulatory Disorders (Inborn Errors of Immunity). *Front Immunol*. 2019 Apr 16;10:777.

**Rose GS**, Arnold CA, **Badizadegan K**, **Carter CM**, **Conces MR**, **Kahwash SB**, **Nicol KK**, **Arnold MA**. Cytoplasmic Fibrillar Aggregates in Gallbladder Epithelium Are a Frequent Mimic of Cystoisospora in Pediatric Cholecystectomy Specimens. *Arch Pathol Lab Med*. 2019 Apr 10. [Epub ahead of print]

Schieffer KM, Varga E, Miller KE, Agarwal V, Koboldt DC, Brennan P, Kelly B, Dave-Wala A, **Pierson CR**, Finlay JL, AbdelBaki MS, White P, Magrini V, Wilson RK, Mardis ER, **Cottrell CE**. Expanding the Clinical History Associated with Syndromic Klippel-Feil: A Unique Case of Comorbidity with Medulloblastoma. *Eur J Med Genet*. 2019;62(8):103701.

**Wang H**, Hecht S, Kline D, **Leber AL**. Staphylococcus Aureus and Methicillin Resistance Detection Directly from Pediatric Samples Using PCR Assays with Differential Cycle Threshold Values for Corroboration of Methicillin Resistance. *J Microbiol Methods*. 2019 Apr;159:167-173.

Department Report

BIG LOTS BEHAVIORAL HEALTH SERVICE LINE



**David A. Axelson, MD**  
*Medical Director of Behavioral Health Services and  
Chief of Child and Adolescent Psychiatry and Behavioral Health  
Nationwide Children's Hospital and The Ohio State University*

Behavioral Health Services at Nationwide Children's Hospital is a comprehensive service line dedicated to children and adolescents affected by mental illness and problems of emotion, behavior, development, thought and adaptation to life challenges, including those associated with physical illness and trauma. We are committed to partnering with patients, families and referring primary care clinicians and specialists to deliver services of public health relevance and to achieve the best possible clinical outcomes. Because no single discipline or professional can adequately address the needs of every child, our approach is deliberately multidisciplinary and collaborative.

Care is typically delivered by a team composed of a combination of child and adolescent psychiatrists, developmental and behavioral pediatricians, psychologists and neuropsychologists, nurses, social workers, family therapists and counselors. By working together, we aim to deliver team-based care that transcends the work of individual professionals working alone, incorporates evidence-based practices into active clinical settings and establishes high standards of quality, safety and customer satisfaction. Faculty from the Department of Pediatrics and the Child and Adolescent Division of the Department of Psychiatry and Behavioral Health provide clinical care in the service line.

In June 2017, Nationwide Children's broke ground on the Big Lots Behavioral Health Pavilion, a new facility fully dedicated to children and adolescents with mental and behavioral health conditions. As the most comprehensive pediatric facility of its kind nationally, the Big Lots Behavioral Health Pavilion will house integrated behavioral health services, including inpatient beds, a psychiatric crisis evaluation center with observation beds, a crisis stabilization unit, a partial hospital, and intensive outpatient and outpatient programs. The pavilion will serve as a place to train the wide range of disciplines in pediatric mental and behavioral health, as well as foster collaboration with Nationwide Children's research teams and community partner agencies.

In addition to being one of the largest outpatient service lines at Nationwide Children's, we are also the largest

pediatric behavioral health network of any children's hospital in the country, with over 240,000 outpatient visits completed in the last year. Clinical services within behavioral health serve as a setting for training a wide range of disciplines. Associated training programs include pre-professional internships in psychology, social work and clinical counseling, fellowships in developmental behavioral pediatrics, post-doctoral psychology fellowships in Pediatric Psychology, Neuropsychology, Intellectual and Developmental Disabilities, Autism Treatment, and Child Clinical, a post-graduate fellowship program in child and adolescent mental health for advanced practice nurses, and externships for psychiatric and mental health advanced practice nurses, clinical counselors, social workers, family therapists, and psychologists. In addition, medical students, psychiatry, pediatric and family-practice residents, and nursing students have training experiences and rotations within the service line. The service line supports a diverse portfolio of clinical research studies, many of which are led by investigators in the Center for Biobehavioral Health, the Center for Innovation in Pediatric Practice, the Center for Suicide Research and Prevention, and the Child Development Center Research Program.

By integrating clinical, educational, research and advocacy efforts, we strive to improve the lives of children and families in central Ohio and beyond. The programs within Behavioral Health Services are described below.

**The Child Development Center and Center for Autism Spectrum Disorders** provide services to individuals with intellectual and developmental disabilities, including those with autism spectrum disorders. The Child Development Center offers a wide range of services to address the developmental and behavioral needs of children, adolescents and families living with autism spectrum disorders and other developmental disabilities.

These services include interdisciplinary assessment and treatment, psychological evaluation and treatment, family interventions, advocacy support and care coordination with medical, speech and additional services. The Child Development Center provides integrated care in more than a dozen pediatric subspecialty clinics. The Child Development Center serves as a site for the Autism Speaks Autism Treatment Network, a network of 13 sites across the United States and Canada.

The Center for Autism Spectrum Disorders provides comprehensive, multidisciplinary care focusing on evidence-based treatment, education, research and advocacy for children diagnosed with autism spectrum disorder. Services include intensive behavioral intervention and consultation, school support and educational consultation, Asperger's counseling, social skills groups, parent teaching, advocacy and community education.

**Pediatric Psychology and Neuropsychology** provides clinical services in two primary areas: Pediatric Psychology provides specialized assessment and intervention services that focus on the relationship between cognitive, social, and emotional functioning and physical health, typically for children with co-occurring medical conditions (e.g., cancer, diabetes, sickle cell disease); Pediatric Neuropsychology performs specialized evaluations for children and adolescents with a range of medical and neurological disorders that impact thinking or behavior (e.g., brain tumors, epilepsy, seizure disorders, traumatic brain injury). The section provides care throughout the hospital, including inpatient medical units, medical specialty outpatient clinics and the Psychology Clinic at Nationwide Children's.

In 2018, Pediatric Psychology had continued growth in patient volume for both inpatient consultation and liaison and outpatient services. One area of continued expansion has been integrating pediatric psychologists into our Primary Care Centers with two new integration sites added in 2018 and the launch of integrated care in Partners For Kids<sup>sm</sup> (PFK) practices through Project ECHO Behavioral Health. PFK is the accountable care organization affiliated with Nationwide Children's Hospital. In 2018, Pediatric Psychology also realized growth in integrated care within our Rheumatology, Orthopaedics and Neonatology services among others. Our psychologists provide leadership in several programs within the Department of Pediatrics at Nationwide Children's, with roles such as director of Psychosocial Services for the Division of Hematology, Oncology & Blood and Marrow Transplant at Nationwide Children's, psychosocial leadership in areas of gastrointestinal care and the Newborn Intensive Care Unit, program leadership in the interdisciplinary feeding program for children with feeding aversions, and the comprehensive interdisciplinary pain program. Our psychologists act as liaisons to divisions within the Department of Pediatrics to provide expertise in clinical care and to assist in development of research and quality initiatives around the psychosocial care for patients and families. See page 111 for a list of faculty, selected publications and grants awarded.

**Psychiatry and Community Behavioral Health** is the largest and most clinically diverse section of Behavioral Health. This integrated program of care for pediatric

mental disorders was created via collaboration between Nationwide Children's and The Ohio State University Wexner Medical Center. Services now available include pediatric crisis assessment and treatment services with an expanded Youth Crisis Stabilization Unit at Nationwide Children's, consultation-liaison services for youth hospitalized at Nationwide Children's, psychiatric inpatient beds at Nationwide Children's and The Ohio State University's Harding Hospital, Adolescent Intensive Outpatient Programs at The Ohio State University, multiple levels of care for eating disorders in collaboration with Adolescent Medicine, the Mood and Anxiety Program with intensive outpatient services, intermediate levels of behavioral health care in the community courts and school, specialized services for early child mental health, outpatient treatment clinics and a novel program to integrate mental health service delivery in primary care settings. Over the past year, there has been substantial growth in the number of outpatient visits provided in the psychiatry, school-based and general therapy clinics. See page 133 for a list of faculty, selected publications and grants awarded.

**Center for Biobehavioral Health:** See page 180 for information about the Center for Biobehavioral Health in the Abigail Wexner Research Institute at Nationwide Children's Hospital.

**GRANTS AWARDED TO  
CLINICAL AND RESEARCH FACULTY  
JULY 1, 2018 – JUNE 30, 2019**

\$17,165,188

FAST FACTS

July 2018 through June 2019

|                                                                               |         |
|-------------------------------------------------------------------------------|---------|
| <b>Child Development Center and Center for Autism Spectrum Disorders</b>      |         |
| Child Development Center Visits: .....                                        | 12,538  |
| Child Development Center Medical Clinic/Outpatient Consultation Visits: ..... | 1,388   |
| Center for Autism Spectrum Disorders Visits: .....                            | 41,330  |
| <b>Behavioral Health</b>                                                      |         |
| Total Outpatient Visits/Consults: .....                                       | 242,612 |
| Total Inpatient Consults: .....                                               | 6,109   |
| Total Inpatient Discharges: .....                                             | 1,519   |
| Total Inpatient Days: .....                                                   | 8,782   |

PSYCHIATRY AND COMMUNITY BEHAVIORAL HEALTH

Psychiatry and Community Behavioral Health at Nationwide Children’s Hospital is the largest and most clinically diverse section of Behavioral Health. This integrated program of care for pediatric mental disorders was created via collaboration between Nationwide Children’s Hospital and The Ohio State University Wexner Medical Center. The Child and Adolescent Division in The Ohio State University Department of Psychiatry and Behavioral Health has faculty at Nationwide Children’s and The Ohio State University. See page 131 for details and for information about all Behavioral Health services.

FACULTY



David A. Axelson, MD  
Chief

FULL-TIME NATIONWIDE CHILDREN'S FACULTY

- John Ackerman, PhD
- Benjamin Albrecht, DO
- Jeffrey A. Bridge, PhD
- Shannon M. Cheek, MD
- Joyce Chen, MD
- Nancy Cunningham, PsyD
- Mary Lynn Dell, MD
- Ben Fields, PhD
- Michael Flores, PhD
- Bela M. Gandhi, MD
- Richard H. Gilchrist, MD
- Charles J. Glawe, MD
- Jocelyn Hart, MD
- Karah Harvey, MD
- Joseph Hatcher, PhD
- Geeta Ilipilla, MD
- Natalie Jacobowski, MD
- Kristina R. Jiner, MD
- Anna Kerlek, MD

- Robert A. Kowatch, MD, PhD
- Rajeev Krishna, MD, PhD
- Scott Leibowitz, MD
- Molly Meers, PhD
- Jennifer Munoz, PhD
- Mary Ann Murphy, MD
- Sarah Nayeem, MD
- Priti Purushothaman, MD
- Ujjwal Ramtekkar, MD
- Jennifer Reese, PsyD
- Nadine Schwartz, MD
- Lacramioara Spetie, MD
- Maria Stamatakos, MD
- Griffin A. Stout, MD
- Glenn Thomas, PhD
- Raymond Troy, MD
- Pankhuree Vandana, MD
- Elizabeth Vickery, PhD
- Kelly Wesolowski, PsyD
- Kris West, PhD

OSU-AFFILIATE FACULTY

- Michael G. Aman, PhD
- L. Eugene Arnold, MD, MEd
- Mary Fristad, PhD
- Sathyan Gurumurthy, MD
- Amy B. Hoisington-Stabile, MD
- Ghada N. Lteif, MD
- Jessica R. Strafford, MD

GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019

\$203,776

SELECTED PUBLICATIONS

Bridge JA, Greenhouse JB, Ruch D, Stevens J, Ackerman J, Sheftall AH, Horowitz LM, Kelleher KJ, Campo JV. Association Between the Release of Netflix’s 13 Reasons Why and Suicide Rates in the United States: An Interrupted Time Series Analysis. *J Am Acad Child Adolesc Psychiatry*. 2019 Apr 28. pii: S0890-8567(19)30288-6.

Leibowitz SF, Lantos JD. Affirming, Balanced, and Comprehensive Care for Transgender Teenagers. *Pediatrics*. 2019 Jun;143(6). pii: e20190995.

Mendez I, Axelson D, Castro-Fornieles J, Hafeman D, Goldstein TR, Goldstein BI, Diler R, Borrás R, Merranko J, Monk K, Hickey MB, Birmaher B. Psychotic-Like Experiences in Offspring of Parents with Bipolar Disorder and Community Controls: A Longitudinal Study. *J Am Acad Child Adolesc Psychiatry*. 2019 May;58(5):534-543.e6.

Roth DE, Ramtekkar U, Zekovic-Roth S. Telepsychiatry: A New Treatment Venue for Pediatric Depression. *Child Adolesc Psychiatr Clin N Am*. 2019;28(3):377-395. [Epub 2019 Apr 4]

Weintraub MJ, Axelson DA, Kowatch RA, Schneck CD, Miklowitz DJ. Comorbid Disorders as Moderators of Response to Family Interventions among Adolescents with Bipolar Disorder. *J Affect Disord*. 2019 Mar;246:754-762.

FAST FACTS

July 2018 through June 2019

|                                                          |        |
|----------------------------------------------------------|--------|
| Psychiatry Inpatient Consultations:.....                 | 1,947  |
| Psychiatry Inpatient Unit Discharges: .....              | 573    |
| Community-Based Visits: .....                            | 43,732 |
| Outpatient Therapy Visits:.....                          | 79,752 |
| Partial Hospital/Intensive Outpatient Program Visits: .. | 4,691  |
| Psychiatry Clinic Visits: .....                          | 31,153 |
| Emergency Department Assessments: .....                  | 5,236  |
| Youth Crisis Stabilization Unit Discharges:.....         | 946    |

2018 – 2019 NATIONWIDE CHILDREN'S  
FELLOWSHIP PROGRAM

CHILD & ADOLESCENT PSYCHIATRY

- Cristen Collins, MD
- Charles W. Forman, DO
- Sarah Hamilton, MD

Department Report

RADIOLOGY

The Department of Pediatric Radiology at Nationwide Children’s Hospital is one of the nation’s premier clinical imaging programs with subspecialty expertise in abdominal, cardiac, chest, fetal/neonatal, interventional, musculoskeletal, neuroimaging and nuclear medicine. We provide expert care in image-guided diagnosis and therapy. Our mission is to improve children’s lives through innovative imaging. The major philosophical consideration that drives our mission is that children are not small adults. Technology must be adapted to meet the needs of pediatric patients to create imaging biomarkers specific for pediatric disease. Our vision of the reinvented imaging department, the Children’s Imaging Biomarker Alliance (CIBA), was born with the following goals:

- Develop and validate imaging biomarkers specific to pediatric disease
- Determine quality, safety and cost-effectiveness of validated biomarkers
- Integrate imaging biomarkers across the basic/translational /clinical spectrum
- Integrate pediatric research across departments, imaging modalities and populations

We have a collaborative biomarker-based imaging program with a robust quality and safety infrastructure, optimized distribution of imaging resources, an integrated model of imaging informatics, and an advanced image processing program using 3D modeling and 3D printing for personalized treatment planning and creation of patient-specific devices.

FACULTY



**Rajesh Krishnamurthy, MD**  
*Radiologist-in-Chief*

- Brent H. Adler, MD  
*Associate Radiologist-in-Chief, Clinical Affairs (Imaging)*
- David Gregory Bates, MD
- Adam Bobbey, MD  
*Section Chief, Nuclear Medicine and Molecular Imaging*
- Leah Braswell, MD
- Ellen Chung, MD  
*Associate Radiologist-in-Chief, Innovation*
- Eric Diaz, MD
- Stephen Druhan, MD

- Elizabeth Hingsbergen, MD  
*Associate Radiologist-in-Chief, Operations*
- Mai-Lan Ho, MD
- Mark Hogan, MD
- Jeremy Jones, MD  
*Section Chief, Neuroradiology Imaging*
- Anna Lillis, MD
- Lisa Martin, MD
- Aaron McAllister, MD
- Kathryn Milks, MD
- James Murakami, MD
- Becky Murray, MD
- Julie O’Donovan, MD
- Andrew Rabe, DO
- Mitch Rees, MD
- Diana Rodriguez, MD
- Lynne Ruess, MD
- Jerome Rusin, MD
- Summit Shah, MD
- Sally Smith, DO

- Benjamin Thompson, DO
- Patrick Warren, MD  
*Section Chief, Interventional Imaging*
- Cody Young, DO
- Nicholas Zumberge, MD

We are embarking on a program called the Children’s Imaging Biomarker Alliance, which brings together strategic partnerships and shared cutting-edge resources to create world-class imaging programs. The integrated model is based on dyads (or pairs), that have been created for key areas. The dyads can tap into an array of resources to approach complex issues. The resources are housed under the Pediatric Advanced Imaging Resource (PAIR), and include subspecialized radiologists, medical imaging scientists, advanced imaging analysts, specialized technologists, novel imaging techniques, and centralized imaging hardware and software.

Interventional Radiology

We developed a comprehensive multidisciplinary vascular anomalies center, staffed by three interventional radiologists specialized in vascular anomalies, with notable developments including a weekly VAC clinic, and a new lymphatic channel imaging and intervention program. In addition, James Murakami, MD, is the recipient of a \$1 million endowment to create and scale innovative percutaneous treatments for orphan diseases in children. Interventional radiology played an important role in the path-breaking gene therapy trials by providing targeted gene delivery to the patients.

Neuroimaging and Body Imaging

Mai-Lan Ho, MD, was recruited to promote neuroimaging research, specifically focusing on imaging genomics of neurological conditions, especially tumors and epilepsy. The imaging quality program distinguished itself at the Society of Pediatric Radiology 2019 meeting with four podium presentations focusing on Ongoing Practice Evaluation (OPEN), reducing sedation for MR and CT imaging, daily huddle, and standardized reporting.

Imaging Research

Rajesh Krishnamurthy, MD, became the chair of the pediatric imaging research committee at the American College of Radiology. Nationwide Children’s became the only children’s hospital with the ability to perform large animal imaging with all major imaging modalities

including MRI, CT, 3D rotational angiography and nuclear imaging, significantly enhancing the capabilities of researchers to translate their research to children.

GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019

\$326,999

SELECTED PUBLICATIONS

**Krishnamurthy R**, Wang DJJ, Cervantes B, **McAllister A**, Nelson E, Karampinos DC, Hu HH. Recent Advances in Pediatric Brain, Spine, and Neuromuscular Magnetic Resonance Imaging Techniques. *Pediatr Neurol*. 2019;96:7-23. [Epub 2019 Mar 12]

Hu HH, **McAllister AS**. The Potential and Promise of Diffusion Tensor MRI in Predicting Neurodevelopment in Children. *Radiology*. 2019;292(1):188-189. [Epub 2019 Jun 4]

Foo MI, **Braswell LE**, Lubeley LJ, **Murakami JW**. Minimally Invasive Treatment of Pediatric Head and Neck Dermoids: Percutaneous Drainage and Radiofrequency Coblation. *Pediatr Radiol*. 2019;49(9):1222-1228. [Epub 2019 Jun 4]

Mendell JR, Chicoine LG, Al-Zaidy SA, Sahenk Z, Lehman K, Lowes L, Miller N, Alfano L, Galliers B, Lewis S, Murrey D, Peterson E, Griffin DA, Church K, Cheatham S, Cheatham J, **Hogan MJ**, Rodino-Klapac LR. Gene Delivery for Limb-Girdle Muscular Dystrophy Type 2D by Isolated Limb Infusion. *Hum Gene Ther*. 2019;30(7):794-801. [Epub 2019 Apr 19]

2018 – 2019 NATIONWIDE CHILDREN’S  
FELLOWSHIP PROGRAM

PEDIATRIC INTERVENTIONAL RADIOLOGY

Nathan Fagan, MD

PEDIATRIC RADIOLOGY

Eric Morgan, MD



Oluyinka O. Olutoye, MD, PhD  
*Surgeon-in-Chief*

SURGICAL SERVICES

Nationwide Children’s Hospital’s surgical departments have come together with a single, clear focus — to provide optimal outcomes for every child — inside and outside the walls of the operating room. This work is predicated on three core pillars — providing advanced clinical care, performing ground-breaking research and offering industry-leading training programs — that combine to provide the best care for every child.

Our faculty are helping to improve the care provided to children around the world by training the next generation of surgeons. Our departments offer the most surgical residency and fellowship programs of any free-standing pediatric hospital in the United States. Training programs are also offered to other surgeons, providing opportunities for them to advance their skills in more advanced techniques such as minimally invasive laparoscopic and robot-assisted laparoscopic surgery.

SURGICAL SUBSPECIALTIES

- |                                        |                                       |                                      |
|----------------------------------------|---------------------------------------|--------------------------------------|
| • Cardiothoracic Surgery               | • Ophthalmology                       | • Pediatric Surgery                  |
| • Colorectal and Pelvic Reconstruction | • Orthopaedics                        | • Plastic and Reconstructive Surgery |
| • Dentistry                            | • Otolaryngology                      | • Transplant                         |
| • Neurosurgery                         | • Pediatric and Adolescent Gynecology | • Trauma                             |
|                                        |                                       | • Urology                            |

Surgical Services

THE HEART CENTER / CARDIOTHORACIC SURGERY

The Cardiothoracic Surgery Program at Nationwide Children’s Hospital is dedicated to the treatment of all patients, from fetus to adulthood, with congenital heart defects ranging from the most straightforward to the extremely complex. As part of The Heart Center, we offer a comprehensive approach to heart care that is based on a multidisciplinary team model, which enables our team to constantly monitor quality of care and patient safety pre-and post-surgery to assure the best possible outcomes. See page 43 for details about The Heart Center.



FACULTY



**Mark E. Galantowicz, MD**  
*Chief, Cardiothoracic Surgery*  
*Co-Director, Heart Center*

Sergio A. Carrillo Melendez, MD

Patrick I. McConnell, MD  
*Director, Cardiopulmonary Mechanical Assist Program*

Toshiharu Shinoka, MD, PhD  
*Director, Cardiovascular Tissue Engineering Program*

GRANTS AWARDED TO HEART CENTER  
AND CARDIOVASCULAR RESEARCH FACULTY  
JULY 1, 2018 – JUNE 30, 2019

\$3,290,050

SELECTED PUBLICATIONS

Backes CH, Nealon E, Armstrong AK, Cua CL, Mitchell C, Krishnan U, Vanderlaan RD, Song MK, Viola N, Smith CV, **McConnell PI**, Rivera BK, Bridge J. Pulmonary Vein Stenosis in Infants: A Systematic Review, Meta-Analysis, and Meta-Regression. *J Pediatr*. 2018 Jul;198:36-45.e3.

Best C, Szafron JM, Rocco KA, Zbinden J, Dean EW, Maxfield MW, Kurobe H, Tara S, Bagi PS, Udelsman BV, Khosravi R, Yi T, **Shinoka T**, Bymphrey JD, Breuer CK. Differential Outcomes of Venous and Arterial Tissue Engineered Vascular Grafts Highlight the Importance of Coupling Long-term Implantation Studies with Computational Modeling. *Acta Biomater*. 2019 Aug;94:183-194.

Evans WN, Acherman RJ, Berthoty D, Mayman GA, Ciccolo ML, **Carrillo SA**, Restrepo H. Aortic Arch with Situs Solitus. *Congenit Heart Dis*. 2018 Jul;13(4):624-627.

Stacy MR, Best CA, Maxfield MW, Qiu M, Naito Y, Kurobe H, Mahler N, Rocco KA, Sinusas AJ, **Shinoka T**, Sampath S, Breuer CK Magnetic Resonance Imaging of Shear Stress and Wall Thickness in Tissue-Engineered Vascular Grafts. *Tissue Eng Part C Methods*. 2018 Aug;24(8):465-473.

Reinhardt J, Rosado R, De Dios J, Barker J, Best C, Yi T, Zeng Q, Partida-sanchez, S, **Shinoka T**, Breuer C. Early Natural History of Neotissue Formation in Tissue Engineered Vascular Grafts in Murine Model. *Regenerative Medicine. Regen Med*. 2019 May;14(5):389-408.

COLORECTAL AND PELVIC RECONSTRUCTION

The Center for Colorectal and Pelvic Reconstruction at Nationwide Children’s Hospital is leading the way in providing high quality care for children diagnosed with colorectal and pelvic conditions. It is clear that there is a direct correlation between the number of patients a clinical program sees and the high-quality outcomes they can deliver to their patients. Colorectal and Pelvic Reconstruction is the busiest program of its kind anywhere in the world, having performed more than 1,000 operations last year.

Every child diagnosed with a colorectal or pelvic condition is handled with an individualized treatment plan. Because of the complexity of many conditions, most children require care throughout their life. Our team is committed to providing optimal outcomes and quality of life from newborns, through toilet training, puberty, and adulthood, including bowel, urinary, and sexual function and childbearing.



FACULTY



**Richard J. Wood, MD**  
*Interim Chief  
Director, Colorectal and Pelvic Reconstruction*

COLORECTAL AND PELVIC RECONSTRUCTIVE SURGERY

Karen A. Diefenbach, MD  
Allesandra Gasior, DO  
*Transitional Care Director*  
Ihab Halaweish, MD

GASTROENTEROLOGY, HEPATOLOGY AND NUTRITION

Neetu Bali, MD  
Carlo Di Lorenzo, MD

Peter Lu, MD  
Karla Vaz, MD  
Kent C. Williams, MD  
Desale Yacob, MD  
*Motility Director, Colorectal and Pelvic Reconstruction*

ANATOMIC PATHOLOGY

Peter B. Baker III, MD  
Bonita R. Fung, MD

DIAGNOSTIC RADIOLOGY

Brent H. Adler, MD  
David Gregory Bates, MD  
Benjamin P. Thompson, DO

NEUROSURGERY

Jeffrey R. Leonard, MD

PEDIATRIC AND ADOLESCENT GYNECOLOGY

Geri D. Hewitt, MD  
*Gynecology Director, Colorectal and Pelvic Reconstruction*  
Katherine A. McCracken, MD

UROLOGY

Seth A. Alpert, MD  
Christina B. Ching, MD  
Daniel G. DaJusta, MD  
*Urology Director, Colorectal and Pelvic Reconstruction*  
Molly Fuchs, MD  
V. Rama Jayanthi, MD

PROGRAM MANAGER

Julie Choueiki, MSN, RN  
Stephanie Vyrostek, BSN, RN

CLINICAL LEADERS

Meghan E. Fisher, BSN, RN  
Marissa Condon, BSN, RN

ADVANCE PRACTICE NURSE COORDINATORS

Kristina Booth, MSN, CFNP  
Onnalisa Nash, MS, CPNP-PC

The Center for Colorectal and Pelvic Reconstruction has a growing transition of care program for children as they become young adults and adulthood. With the expertise of Dr. Alessandra Gasior, the first surgeon in the world trained in both pediatric and adult colorectal surgery, this unique program will collaborate with The Ohio State University Wexner Medical Center. The center has changed the lives of many adult patients through our collaborative approach to care.

The complex reconstruction program, working closely with urologists, gynecologists and gastroenterologists, continues to help children from around the world, thus far providing guidance and surgery for children from all 50 states and 73 countries. The use of minimally invasive surgery has expanded as well, offering both robot-assisted and pure laparoscopic surgical treatment of complex conditions, including bladder neck reconstruction, appendicovesicostomy and/or Malone procedures for severe incontinence, both urinary and fecal, and offering unique opportunities to share tissues such as a shared appendix used for both procedures.

The Colorectal and Pelvic Reconstruction team travels to provide surgical education across the globe. Surgeons train fellow surgeons and nurses train nurses. In the upcoming year the team looks forward to visiting Greece, Vienna, South Africa and China.

The nursing team has completed their first bowel management book with a focus on case presentations for a variety of diagnoses and specific patient populations. This book is set to be published by the end of 2019.

SELECTED PUBLICATIONS

Halleran D, Vilanova-Sanchez A, Rentea R, Vriesman M, Maloof T, Lu P, Onwuka A, Weaver L, **Vaz K, Yacob D, Di Lorenzo C**, Levitt M, **Wood RJ**. A Comparison of Malone Appendicostomy and Cecostomy for Antegrade Access as Adjuncts to a Bowel Management Program for Patients with Functional Constipation or Fecal Incontinence. *J Pediatr Surg*. 2019 Jan;54(1):123-128.

Reck C, Sebastião Y, **Fuchs M**, Halleran D, Weaver L, **Bates G, Gasior A**, Maloof T, Hoover E, Jaggars J, Gagnon R, **Ching C, Dajusta D, Jayanthi V**, Levitt M, **Wood RJ**. Can Sacral Development as a Marker for Caudal Regression Help Identify Associated Urologic Anomalies in Patients with Anorectal Malformation? *J Pediatr Surg*. 2018 Nov;53(11):2178-2182.

Vilanova-Sanchez A, Halleran D, Reck C, **Gasior A**, Weaver L, **Fisher M**, Peters K, Wagner A, **Nash O, Booth K, Williams C**, Brown S, **Lu P, Fuchs M, Diefenbach K, Leonard J, Hewitt G, McCracken K, Di Lorenzo C, Wood RJ**, Levitt M. A Descriptive Model for a Multidisciplinary Unit for Colorectal and Pelvic Malformations. *J Pediatr Surg*. 2019 Mar;54(3):479-485.

Vilanova-Sánchez A, Reck C, **Wood RJ**, García-Maurino C, **Gasior A**, Dyckes R, Weaver L, Minzler D, **Diefenbach K**, Rentea R, **Fuchs M, Ching C, Dajusta D, Mccracken K, Hewitt G, Jayanthi R**, Levitt M. Impact on Patient Care of a Multidisciplinary Center Specializing in Colorectal and Pelvic Reconstruction. *Front Surg*. 2018 Nov 19;5:68.

2018 – 2019 NATIONWIDE CHILDREN'S FELLOWSHIP PROGRAM

PEDIATRIC COLORECTAL RESEARCH

Devin R. Halleran, MD

PEDIATRIC COLORECTAL SURGERY

Hira Ahmad, MD

INTERNATIONAL PELVIC RECONSTRUCTION

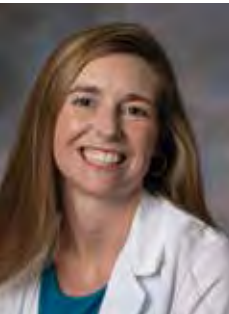
Raquel Quintanilla Amoros, MD  
*(Hospital Alberto Sabogal, Essalud, Peru)*

Marion Arnold, MBChB, MMed  
*(Red Cross War Memorial Children's Hospital, South Africa)*

DENTISTRY

The Department of Dentistry at Nationwide Children’s Hospital is a team of dedicated pediatric dentists, orthodontists, oral surgeons, endodontists, general dentists, residents and team members who provide comprehensive preventive, therapeutic, urgent and emergency oral health care services for infants, children and adolescents, including those with special health care needs. Our mission is to optimize oral health for the children who need us most through a balanced program dedicated to providing quality clinical care and specialty services while advancing knowledge through research, advocacy and community partnerships within a premier educational environment. Scientific discoveries focus on caries prevention, behavior management, oral microbiome and dental trauma outcomes.

FACULTY



Janice A. Townsend, DDS, MS  
Division and Section Chief

FULL-TIME NATIONWIDE CHILDREN'S FACULTY

- Homa Amini, DDS, MS, MPH
- Paul S. Casamassimo, DDS, MS
- Daniel B. Claman, DDS
- Catherine M. Flaitz, DDS, MS
- Kimberly Hammersmith, DDS, MPH, MS  
Program Director
- Ashok Kumar, BDS, MS  
Director of Clinical Operations and General Anesthesia
- Rosa Ortega, DDS, MS

OSU-AFFILIATE FACULTY

- Hany A. Emam, BDS, MS
- Henry W. Fields, DDS, MS, MSD  
Section Chief, Orthodontics
- Ann L. Griffen, DDS, MS
- Erin L. Gross, DDS, PhD, MS
- Courtney A. Jatana, DDS, MS, FACS
- Kelly S. Kennedy, DDS, MS
- Peter E. Larsen, DDS  
Section Chief, Oral and Maxillofacial Surgery

- Dennis J. McTigue, DDS, MS
- Ana M. Mercado, DMD, MS, PhD
- Gregory M. Ness, DDS
- Diego A. Solis, DDS

COMMUNITY-BASED FACULTY

- Ashley E. Anderson, DDS
- Carolyn A. Barber, DDS
- Janet J. Brown, DDS
- Jennifer Bryk-Hechko, DDS, MS
- Emily R. Burns, DDS, MS
- Jackson Cockley, DDS
- Johnathan W. Draney, DDS, MS
- Kylene H. Fernandez, DDS, MS
- Timothy J. Frey, DDS
- Lucia C. Gerstmann, DDS, MS
- Kimberly M. Gill, DDS, MS
- Jillian N. Gray, DDS
- Mitzi L. Hines, DDS
- Gary M. Judis, DDS
- Edith Y. Kang, DDS, MPH, MS
- Gerald H. Kassoy, DDS, MS
- Patrick M. Kennedy, DDS
- Nicholas M. Kerns, DDS, MS
- Joshua M. Leavitt, DMD, MS
- Jeffrey S. Lee, DDS
- Douglas Lin, DDS, MS
- Sean E. Lindsey, DDS
- Eileen M. Martinez, DDS
- Monte E. Masonbrink, DDS, MS

- Yoon-Mi L. Matraccia, DMD, MS
- Jeffrey T. Milton, DDS, MS
- Kara M. Morris, DDS, MS
- Cecilia A. Moy, DDS, MS
- Andrea M. Myers, DDS
- Scott W. Nieman, DDS
- DaAdrian T. Norman, DDS
- Colleen C. Orellana, DDS, MS
- Andree-Anne Page, DMD
- Sachin S. Parulkar, DDS
- Monica R. Patel, DMD, MS
- Nira S. Patel, DDS
- Matthew L. Pingel, DMD
- Mindy A. Price, DDS, MS
- Sidney D. Price, DDS, MS
- Joel J. Richards, DDS
- Shaun A. Rotenberg, DMD, MS
- Avneet K. Sandhu, DDS
- Marlina M. Shah, DDS, MS
- Anuradha Shelar, DDS
- Rajan K. Sheth, DDS
- David S. Silverglade, DDS, MS
- David A. Smeltzer, DDS
- Randall M. Speer, DDS
- Rob S. Steiner, DMD
- Kumar Subramanian, DDS, MS
- Claire E. Towning, DDS
- Eric C. Van Gilder, DDS
- Kevin T. Weitzel, DMD, MS
- Stephen Wilson, DMD

In the past year, the department has made considerable progress in improving access for patients. Overall patient visits have increased by 10% resulting in approximately 48,000 clinical visits and 3,700 surgical visits per year. The department has focused on improving access to medically complex patients and the clinic is now seeing approximately 1,000 new medically complex patients each year. Faculty schedules have been modified to treat medically complex and emergency patients in a timelier manner. This increase in access has been supported

through the hiring of pediatric dentistry faculty member, Ehsan Azadani, DDS, MS, and the addition of general dentists to provide care within an appropriate scope of services. The department has been successful in providing a stable dental presence on interdisciplinary hospital teams through a Dental Hygiene Ambassador who provides health care education and facilitates patient scheduling.

Additional highlights:

- Completed renovations for the dental surgery and sedation center in the hospital
- National and local faculty and resident recognitions:
  - Homa Amini, DDS, MS, MPH, received grants from two groups:
    - Primary investigator for Ohio Medicaid, Medicaid Equity Simulation Project; MEDTAPP: Access to Dental Care for Immigrant Families
    - Health Resources and Services Administration Dental Faculty Loan Repayment grants
  - Ehsan Azadani, DDS, MS, was awarded a Dental Faculty Loan Repayment grant.
  - Paul Casamassimo, DDS, earned the *Journal of Public Health Dentistry's* Top 20 Articles Cited Award, 2019 for Wright, R., Casamassimo, P.S. Assessing Attitudes and Actions of Pediatric Dentists Toward Childhood Obesity and Sugar-Sweetened Beverages. *Journal of Public Health Dentistry*, 77 (Supplement): S79-S87, 2017.
  - Dan Claman, DDS, was appointed director of the Pediatric Fellow Program.
  - Ann Griffen, DDS, MS, was awarded a new NIH grant for a collaborative project with investigators. Dr. Griffen is one of the team of four principle investigators on the project. NIH R01DE026603 MPIs: Graves, Griffen, Leys, Sawyer, 2018-2023. Diabetes Reversal and the Subgingival Microbiota.
  - Erin Gross, DDS, MS, received the Jeffrey Dalin, DDS, Give Kids A Smile Volunteer Award, 2018.
  - Kimberly Hammersmith, DDS, MPH, MS, was appointed program director and assistant professor at The Ohio State College of Dentistry.

o Ashok Kumar, DDS, MS, was promoted to clinical professor, The Ohio State University College of Dentistry.

o Janice Townsend, DDS, MS, earned the *Journal of Dental Education's* Most Notable Articles of 2018 for Townsend JA, Zorek JA, Andrieu SC, Baroni de Carvalho R, Mercante DE, Schiavo JH, Gunaldo TP. Developing Interprofessional Education: Establishing a Baseline and Moving Forward. *J Dent Educ.* 2018;82(5):446-53.

Research (funded) highlights:

- Improved Access to Care with Homa Amini, DDS, MPH, MS
- Oral Microbiome Studies with Ann Griffen, DDS, MS, and research team, OSU College of Dentistry
- Teledentistry with Kimberly Hammersmith, DDS, MPH, MS

SELECTED PUBLICATIONS

Casamassimo PS, Flaitz CM, Hammersmith K, Sangvai S, Kumar A. Recognizing the Relationship between Disorders in the Oral Cavity and Systemic Disease. *Pediatr Clin North Am.* 2018 Oct; 65(5):1007-1032.

Kerr R, Claman D, Amini H, Alexy E, Kumar A, Casamassimo P. Evaluation of the Ability of Five- to 11-Year-Olds to Brush Their Teeth Effectively with Manual and Electric Toothbrushing. *Pediatr Dent.* 2019 Jan 15;41(1):20-24.

Mukherjee C, Beall CJ, Griffen AL, Leys EJ. High-resolution ISR Amplicon Sequencing Reveals Personalized Oral Microbiome. *Microbiome.* 2018 Sep 5;6(1):153. doi: 10.1186/s40168-018-0535-z.

2018 – 2019 NATIONWIDE CHILDREN’S RESIDENCY PROGRAM

PEDIATRIC DENTISTRY

- Seth Bradbury, DDS
- Alexis B. Capecci, DDS
- Andrew Carranco, DDS
- Preston P. Colven, DDS
- Joseph R. DePalo, DDS
- Kim T. Do, DDS
- Taylor Harlan, DDS
- Shayna Mattox, DDS
- Jamie Molina, DDS
- Enrique Ramirez, DDS
- Adam Richardson, DDS
- Katie M. Seymour, DDS
- Mallary N. St. John, DDS
- Macaire C. Thiel, DDS
- Victoria Tran, DDS
- Chloe Wong DDS

FAST FACTS

July 2018 through June 2019

|                                                       |        |
|-------------------------------------------------------|--------|
| Inpatient Discharges:.....                            | 2      |
| Observation and Outpatient-in-a-Bed Discharges: ..... | 16     |
| Total Discharges:.....                                | 18     |
| Average Length of Stay*:.....                         | 1.0    |
| Patient Days*:.....                                   | 2      |
| Dental Clinic Visits: .....                           | 45,010 |
| Mobile Dental Unit Visits: .....                      | 170    |
| Dental Clinic and Sedation:.....                      | 432    |
| Total Surgical Procedures:.....                       | 5,119  |

\*Excludes observation and outpatient-in-a-bed patients.

Surgical Services

NEUROSURGERY

Ranked seventh in the country by U.S. News & World Report, the Division of Pediatric Neurosurgery at Nationwide Children’s Hospital provides evaluation and treatment for problems of the central nervous system in patients from birth through 21 years of age and in selected adults with congenital neurological disorders. The staff works closely with members of the departments of Anesthesia, Hematology, Oncology & Blood and Marrow Transplant, Neurology, Physical Medicine and Rehabilitation, Pediatric Surgery, Plastic and Reconstructive Surgery, and many other pediatric disciplines.



FACULTY



Jeffrey R. Leonard, MD  
Chief

FULL-TIME NATIONWIDE CHILDREN’S FACULTY

- Annie I. Drapeau, MD
- Jonathan A. Pindrik, MD
- Ammar Shaikhouni, MD, PhD
- Eric A. Sribnick, MD, PhD

OSU-AFFILIATE FACULTY

- John M. McGregor, MD
- Ehud U. Mendel, MD
- Shahid Nimjee, MD
- Ciaran J. Powers, MD, PhD
- Daniel Prevedello, MD
- Patrick Youssef, MD

With over 850 surgical cases and more than 5,500 clinic visits performed in 2018 alone, the Department of Pediatric Neurosurgery has continued with significant

growth. Outreach efforts have been successful, as the team has provided care to patients from all around the world, including 28 states and 6 countries. The pediatric epilepsy surgery program is steadily expanding and is on pace to perform over 40 epilepsy cases this year.

The Selective Dorsal Rhizotomy Program continues to provide comprehensive care for patients with spastic cerebral palsy, including care provided by colleagues in Physical Medicine and Rehabilitation, as well as in Therapy Services. Our program is one of very few in the country that perform this procedure with great success. Our out-of-state referrals have grown significantly, as demonstrated by increases in new patient clinic visits, inpatient hospital days and a case volume increase of 12 percent year to date.

The scholarly output of the program has increased markedly with over 30 publications (journals, chapters and manuscripts) and 20 presentations in national and international meetings. We have enrolled over 400 patients in either clinical trials or registry projects, and as a member of the Hydrocephalus Clinical Research Network, we continue to participate in multi-institutional studies focusing on the treatment of hydrocephalus. In addition, the department is a part of many other research endeavors, studying Chiari I malformations, cerebral palsy, epilepsy and brain tumors.

Jonathan A. Pindrik, MD, is co-director of the Epilepsy Surgery Program and the site principal investigator for the Hydrocephalus Clinical Research Network. Eric A. Sribnick, MD, PhD, continues a basic science research program on the role of immunology in traumatic brain injury and is the trauma liaison for the department. Both have submitted and presented multiple abstracts at

national meetings over the last year. Annie I. Drapeau, MD, is co-director of the Craniofacial Surgery Program. Her research interests include blood-brain barrier and brain malignant primary brain tumors, cervical spine injury and non-accidental trauma, patient volume effects on outcomes in pediatric neuro-oncology. The 2018-19 fellow, Ammar Shaikhouni, MD, PhD, is now a faculty member working with both Nationwide Children’s and The Ohio State University Wexner Medical Center. He has a clinical and research focus on both adult and pediatric epilepsy, movement disorders and stereotactic surgery for gene and drug delivery.

Chief Jeffrey Leonard, MD, continues his focus on spasticity, cerebral palsy and improving treatment for childhood brain tumors. He has had multiple invited presentations both nationally and internationally in addition to receiving two visiting professorships. He served as co-editor for the book, *Cerebrospinal Fluid Disorders: Lifelong Implications*.

SELECTED PUBLICATIONS

Limbrick D, **Leonard JR**. *Cerebrospinal Fluid Disorders: Lifelong Implications*. (New York, New York: Springer, 2018), 387.

**Pindrik J**, Hoang N, Smith L, Halverson M, Wojnarski, McNally K, Gedela S, **Ostendorf A**. Pre-Operative Evaluation and Surgical Management of Infants and Toddlers with Drug Resistant Epilepsy. *Neurosurgical Focus*. Sep 2018; 45(3):E3.

**Sribnick EA**, Lunney M, Wright DW, et al. The Surgical Intervention for Traumatic Injury Scale: A Clinical Tool for Traumatic Brain Injury. *West J Emerg Med*. 2019;20(4):578–584.

Tamargo RJ, **Pindrik JA**. Mammalian Skull Dimensions and the Golden Ratio  $\phi$ ). *J Craniofac Surg*. 2019 May 10. [Epub ahead of print]

Walz PC, **Drapeau A**, **Shaikhouni A**, Eide J, Rugino AJ, Mohyeldin A, Carrau R, Prevedello D. Pediatric Pituitary Adenoma. *Childs Nerv Syst*. 2019 Jul. [Epub ahead of print]

FAST FACTS

July 2018 through June 2019

|                                                       |       |                                               |       |
|-------------------------------------------------------|-------|-----------------------------------------------|-------|
| Inpatient Discharges:.....                            | 687   | Total Surgical Procedures:.....               | 948   |
| Observation and Outpatient-in-a-Bed Discharges: ..... | 164   | Neurosurgery Main Campus Clinic Visits: ..... | 5,834 |
| Total Discharges:.....                                | 851   |                                               |       |
| Average Length of Stay*:.....                         | 6     |                                               |       |
| Average Daily Census*: .....                          | 12    |                                               |       |
| Patient Days*:.....                                   | 4,225 |                                               |       |

\*Excludes observation and outpatient-in-a-bed patients.

2018 – 2019 NATIONWIDE CHILDREN’S FELLOWSHIP PROGRAM

PEDIATRIC NEUROSURGERY

Ammar Shaikhouni, MD, PhD

Surgical Services

OPHTHALMOLOGY

The Department of Ophthalmology at Nationwide Children’s Hospital is dedicated to serving the eye care needs of children of all ages regardless of the family’s ability to pay. The department includes the Eye Clinic and the Electrophysiology Testing Laboratory at Nationwide Children’s. The Eye Clinic serves in-house patient referrals, comprehensive outpatient eye care and offers special testing on the patients of community based physicians. The clinic staff includes pediatric ophthalmologists, optometrists, pediatric ophthalmology fellow and ophthalmology residents from The Ohio State University College of Medicine, as well as low vision and rehabilitation specialists. In addition, the Eye Clinic offers specialty clinics staffed by ophthalmologists and other specialists and professionals for patients with issues related to glaucoma, retina, oculoplastics, intracranial hypertension and low vision.

FACULTY



David L. Rogers, MD  
Chief

FULL-TIME NATIONWIDE CHILDREN’S FACULTY

- Don L. Bremer, MD
- Cybil B. Cassidy, MD
- Richard P. Golden, MD
- Hilliary E. Inger, MD
- Catherine Olson Jordan, MD
- Julie M. Lange, MD
- Mary Lou McGregor, MD
- Gary L. Rogers, MD
- Amanda L. Way, MD

OSU-AFFILIATE FACULTY

- N. Douglas Baker, MD
- Lance Bodily, MD
- Dominic M. Buzzacco, MD
- Kenneth V. Cahill, MD
- Colleen M. Cebulla, MD
- Megan M. Chambers, MD

- Brandon C. Cho, MD
- Raymond I. Cho, MD
- Louis J. Chorch, III, MD
- Mary A. Craven, MD
- Frederick H. Davidorf, MD
- Jill A. Foster, MD
- Andrew J. Hendershot, MD
- Charles J. Hickey, MD
- Steven E. Katz, MD
- Curtin G. Kelley, MD
- Johnstone M. Kim, MD
- Dino D. Klisovic, MD
- Rebecca A. Kuennen, MD
- Carrie A. Lembach, MD
- Thomas F. Mauger, MD
- Cameron B. Nabavi, MD
- Matthew P. Ohr, MD
- Tyler Oostry, MD
- Daniel G. Straka, MD
- Ana M. Suelves Cogollos, MD
- Jeremy F. Tan, MD
- Michael B. Wells, MD

The Department of Ophthalmology supports research and teaching programs that ensure delivery of the highest quality pediatric care now and in the future. We are participating in several amblyopia and retinopathy of prematurity (ROP) studies sponsored by the Pediatric Eye Disease Investigator Group. Recently, we were selected as one of only 10 sites from this group who will participate in a large, multicultural

study investigating the use of low-dose Atropine 0.01% eye drops to prevent myopia progression. Research continues on projects concerning infantile cataracts, fourth cranial nerve palsy and convergence insufficiency.

The Visual Electrophysiology Clinic at Nationwide Children’s is led by Julie Racine, PhD. This clinic performs electroretinograms, multifocal electroretinograms, electro-oculograms and visual evoked potential on patients of all ages, including adults, to assess retinal and retino-cortical function. The department also houses the Ohio Amblyope Registry program (funded by the Ohio Department of Health’s Save Our Sight Fund), the first and only statewide program in the United States designed to serve the needs of children with amblyopia. It is a voluntary registration program to increase knowledge about amblyopia, its causes, treatment and prevention, and it provides free eye patches and other important services to help families of children with amblyopia.

The department is equipped with state-of-the-art technology for utilization in standard dilated eye exams and for specialty testing, including ultrasound (A/B scans), retinal photography, visual field, optical coherence tomography (OCT), autorefraction, tonometry, color vision and contrast sensitivity. The number of patients served remains strong and continues to grow.

We are also one of 15 sites currently participating in the multicenter Artisan Aphakia Lens Study. The Artisan Aphakia lens is unique because it is fixed to the iris and therefore allows for lens implantation in patients who do not have the support structure for a traditional implant. Without an implant lens, these children must wear extremely strong and cosmetically unappealing glasses or highly customized, and often poorly tolerated, hard contact lenses. These patients now have an option to live with much more normal visual function. These lenses are not FDA approved, and we expect this study will help gain approval.

GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019

\$595,521

SELECTED PUBLICATIONS

**Inger HE, McGregor ML, Jordan CO, Reem RE,** Aylward SC, Scoville NM, Bai S, **Rogers DL.** Surgical Intervention in Pediatric Intracranial Hypertension: Incidence, Risk Factors and Visual Outcomes. *J AAPOS.* 2019 Apr;23(2):96.e1-96.e7.

**Jordan CO,** Aylward SC. Intracranial Hypertension: A Current Review. *Curr Opin Pediatr.* 2018 Dec;30(6):764-774.

Matsa E, Shi J, Wheeler KK, McCarthy T, **McGregor ML,** Leonard JC. Trends in US Emergency Department Visits for Pediatric Acute Ocular Injury. *JAMA Ophthalmol.* 2018 Aug;136(8):895-903.

Phelps DL, Watterberg KL, Nolen TL, Cole CA, Cotten CM, Oh W, Poindexter BB, Zaterka-Baxter KM, Das A, Lacy CB, Scorsone AM, Walsh MC, Bell EF, Kennedy KA, Schibler K, Sokol GM, Laughon MM, Lakshminrusimha S, Truog WE, Garg M, Carlo WA, Laptook AR, Van Meurs KP, Carlton DP, Graf A, DeMauro SB, Brion LP, Shankaran S, Orge FH, Olson RJ, Mintz-Hittner H, Yang MB, Haider KM, Wallace DK, Chung M, Hug D, Tsui I, Cogen MS, Donahue JP, Gaynon M, Hutchinson AK, **Bremer DL,** Quinn G, He YG, Lucas WR Jr, Winter TW, Kicklighter SD, Kumar K, Chess PR, Colaizy TT, Hibbs AM, Ambalavanan N, Harmon HM, McGowan EC, Higgins RD; Eunice Kennedy Shriver National Institute of Child Health and Human Development Neonatal Research Network. Effects of Myo-inositol on Type 1 Retinopathy of Prematurity among Preterm Infants <28 Weeks’ Gestational Age: A Randomized Clinical Trial. *JAMA.* 2018 Oct 23;320(16):1649-1658.

Shi A, Kulkarni A, Feldman KW, Weiss A, McCourt EA, Schloff S, Partington M, Forbes B, Geddie BE, Bierbrauer K, Phillips PH, **Rogers DL,** Abed Alnabi W, Binenbaum G, Levin AV. Retinal Findings in Young Children with Increased Intracranial Pressure From Nontraumatic Causes. *Pediatrics.* 2019 Feb;143(2).

Wallace DK, Dean TW, Hartnett ME, Kong L, Smith LE, Hubbard GB, **McGregor ML, Jordan CO,** Mantagos IS, Bell EF, Kraker RT; Pediatric Eye Disease Investigator Group. A Dosing Study of Bevacizumab for Retinopathy of Prematurity: Late Recurrences and Additional Treatments. *Ophthalmology.* 2018 Dec;125(12):1961-1966.

FAST FACTS

July 2018 through June 2019

|                                                       |       |
|-------------------------------------------------------|-------|
| Observation and Outpatient-in-a-Bed Discharges: ..... | 7     |
| Total Discharges: .....                               | 7     |
| Total Surgical Procedures: .....                      | 1,804 |
| Inpatient Consults: .....                             | 2,334 |
| Eye Clinic and Low Vision Eye Clinic Visits: .....    | 9,870 |

\*Excludes observation and outpatient-in-a-bed patients.





Christopher A. Iobst, MD  
Director

Limb Lengthening and Reconstruction

*“The goal is to make a tailor-made prescription pattern for each common injury that we see.”*

– Christopher Iobst, MD, Director, Center for Limb Lengthening and Reconstruction



## Orthopaedics

### How Much Opioid Medication Should Pediatric Orthopedic Patients Receive?

Doctors have traditionally used opioids as the primary component of pain management after orthopedic surgery in pediatric patients. But with the misuse and abuse of prescription opioids a growing public health concern, doctors are looking to limit what they prescribe to the minimum amount needed for pain relief.

Researchers from Nationwide Children’s set out to evaluate the opioid prescribing patterns of their orthopedic team for post-surgical pediatric orthopedic fracture patients. They reviewed the charts of all patients aged 18 years and younger who underwent surgery for elbow, forearm, wrist, femur, tibia and ankle fractures between 2014 and 2016.

The researchers found that their pediatric orthopedic trauma patients were receiving generic numbers of opioid pain medication doses after surgery due to universal, rather than injury-specific, prescribing patterns. In other words, patients with surgery to fix a femur or tibia fracture were receiving a similar amount of medication to a patient undergoing an elbow fracture pinning.

The researchers say this standardized approach to prescribing the same number of doses to every patient can potentially result in some over- or under-prescribing. They conclude that in order to limit the amount of unnecessary opioids in the community, it is important to determine the appropriate amount of medication needed to safely manage each type of pediatric orthopedic patient.

“The goal is to make a tailor-made prescription pattern for each common injury that we see,” says **Christopher Iobst, MD**, a pediatric orthopedic surgeon at Nationwide Children’s. “For instance, a femur fracture, which is a potentially more painful injury, might require more doses of pain medication than an elbow fracture.”

Since the time of data collection for this study, Dr. Iobst says the Orthopaedics team at Nationwide Children’s has become more restrictive in its use of opioid pain medication and more likely to prescribe non-narcotic pain medications, such as acetaminophen and anti-inflammatory drugs.

“We are cognizant of the fact that excess opioid pain medication can be dangerous because it can be misused or abused if it’s lying around the house,” he says. “We’re actively working to prescribe just the appropriate amount necessary for the patient’s particular injury.”

This study, along with a successful Quality Improvement program led by Otolaryngology to reduce opioid prescriptions, has inspired the Orthopaedics team at Nationwide Children’s to take action by standardizing prescribing patterns, using e-prescriptions and increasing patient and provider education. As a result, the team is prescribing fewer doses of opioids at discharge for surgical patients.

**CITATION:**  
Iobst CA, Singh S, Yang JZ. Opioid Prescription Patterns for Pediatric Orthopaedic Fracture Patients. *Journal of Clinical Orthopaedics and Trauma*. August 2018. [Epub ahead of print]

ORTHOPAEDICS

The Department of Orthopaedics at Nationwide Children’s Hospital provides diagnosis, evaluation and treatment for all orthopedic conditions and disorders in infants, children and adolescents. Inpatient, outpatient and emergency services are provided to patients with a wide range of developmental, congenital, neuromuscular and posttraumatic problems of the musculoskeletal system, trauma and fractures, scoliosis and other spinal abnormalities.

Faculty members participate in the education of health care professionals at several levels. Residents, medical students and nurses from The Ohio State University Wexner Medical Center, OhioHealth, and Mount Carmel Health System receive all of their pediatric orthopedic experience at Nationwide Children’s. The Accreditation Council for Graduate Medical Education-accredited fellowship program rounds out the extensive educational program.

FACULTY



Kevin E. Klingele, MD  
Chief

FULL-TIME NATIONWIDE CHILDREN’S FACULTY

- Allan C. Beebe, MD
- Matthew C. Beran, MD
- Christopher A. Iobst, MD
- John R. Kean, MD
- Jan E. Klamar, MD
- Julie Balch Samora, MD, PhD, MPH
- Walter P. Samora III, MD
- Amanda T. Whitaker, MD

OSU-AFFILIATE FACULTY

- Hisham M. Awan, MD
- Joel L. Mayerson, MD
- Thomas J. Scharschmidt, MD

COMMUNITY-BASED FACULTY

- Brent A. Bickel, MD
- Craig N. Dimitris, MD

- Jonathan B. Feibel, MD
- Terry T. Fowler, MD
- Robert T. Gorsline, MD
- Lee M. Hlad, DPM
- Michael S. Lefkowitz, MD
- James E. Popp, MD
- Daniel P. Quinn, MD
- Desmond J. Stutzman, DO
- Corey L. Van Hoff, MD
- Marlo O. VanSteyn, MD
- Raymond K. Wurapa, MD

In 2018, the Department of Orthopaedics continued its ascent to becoming a national leader in the research of pediatric orthopaedic conditions. With the development of an expanded and dedicated research team, the department published 68 peer-reviewed articles, authored 14 book chapters, eight case reports and nine posters. Academic productivity resulted in 36 podium presentations representing Nationwide Children’s at 26 regional, national and international conferences. Sixteen presentations and posters by residents and medical students are the result of fostering a fertile learning environment for the next generation. Continued involvement in 11 multicenter collaborative studies, such as International Perthes Study Group, CoULD, GOAL and PROOF, have led to a concentrated engagement with colleagues across the globe for best outcomes for our patients.

Composed of a research scholar, several coordinators, engineers, resident and medical student rotators, the research team helped maintain and produce 64

active institutional review board studies encompassing all aspects of pediatric orthopaedics and quality improvement initiatives.

Dr. Baruch Danino served as the department’s first international exchange visitor research scholar in the Department of Orthopaedic Surgery at Nationwide Children’s.

His year at Nationwide Children’s was devoted to time within the Iobst Biomechanical Lab and the Center for Limb Lengthening and Reconstruction performing surgery on large-animal models. He also worked on multiple studies in collaboration with the Center for Hip Preservation, producing an algorithm to predict sequential, contralateral slipped capital femoral epiphysis (SCFE).

SELECTED PUBLICATIONS

Davis RL, **Samora WP**, Persinger F, **Klingele KE**. Treatment of Unstable Versus Stable Slipped Capital Femoral Epiphysis Using the Modified Dunn Procedure. *J Pediatr Orthop*. 2019 Sep;39(8):411-415. [Epub 2017 Mar]

Hubbard EW, Liu RW, **Iobst CA**. Understanding Skeletal Growth and Predicting Limb-Length Inequality in Pediatric Patients. *J Am Acad Orthop Surg*. 2019 May 1;27(9):312-319.

**Iobst CA**, Singh S, Yang JZ. Opioid Prescription Patterns for Pediatric Orthopaedic Fracture Patients. *J Clin Orthop Trauma*. Winter 2018;27(4):269-273.

Lin JS, Popp JE, **Samora JB**. Treatment of Acute Seymour Fractures. *J Pediatr Orthop*. 2019 Jan 1;39(1):e23-e27.

Little KJ, Godfrey J, Cornwall R, Carr P, Dolan K, **Samora JB**. Increasing Brace Treatment for Pediatric Distal Radius Buckle Fractures: Using Quality Improvement Methodology to Implement Evidence-based Medicine. *J Pediatr Orthop*. 2019 Sep;39(8):e586-e591. [Epub 2018 Aug]

**Samora JB**, Adler B, Druhan S, Brown SA, Erickson J, **Samora WP**, **Klingele KE**. MRI in Idiopathic, Stable, Slipped Capital Femoral Epiphysis: Evaluation of Contralateral Pre-slip. *J Child Orthop*. 2018 Oct 1;12(5):454-460.

FAST FACTS

July 2018 through June 2019

|                                                       |       |                                              |        |
|-------------------------------------------------------|-------|----------------------------------------------|--------|
| Inpatient Discharges:.....                            | 552   | Inpatient Consults:.....                     | 305    |
| Observation and Outpatient-in-a-Bed Discharges: ..... | 433   | Dublin Orthopaedic Clinic Visits: .....      | 10,907 |
| Total Discharges:.....                                | 985   | New Albany Orthopaedic Clinic Visits:.....   | 2,048  |
| Average Length of Stay*:.....                         | 2.8   | Orthopaedic Clinic Visits: .....             | 15,793 |
| Average Daily Census*:.....                           | 4.2   | Orthopaedic Oncology Clinic Visits:.....     | 644    |
| Patient Days*:.....                                   | 1,529 | Westerville Orthopaedic Clinic Visits: ..... | 8,956  |
| Total Surgical Cases: .....                           | 2,600 |                                              |        |

\*Excludes observation and outpatient-in-a-bed patients.

2018 – 2019 NATIONWIDE CHILDREN’S FELLOWSHIP PROGRAM

PEDIATRIC ORTHOPEDICS

Rachel Randall, MD

OTOLARYNGOLOGY

The Department of Pediatric Otolaryngology at Nationwide Children’s Hospital provides comprehensive diagnosis and treatment for children who have diseases of the ears, nose and throat. These problems include congenital and acquired diseases of the head and neck, hearing loss, ear infections, tonsillitis, sinusitis, acute and chronic nasal problems, airway disorders, voice disorders, sleep apnea, skull base tumors, salivary gland problems and many other related diseases.

FACULTY



Charles A. Elmaraghy, MD, FAAP, FACS  
Chief

FULL-TIME NATIONWIDE CHILDREN’S FACULTY

- Oliver F. Adunka, MD, FACS
- Ethan Bassett, MD
- Tendy Chiang, MD
- Jonathan M. Grischkan, MD, FAAP, FACS
- Kris R. Jatana, MD, FAAP, FACS
- Spencer Lindsey, MD
- Prashant S. Malhotra, MD, FAAP, FACS
- Meredith Merz-Lind, MD, FAAP, FACS
- James M. Ruda, MD
- Patrick C. Walz, MD
- Gregory J. Wiet, MD, FAAP, FACS

OSU-AFFILIATE FACULTY

- Amit Agrawal, MD
- Eugene Ge-Hink Chio, MD
- Brad W. deSilva, MD
- Edward E. Dodson, MD
- Garth F. Essig Jr., MD
- L. Arick Forrest, MD

- Brandon Kim, MD
- Leslie R. Kim, MD, MPH
- Jameson K. Mattingly, MD
- Aaron C. Moberly, MD
- Matthew O. Old, MD
- Bradley A. Otto, MD
- Robert S. Pema, DO
- Minka L. Schofield, MD

COMMUNITY-BASED FACULTY

- Patrick L. Bockenstedt, MD
- Jacob P. Burkhardt, DO
- Roberto J. Castellon, MD
- Daniel W. Chase, MD
- Subinoy Das, MD
- Timothy P. Drankwalter, DO
- Alexander A. Farag, MD
- Alfred J. Fleming Jr., MD
- Akash Gupta, MD
- Joseph E. Hall, MD
- Jeffrey B. Hiltbrand, MD
- Steven M. Hirsch, MD
- Clifton R. Hood, DO
- Richard T. Irene, MD
- Scott T. Kramer, MD
- Michael J. Loochtan, MD
- James D. Lowery, MD
- Michael D. Martyn, MD
- Douglas D. Massick, MD
- Timothy J. Nash, DO
- Stephen J. Nogan, MD

- Blaize A. O’Brien, MD
- David M. Powell, MD
- Cherie Ryoo, MD
- John M. Ryzenman, MD
- Ashish Shah, MD
- Thomas M. Shirck, DO
- Stephen P. Smith Jr, MD
- Adam C. Spiess, MD
- Evan J. Tobin, MD
- Darryl N. Willett, MD

The Department of Pediatric Otolaryngology continues its clinical growth of services with over 32,000 clinic visits and over 9,000 surgical procedures. The department has grown both clinically and academically. New clinical programs include our same-day ear tube surgery pilot program that allows for a single visit for evaluation and surgery. We have published over 40 original research manuscripts in peer-reviewed journals and added a summer research program for undergraduates and medical students led by Tendy Chiang, MD. Kris R. Jatana, MD, FAAP, FACS, created a transitional care unit for patients eligible for

discharge following surgery that may in the past be admitted overnight. This has allowed for a streamlined process that helps enhance the patient experience while being responsible with inpatient resources. Meredith Merz-Lind, MD, FAAP, FACS, was elected President of Medical Staff and has been an important advocate for changes in by-laws and policies improving patient care.

GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019

\$31,299

SELECTED PUBLICATIONS

Pitner H, **Elmaraghy C**, Fischer B, Onwuka A, Rabe A, Walz P. Diagnostic Accuracy of Midline Pediatric Neck Masses. *Otolaryngol Head Neck Surg.* 2019 Jun;160(6):1111-1117.

**Wiet MG**, Dharmadhikari S, White A, Reynolds SD, Johnson J, Breuer CK, Chiang T. Seeding and Implantation of a Biosynthetic Tissue-engineered Tracheal Graft in a Mouse Model. *J Vis Exp.* 2019 Apr 1;(146).

**Jatana KR**, Barron CL, Jacobs IN. Initial clinical application of tissue pH neutralization after esophageal button battery removal in children. *Laryngoscope.* 2019;129(8):1772-1776. [Epub 2019 Mar 5]

**Lind MM**, Corridore M, Sheehan C, Moore-Clingenpeel M, Maa T. A Multidisciplinary Approach to a Pediatric Difficult Airway Simulation Course. *Otolaryngol Head Neck Surg.* 2018 Jul;159(1):127-135.

Powell KA, Kashikar T, Hittle B, Stredney D, Kerwin T, **Wiet GJ**. Atlas-based Segmentation of Temporal Bone Surface Structures. *Int J Comput Assist Radiol Surg.* 2019;14(8):1267-1273. [Epub 2019 Apr 25]

| FAST FACTS                                            |        |
|-------------------------------------------------------|--------|
| July 2018 through June 2019                           |        |
| Inpatient Discharges:.....                            | 73     |
| Observation and Outpatient-in-a-Bed-Discharges:.....  | 2,534  |
| Total Discharges:.....                                | 2,607  |
| Average Length of Stay*:.....                         | 3.8    |
| Average Daily Census*: .....                          | 0.8    |
| Patient Days*:.....                                   | 275    |
| Total Surgical Cases: .....                           | 9,457  |
| Inpatient Consults:.....                              | 792    |
| Dublin ENT Clinic Visits:.....                        | 9,058  |
| ENT (Main Campus) Clinic Visits: .....                | 15,524 |
| Lima ENT Clinic Visits: .....                         | 91     |
| Mansfield ENT Clinic Visits:.....                     | 421    |
| Marysville ENT Clinic Visits: .....                   | 577    |
| Pediatric Aerodigestive Disorders Clinic Visits:..... | 87     |
| Rhinology Clinic Vists:.....                          | 54     |
| Springfield ENT Clinic Visits: .....                  | 354    |
| Westerville ENT Clinic Visits:.....                   | 9,626  |
| Total ENT Clinic Visits: .....                        | 35,792 |

\*Excludes observation and outpatient-in-a-bed patients.

2018 – 2019 NATIONWIDE CHILDREN’S FELLOWSHIP PROGRAM

PEDIATRIC OTOLARYNGOLOGY  
Vikrum Thimmappa, MD

PEDIATRIC AND ADOLESCENT GYNECOLOGY

The Section of Pediatric and Adolescent Gynecology at Nationwide Children’s Hospital provides comprehensive reproductive health services for patients and their families from birth through early adulthood. These services are provided within a wide array of clinical services, including:

- Pediatric and Adolescent Gynecology
- Center for Colorectal and Pelvic Reconstruction
- Endometriosis and Chronic Pain Program
- Family AIDS Clinic and Education Services (FACES)
- Fertility and Reproductive Health Program
- Teen and Pregnant Program
- THRIVE Program (differences of sexual development and complex urological and gender concerns)

FACULTY



Geri D. Hewitt, MD  
Chief

Pediatric and Adolescent Gynecology

Leslie Appiah, MD  
Geri D. Hewitt, MD  
Kate A. McCracken, MD  
Dana Lenobel, APN

Teen and Pregnant Program

Kara Malone, MD  
Lesley Manson, WHNP-BC  
Natasha Reno, WHNP

Family AIDS Clinic and Education Services

Heather Frey, MD  
Maggie Rosen, MD  
Stephen Thung, MD

Maternal-Fetal Medicine Staff

Michael P. Cackovic, MD  
Heather Frey, MD  
Kara B. Markham, MD

Philip Samuels, MD  
Cynthia S. Shellhaas, MD  
Stephen F. Thung, MD, MSCI

Pediatric and Adolescent Gynecology continues to grow in all aspects of medical services provided and in ambulatory clinic visits, patient consultations, and surgical procedures performed. The geographic region we serve continues to expand as well.

Gynecology continues to work collaboratively within the Center for Colorectal and Pelvic Reconstruction to address the reproductive health needs of females born with anorectal malformations across their life span. This work encompasses direct surgical and medical patient care, research projects and educational initiatives.

The Endometriosis and Chronic Pelvic Pain Program provides streamlined, comprehensive care for patients with chronic pelvic pain. The multidisciplinary collaboration includes providers from numerous disciplines across the medical center working together to enhance quality of life and reproductive outcomes for these patients. An Endometriosis Support Group has been established and meets quarterly. Other initiatives within this program include quality improvement and patient and provider education.

The Fertility and Reproductive Health Program provides clinical services and best practices for patients at risk of diminished fertility. Nationwide Children’s is part of the international Oncofertility Consortium, and we are successfully performing ovarian tissue cryopreservation procedures inside of an IRB protocol. We are also working collaboratively with oncology to provide reproductive health care to cancer survivors.

The Teen and Pregnant Program clinic continues to see patients in the Livingston Ambulatory Center building and in the Linden neighborhood. The preterm delivery rate for the Teen and Pregnant Program continues to be lower than the Franklin County rate and the overall Ohio rate of preterm deliveries. Additionally Teen and Pregnant Program patients have higher rates of contraception after delivery with long-acting reversible contraception (LARC) methods than the national average for teenaged mothers.

SELECTED PUBLICATIONS

Anazodo A, Laws P, Logan S, Saunders C, Travaglia J, Gerstl B, Bradford N, Cohn R, Birdsall M, Barr R, Suzuki N, Takae S, Marinho R, Xiao S, Qiong-Hua C, Mahajan N, Patil M, Gunasheela D, Smith K, Sender L, Melo C, Almeida-Santos T, Salama M, **Appiah L**, Su I, Lane S, Woodruff TK, Pacey A, Anderson RA, Shenfield F, Ledger W, Sullivan E. How Can We Improve Oncofertility Care for Patients? A Systematic Scoping Review of Current International Practice and Models of Care. *Human Reproduction Update*. 2019 Mar 1;25(2):159-179.

**Hewitt G**, Gerancher K. ACOG Committee Opinion No. 760: Dysmenorrhea and Endometriosis in the Adolescent. *Obstet Gynecol*. 2018 Dec;132(6):e249-258.

Saraf AJ, Stanek J, Audino A, Dajusta D, Hansen-Moore J, **McCracken K**, Whiteside S, Yeager N, Nahata L. Examining Predictors and Outcomes of Fertility Consults among Children, Adolescents and Young Adults with Cancer. *Pediatr Blood Cancer*. 2018 Dec;65(12):e27409.

Smith BM, Duncan FE, Ataman L, Smith K, Quinn GR, Chang RJ, Finlayson C, Orwig K, Valli-Pulaski H, Moravek MB, Zelinski MB, Irene Su H, Vitek W, Smith JF, Jeruss JS, Gracia C, Coutifaris C, Shah D, Nahata L, Gomez-Lobo V, **Appiah LC**, Brannigan RE, Gillis V, Gradishar W, Javed A, Rhoton-Vlasak AS, Kondapalli LA, Neuber E, Ginsberg JP, Muller CH, Hirshfeld-Cytron J, Kutteh WH, Lindheim SR, Cherven B, Meacham LR, Rao P, Torno L, Sender LS, Vadaparampil ST, Skiles JL, Schafer-Kalkhoff T, Frias OJ, Byrne J, Westphal LM, Schust DJ, Klosky JL, McCracken KA, Ting A, Khan Z, Granberg C, Lockart B, Scoccia B, Laronda MM, Mersereau JE, Marsh C, Pavone ME, Woodruff TK. The National Physicians Cooperative: Transforming Fertility Management In The Cancer Setting And Beyond. *Future Oncol*. 2018 Dec;14(29):3059-3072.

Vilanova-Sanchez A, **McCracken K**, Halleran DR, Wood RJ, Reck-Burneo CA, Levitt MA, **Hewitt G**. Obstetrical Outcomes in Adult Patients Born with Complex Anorectal Malformations and Cloacal Anomalies: A Literature Review. *J Pediatr Adolesc Gynecol*. 2019 Feb;32(1):7-14.

FAST FACTS

July 2018 through June 2019

|                                                                      |       |
|----------------------------------------------------------------------|-------|
| Downtown Teen and Pregnant Clinic Visits: .....                      | 1,781 |
| Dublin Pediatric and Adolescent Gynecology Clinic Visits: .....      | 818   |
| Linden Teen and Pregnant Clinic Visits:.....                         | 663   |
| Main Campus Pediatric and Adolescent Gynecology Clinic Visits: ..... | 3,584 |
| Westerville Pediatric and Adolescent Gynecology Clinic Visits: ..... | 954   |
| Total Pediatric and Adolescent Gynecology Clinic Visits: .....       | 7,800 |
| Total Surgical Procedures:.....                                      | 458   |



*“We have discovered that a novel probiotic delivery system, in which we administer the probiotic *Lactobacillus reuteri* in its biofilm state, can protect the intestines from injury.”*

– Gail Besner, MD, Chief, Pediatric Surgery

## *Pediatric Surgery*

### **Development of Innovative Scoring Systems for Sickness and Tissue Damage From *Clostridium difficile* Colitis**

Two novel scoring systems consistently and efficiently assess sickness and tissue injury during antibiotic-associated *Clostridium difficile* colitis in a murine model, researchers at the Abigail Wexner Research Institute at Nationwide Children’s Hospital report in the *Journal of Investigative Surgery*.

The serious health threat causes approximately 500,000 infections in patients of all ages and over 30,000 deaths, and results in an estimated \$4.8 billion for associated health care costs in the United States annually. To address the threat, **Gail Besner, MD**, chief of Pediatric Surgery at Nationwide Children’s, teamed with colleagues with expertise in various backgrounds.

After establishing reproducible infection in the model, the team scored signs of sickness using their novel clinical sickness score (CSS; range 0–12). Scores of 6 or higher were consistent with *C. difficile* colitis.

Intestinal tissue was then analyzed to define a histologic injury score (HIS; range 0-9) to assess tissue damage. Scores of 4 or higher were consistent with *C. difficile* colitis.

Twenty-three percent of mice receiving antibiotics alone and 65% receiving antibiotics and *C. difficile* showed signs of sickness. Eight percent of mice receiving antibiotics alone and 75% receiving antibiotics and *C. difficile* had histologic injury.

“My laboratory has collaborated for several years with those of Dr. Steven Goodman and Dr. Michael Bailey. Each one has expertise in different areas: animal models of human diseases; the biofilms and probiotics; and the microbiome,” says Dr. Besner, who is also a professor of Surgery and Pediatrics at The Ohio State University College of Medicine and senior author of the study.

“The sum of what we can accomplish working together is more than just the additive effects of three laboratories had we been working independently. We have discovered that a novel probiotic delivery system, in which we administer the probiotic *Lactobacillus reuteri* in its biofilm state, can protect the intestines from injury.”

Dr. Besner says the team is completing an analysis, using these grading systems, demonstrating that this novel probiotic delivery system can both prevent and treat the disease.

#### **CITATION:**

Shelby RD, Tengberg N, Conces M, Olson JK, Navarro JB, Bailey MT, Goodman SD, Besner GE. Development of a Standardized Scoring System to Assess a Murine Model of *Clostridium difficile* Colitis. *Journal of Investigative Surgery*. 2019 Mar 20:1-9.

PEDIATRIC SURGERY

The mission of the Department of Pediatric Surgery at Nationwide Children’s Hospital is to provide collaborative, comprehensive and multidisciplinary care for infants, children and adolescents with surgical disorders. The members of the department are all full-time faculty of the Department of Surgery at The Ohio State University College of Medicine and are committed to excellence in clinical care, surgical education and research.

FACULTY



Gail E. Besner, MD  
Chief

FULL-TIME NATIONWIDE CHILDREN'S FACULTY

- Jennifer H. Aldrink, MD
- Christopher K. Breuer, MD
- David R. Brigstock, PhD
- Katherine J. Deans, MD, MHSc
- Karen A. Diefenbach, MD
- Renata B. Fabia, MD, PhD
- Jeremy G. Fisher, MD
- Jonathan I. Groner, MD
- Ihab Halaweish, MD
- Brian D. Kenney, MD, MPH
- Denis R. King, MD
- Marc P. Michalsky, MD
- Peter C. Minneci, MD, MHSc
- Benedict C. Nwomeh, MD, MPH
- Oluyinka O. Olutoye, MD, PhD
- Rajan K. Thakkar, MD
- Richard J. Wood, MD
- OSU-AFFILIATE FACULTY
- Amalia L. Cochran, MD
- Hosam F. El Sayed, MBBCh, PhD

- Michael R. Go, MD
- Mounir J. Haurani, MD
- Bradley J. Needleman, MD
- Kristine Orion, MD
- Amer Rajab, MD, PhD
- Timur Sarac, MD
- Jean E. Starr, MD
- Patrick S. Vaccaro, MD
- William K. Washburn, MD

Pediatric Surgery is one of the largest and most diverse departments of its kind in the United States. It includes one of the most well-established and sought after training programs in pediatric surgery, as well as multiple additional specialty training programs. Each faculty member brings individual strengths and talents to the department and is recognized for their expertise in clinical care, research and education.

The department maintains active clinical programs focused on general pediatric surgery, minimally invasive surgery, robotic surgery, surgical oncology, surgical endocrinology, trauma, burns, chest wall deformities, bariatric surgery, inflammatory bowel disease, hepatobiliary surgery, neuromodulation and pediatric colorectal surgery.

The department continues to have one of the busiest robotic surgery programs of any children’s hospital in the United States. It is the only program that uses a multidisciplinary surgical approach through close collaboration between multiple surgical services, including Pediatric General Surgery, Urology, Bariatric Surgery, Surgical Oncology and Colorectal Surgery. In addition, our comprehensive pediatric minimally invasive surgery program and bariatric surgery program continue to attract a diverse array of trainees, having trained surgeons from Ireland and Japan respectively this year.

Pediatric Surgery remains a leader in quality improvement initiatives within the hospital and nationally. One of

the most in-depth systems for conducting Morbidity & Mortality Conferences has been established within Pediatric Surgery, was presented nationally this year at the Children’s Hospital Association Quality & Safety in Children’s Health Conference, and is now being rolled out to many other departments within the hospital.

Researchers in the department continue have more federally funded research projects than any other program in the country. At present, 11 faculty members in Pediatric Surgery at Nationwide Children’s hold externally funded grants, including Drs. Aldrink, Besner, Breuer, Brigstock, Deans, Diefenbach, Fisher, Groner, Michalsky, Minneci and Thakkar.

The research conducted in the department is broad and encompasses a range of basic science, clinical, translational and outcomes research projects. The department continues as a leader in the nation in presentations at national academic meetings. For the eighth year in a row our research trainees have received prestigious national awards for their high-quality research, bringing our total number of research awards to an unprecedented 33 in the past eight years.

GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019

\$6,604,689

SELECTED PUBLICATIONS

Drews JD, Onwuka EA, **Fisher JG**, Huntington JT, Dutkiewicz M, Nogalska A, **Nwomeh BC**. Complications after Proctocolectomy and Ileal Pouch-Anal Anastomosis in Pediatric Patients: A Systematic Review. *J Pediatr Surg*. 2019;54(7):1331-1339. [Epub 2018 Sep 19]

Inge TH, Courcoulas AP, Jenkins TM, **Michalsky MP**, Brandt ML, Xanthakos SA, Dixon JB, Harmon CM, Chen MK, Xie C, Evans ME, Helmrath MA; Teen-LABS Consortium. Five-Year Outcomes of Gastric Bypass in Adolescents as Compared with Adults. *N Engl J Med*. 2019 May 30;380(22):2136-2145.

Lawrence AE, Dienhart M, **Cooper JN**, Lodwick D, Lopez JJ, **Fung B**, **Smith S**, **Warren P**, Mezzoff E, **Balint J**, **Minneci PC**. Ultrasound Elastography as a Non-Invasive Method to Monitor Liver Disease in Children with Short Bowel Syndrome: Updated Results. *J Pediatr Surg*. 2019 Mar 1. pii:S0022-3468(19)30180-0.

Nordin AB, **Diefenbach K**, Sales SP, Christensen J, **Besner GE**, **Kenney BD**. Gangrenous Appendicitis: No Longer Complicated. *J Pediatr Surg*. 2019 Apr;54(4):718-722.

**Thakkar RK**, Diltz Z, Drews JD, Wheeler KK, Shi J, Devine R, **Fabia R**, **Hall M**. Abnormal Lymphocyte Response after Pediatric Thermal Injury is Associated with Adverse Outcomes. *J Surg Res*. 2018 Aug;228:221-227.

FAST FACTS

July 2017 through June 2018

|                                                       |       |
|-------------------------------------------------------|-------|
| Inpatient Discharges:.....                            | 1,808 |
| Observation and Outpatient-in-a-Bed Discharges: ..... | 821   |
| Total Discharges:.....                                | 2,629 |
| Average Length of Stay*:.....                         | 5     |
| Average Daily Census*: .....                          | 23    |
| Patient Days*:.....                                   | 8,504 |
| Total Surgical Procedures:.....                       | 4,616 |
| Inpatient Consults:.....                              | 981   |
| Colorectal Clinic Visits:.....                        | 2,274 |
| Dublin Surgery Clinic Visits:.....                    | 251   |
| Mansfield Surgery Clinic Visits:.....                 | 40    |
| Surgery/Burn Clinic Visits: .....                     | 6,155 |
| Westerville Surgery Clinic Visits:.....               | 363   |
| Total Surgery Clinic Visits:.....                     | 9,083 |

\*Excludes observation and outpatient-in-a-bed patients.

2018 – 2019 NATIONWIDE CHILDREN'S  
FELLOWSHIP PROGRAM

PEDIATRIC MINIMALLY INVASIVE  
SURGERY

David Coyle, MD

PEDIATRIC SURGERY

Justin T. Huntington, MD  
Afif Kulaylat, MD

SURGICAL CRITICAL CARE

Juan Gurria, MD

BIATRIC SURGERY

Keigo Yada, MD

PLASTIC AND RECONSTRUCTIVE SURGERY

The Section of Plastic and Reconstructive Surgery at Nationwide Children’s Hospital provides comprehensive, interdisciplinary management of cleft lip and palate, congenital and traumatic craniofacial anomalies, 22q deletion syndrome, velopharyngeal dysfunction, hemangiomas and vascular anomalies, pigmented birthmarks, burn injuries, microtia and other ear anomalies, breast abnormalities, and congenital and traumatic hand and upper extremity anomalies.

FACULTY



Richard E. Kirschner, MD, FAAP, FACS  
Chief

FULL-TIME NATIONWIDE CHILDREN’S FACULTY

- Adriane Baylis, PhD, CCC-SLP
- Kim Bjorklund, MD
- Ibrahim Khansa, MD
- Ana Mercado, DMD, PhD
- Kara Morris, DDS, MS
- Gregory D. Pearson, MD

OSU-AFFILIATE FACULTY

- Albert Chao, MD
- Jeffrey E. Janis, MD
- Clara N. Lee, MD
- Stephen J. Poteet, MD
- Steven Schulz, MD
- Geoffrey Sisk, MD
- Roman Skoracki, MD
- Ian Valerio, MD

The Section of Plastic and Reconstructive Surgery takes the leading role in several interdisciplinary teams at Nationwide Children’s to provide comprehensive care for the restoration of both form and function. The section offers advanced fellowship training in both

pediatric plastic/craniofacial surgery and craniofacial speech science. Both the Cleft Lip and Palate Center and the Center for Complex Craniofacial Disorders once again received national recognition as leading American Cleft Palate-Craniofacial Association (ACPA)-approved programs. The 22q Center continued to fulfill its mission to provide comprehensive, coordinated services to patients and families from across the nation.

Under the directorship of Gregory D. Pearson, MD, the Center for Complex Craniofacial Disorders successfully launched a strategic growth initiative to expand the breadth of the center’s clinical services, research and education. Growth of the program included the recruitment of craniomaxillofacial surgeon Ibrahim Khansa, MD, and craniofacial orthodontist Ana Mercado, DMD, PhD.

Nationwide Children’s became the first launch site for the NIH-sponsored CORNET project, a comparative effectiveness study of speech and surgical treatments through development of a cleft palate registry/research outcomes network. The project is the largest ever multi-center clinical registry and outcomes research study in the United States focused on cleft palate speech and surgical outcomes. Adriane Baylis, PhD, CCC-SLP, and Richard E. Kirschner, MD, FAAP, FACS, serve as co-investigators on the project.

The section continued its strong commitment to patient safety and quality outcomes through quality improvement, business process improvement, and patient and family education initiatives, including the creation of clinical protocols, educational tools for families and nursing competency requirements. The section hosted the second International Symposium on Velopharyngeal Dysfunction (VPD) in September 2018 with attendees from around the world gathering to share the latest research and clinical insights on VPD management. Finally, with surgical missions and educational efforts carried out abroad, the team continued its commitment to improving the quality of life for underprivileged children around the world.

GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019  
\$178,464

SELECTED PUBLICATIONS

Baylis AL, Pearson GD, Hall C, Madhoun LL, Cummings C, Neal N, Smith A, Eastman K, Stocker C, Kirschner RE. A Quality Improvement Initiative to Improve Feeding and Growth of Infants with Cleft Lip and/or Palate. *Cleft Palate Craniofac J*. 2018 Oct;55(9):1218-1224.

Baylis, A, Shriberg, L. (2018). Estimates of the Prevalence of Speech and Motor Speech Disorders in Youth with 22q11.2 Deletion Syndrome. *Am J Speech Lang Pathol*. 2019 Feb 21;28(1):53-82.

Bjorklund KA, Sommer N, Neumeister MW, Kasten SJ. Establishing Validity Evidence for an Operative Performance Rating System for Plastic Surgery Residents. *J Surg Educ*. 2019 Mar - Apr;76(2):529-539.

Doucet J-C, Russell KA, Daskalogiannakis J, Mercado AM, Emanuele N, James L, Hathaway RR, Long RE. Facial Growth of Patients with Complete Unilateral Cleft Lip and Palate Treated With Alveolar Bone Grafting at 6 Years. *Cleft Palate Craniofac J*. 2019 May;56(5):619-627.

Khansa I, Janis, JE. A Growing Epidemic: Plastic Surgeons and Burnout – A Literature Review. *Plast Reconstr Surg*. 2019;144(2):298e-305e.

2018 – 2019 NATIONWIDE CHILDREN’S FELLOWSHIP PROGRAM

PEDIATRIC PLASTIC SURGERY  
Benjamin Lemelman, MD

CRANIOFACIAL SPEECH  
Jill Deatherage, MA, CCC-SLP

FAST FACTS

July 2018 through June 2019

|                                                    |       |                                                  |       |
|----------------------------------------------------|-------|--------------------------------------------------|-------|
| Inpatient Discharges:.....                         | 86    | Ortho Center Plastic Surgery Clinic Visits:..... | 67    |
| Observation and Outpatient-in-Bed Discharges:..... | 231   | Orthodontics Treatment Program Visits:.....      | 2,688 |
| Total Discharges:.....                             | 317   | Cleft Lip/Craniofacial Clinic Visits:.....       | 2,151 |
| Average Length of Stay*:.....                      | 4.3   | Hilliard Plastic Surgery Clinic Visits:.....     | 284   |
| Average Daily Census*: .....                       | 1.0   | Plastic Surgery Clinic Visits:.....              | 3,764 |
| Patient Days*:.....                                | 371   | Westerville Plastic Surgery Clinic Visits:.....  | 406   |
| Total Surgical Procedures:.....                    | 1,412 | East Broad Plastic Surgery Clinic Visits:.....   | 66    |
| Inpatient Consults:.....                           | 53    | Total Plastic Surgery Clinic Visits: .....       | 9,426 |

\*Excludes observation and outpatient-in-a-bed patients.

TRANSPLANT

The transplant programs at Nationwide Children’s Hospital provide comprehensive services to patients locally, nationally and internationally. Our programs are Abdominal Transplant (including Kidney and Liver Transplant), Blood and Marrow Transplant (BMT), Heart Transplant, and Lung and Heart-Lung Transplant.

PROGRAM LEADERSHIP



**Rolla F. Abu-Arja, MD**  
*Clinical Director*  
*Blood and Marrow Transplant*



**Jeffery J. Auletta, MD**  
*Medical Director*  
*Blood and Marrow Transplant*



**Robert J. Gajarski, MD, MHSA**  
*Medical Director*  
*Heart Transplant*



**Mark E. Galantowicz, MD**  
*Surgical Director*  
*Lung and Heart-Lung Transplant*



**Don Hayes Jr., MD, MS, MEd**  
*Medical Director*  
*Lung and Heart-Lung Transplant*



**Stephen E. Kirkby, MD**  
*Clinical Director*  
*Lung and Heart-Lung Transplant*



**Patrick McConnell, MD**  
*Surgical Director*  
*Heart Transplant*



**Hiren P. Patel, MD**  
*Medical Director*  
*Kidney Transplant*



**Amer Rajab, MD, PhD**  
*Surgical Director*  
*Kidney Transplant*



**W. Kenneth Washburn, MD**  
*Chief of Transplant*  
*Director of Abdominal Transplant*



**Alexander Weymann, MD**  
*Medical Director*  
*Liver Transplant*

ABDOMINAL TRANSPLANT

The Abdominal Transplant Program at Nationwide Children’s offers specialized and comprehensive care to patients with end-stage liver disease due to congenital and acquired hepatic and biliary disorders, and end-stage renal disease due to kidney and urinary tract disorders. We perform both living- and deceased-donor kidney transplants and deceased-donor liver transplants for infants, children and adolescents. Both the Kidney and Liver Transplant Programs are certified by the United Network for Organ Sharing (UNOS). The Kidney Transplant Program is certified by the Centers for Medicare and Medicaid Services (CMS) and is a member of the Improving Renal Outcomes Collaborative (IROC). The Liver Transplant Program is accepted into the Ohio Solid Organ Transplant Consortium (OSOTC) and is an active member of the Society of Pediatric Liver Transplantation (SPLIT). In addition, the programs partner with The Ohio State University Abdominal Organ Transplant Program to provide the full continuum of care to patients as they age and transition to adult care. In the past year, the Nationwide Children’s Kidney Transplant program performed six transplant surgeries, one of which was from a living donor. The Nationwide Children’s Liver Transplant Program performed one liver transplant in 2018.

BLOOD AND MARROW TRANSPLANT

The Blood and Marrow Transplant (BMT) Program uses a family-centered, holistic care model in utilizing hematopoietic cell transplantation as the definitive cure for pediatric and adolescent/young adult patients with malignant and nonmalignant disorders. Our team is dedicated to optimizing clinical applications of hematopoietic cell transplantation by reducing transplant-associated morbidity and mortality through novel care

and innovative therapies, including immune-directed cellular therapies. The BMT Program is supported by the Foundation for Accreditation of Cellular Therapy (FACT)-accredited Apheresis Program at Nationwide Children’s, which offers extracorporeal photopheresis for patients with graft-versus-host disease, and the Cell Therapy Laboratory at The James Cancer Hospital and Solove Research Institute at The Ohio State University (OSU), which offers unique forms of stem cell graft manipulation and processing. Our Cellular Therapy and Cancer Immunotherapy Program (CTCIP) provides logistic support for manufacturing and protocol development of novel investigator-initiated cellular therapies. Lastly, the program educates the next generation of hematopoietic cell transplant and therapy physicians through its fourth-year Pediatric BMT/Cell Therapy Fellowship Program.

The BMT Program is FACT-accredited and is affiliated with the National Marrow Donor Program (NMDP) and the Center for International Blood and Marrow Transplant Research (CIBMTR), and is associated with the Children’s Oncology Group (COG), Pediatric Blood and Marrow Transplant Consortium (PBMTTC), the Primary Immune Deficiency Treatment Consortium (PIDTC), Blood and Marrow Transplant Clinical Trials Network (BMT CTN), Sickle Transplant Alliance for Research (STAR) Consortium, and the New Approaches to Neuroblastoma Therapy (NANT) Consortium. We actively collaborate in cutting-edge research and investigator-initiated clinical trials with OSU’s Comprehensive Cancer Center. Autologous and allogeneic hematopoietic cell transplants are performed using all types of stem cell sources (bone marrow, peripheral blood, and umbilical cord blood) from HLA-matched and haploidentical, related donors as well as HLA-matched, unrelated donors.

In the last year, patients have been treated with a wide range of modified stem cell grafts and cellular therapies. Our program is a Novartis-approved treatment center for Kymriah® CD19 CAR T cell therapy. Under early-phase FDA-approved clinical trials, patients with hematologic malignancies received αβ-T-cell and CD19 B-cell depleted, haploidentical stem cell grafts, and patients with sickle cell disease received unique hematopoietic cell transplants. Virus-specific T-cells (VSTs) were used to treat life-threatening viral infections, and natural killer (NK) cells were manufactured for patients with acute myeloid leukemia (AML) and relapsed, refractory neuroblastoma. Lastly, maternal VSTs were successfully enriched using interferon-gamma capture and administered to a premature infant with disseminated adenovirus, the first reported use of VSTs in this patient population.

HEART TRANSPLANT

The Heart Failure and Transplant Program aims to provide advanced cardiac support to any patient with end-stage heart failure refractory to conventional therapies. This includes advanced mechanical circulatory support with state-of-the-art ventricular-assist devices used as a bridge to transplant in appropriate patients non-responsive to pharmacologic heart failure therapies. The program is certified by UNOS, approved by the Ohio Department of Health and Human Services and remains a member in good standing within the Ohio Solid Organ Transplant Consortium.

Over the past year, we continued to experience growth in our transplant referrals and subsequent transplant volumes, with nearly 50% increases in both areas over the last few years, and with sustained excellence in our early post-transplant outcomes. Our team supported four patients who underwent ventricular assist device (VAD) implants for refractory heart failure while awaiting transplant, and Nationwide Children’s was the first pediatric center to implant the new generation HeartMate III™ VAD in Ohio. With more comprehensive clinical services available and additional personnel, we anticipate continued VAD program growth. This would include meeting the needs of an increasing population of older pediatric and young adult patients with congenital heart disease, as well as being a research site for novel pediatric VAD designs as they enter clinical trials. In collaboration with our oncology colleagues, we have also formally initiated our cardio-oncology program to provide ongoing comprehensive cardiac care to long-term survivors of childhood cancers known to have increased risk for cardiomyopathy. Finally, our program has become an active member of

a recently formed multi-center international quality research consortium, ACTION (Advanced Cardiac Therapies Improving Outcomes Network), and our physicians have assumed leadership roles in the VAD education, team communication and quality improvement modules.

LUNG AND HEART-LUNG TRANSPLANT

The Lung and Heart-Lung Transplant programs are part of an advanced lung disease center consisting of programs for cystic fibrosis, congenital heart disease, pulmonary vascular disorders, interstitial lung disease and neonatal lung disease. Our transplant team also works in conjunction with The Heart Center, offering combined heart-lung transplantation to patients with advanced cardiopulmonary disease.

We offer a full spectrum of lung assist devices and ambulatory extracorporeal membrane oxygenation (ECMO) to children with advanced lung disease, including acute respiratory decompensation, and have the capability of transporting patients to our center on lung assist devices and ECMO.

In the past year, the Lung Transplant Program received a record number of referrals from pediatric institutions throughout the United States and internationally. With a growing research portfolio at Nationwide Children’s, the depth of the research performed by the Lung Transplant Program significantly contributes to the medical literature on advanced lung disease and lung transplantation.

SELECTED PUBLICATIONS

Foltz JA, Moseman JE, Thakkar A, Chakravarti N, **Lee DA**. TGFβ Imprinting During Activation Promotes Natural Killer Cell Cytokine Hypersecretion. *Cancers (Basel)*. 2018 Nov 5;10(11). Pii E423.

Gonzales A, Gates E, **Bhunia N, Mehyar L, Hashem H**, Stanek JR, Krebs B, **Auletta JJ**. Transplant Energize Me Patient Outcome (TEMPO): A Quality Improvement Project That Maintains Functional Mobility in Pediatric Patients Admitted for Allogeneic Hematopoietic Cell Transplantation. *Biol Blood Marrow Transplant*. 2019 May 11. pii: S1083-8791(19)30288-5.

Han JL, Beal EW, Mumtaz K, **Washburn K, Black SM**. Combined Liver-Lung Transplantation: Indications, Outcomes, Current Experience and Ethical Issues. *Transplant Rev (Orlando)*. 2019 Apr;33(2):99-106.

**Hayes D Jr, Kopp BT, Hill CL, Lallier SW, Schwartz CM, Tadesse M, Alsudayri A, Reynolds SD**. Cell Therapy for Cystic Fibrosis Lung Disease: Regenerative Basal Cell Amplification. *STEM CELLS Translational Medicine*. 2019 Mar;8(3):225-235.

**Hayes D Jr**, Wilson KC, **Krivchenia K**, Hawkins SMM, Balfour-Lynn IM, Gozal D, Panitch HB, **Splaingard ML**, Rhein LM, Kurland G, Abman SH, Hoffman TM, Carroll CL, Cataletto ME, **Tumin D**, Oren E, Martin RJ, Baker J, Porta GR, Kaley D, Gettys A, Deterding RR. Home Oxygen Therapy for Children. An Official American Thoracic Society Clinical Practice Guideline. *American Journal of Respiratory and Critical Care Medicine*. 2019 Feb 1;199(3):e5-e23.

Jeewa A, Imamura M, Canter C, Niebler RA, VanderPluym C, Rosenthal DN, Kirklin JK, Cantor RS, Tresler M, McMullan DM, Morell VO, Turrentine M, Ameduri R, Nguyen K, Kanter K, Conway J, **Gajarski R**, Fraser CD, Jr. Long-term Outcomes after Transplantation After Support with a Pulsatile Pediatric Ventricular Assist Device. *J Heart Lung Transplant*. 2019 Apr;38(4):449-455.

Morrison AK, Gowda C, Tumin D, Phelps CM, **Hayes D Jr, Tobias J, Gajarski RJ, Nandi D**. Pediatric Marginal Donor Hearts: Trends in US National Use, 2005-2014. *Pediatr Transplant*. 2018 Aug;22(5):e13216.

Nguyen MC, **Black S, Washburn K, El-Hinnawi A**. En Bloc Liver-Kidney Transplantation with Renal Artery Variation Using Donor Splenic Artery and Left Gastric Artery as Inflow to the Kidney: Case Report. *Int J Surg*. 2018;53:13-16.

**Rangarajan HG**, Smith LC, Stanek JR, **Abu-Arja R, Auletta JJ**, O'Brien SH. Increased Health Care Utilization and Costs During Allogeneic Hematopoietic Cell Transplant for Acute Leukemia and Myelodysplastic Syndromes in Adolescents and Young Adults Compared to Children: A Multicenter Study. *Biol Blood Marrow Transplant*. 2019 May;25(5):1031-1038.

Schafer JR, Salzillo TC, Chakravarti N, Kararoudi MN, Trikha P, Foltz JA, Wang R, Li S, **Lee DA**. Education-Dependent Activation of Glycolysis Promotes the Cytolytic Potency of Licensed Human Natural Killer Cells. *J Allergy Clin Immunol*. 2019 Jan;143(1):346-358.

| FAST FACTS                          |    |
|-------------------------------------|----|
| July 2018 through June 2019         |    |
| Blood and Marrow Transplants: ..... | 53 |
| Heart Transplants: .....            | 5  |
| Lung Transplants: .....             | 1  |
| Kidney Transplants: .....           | 6  |
| Liver Transplants: .....            | 1  |

2018 – 2019 NATIONWIDE CHILDREN’S FELLOWSHIP PROGRAM

PEDIATRIC BONE MARROW TRANSPLANT  
Nabanita Bhunia, MD

PEDIATRIC RENAL TRANSPLANT  
Jessica Greco, MD  
Reeti Kumar, MD  
Emily Stonebrook, MD  
Jason Thomas, MD

TRAUMA

Nationwide Children’s Hospital is one of the largest Level 1 pediatric trauma centers in the nation to be verified by the American College of Surgeons. We are also one of the few free standing pediatric burn centers in the United States to be verified by the American Burn Association. The trauma and burn programs provide clinical care for injured children, a robust quality improvement program to ensure that the highest quality of care is provided, and research to improve outcomes through the Center for Pediatric Trauma Research at Nationwide Children’s. Our nationally recognized trauma and burn service provides care for injured children from infancy through adolescence. Pediatric trauma and burn experts are involved in all aspects of patient care, including pre-hospital, emergency department, critical care, inpatient, operative management and rehabilitation. Our multidisciplinary, collaborative approach allows us to provide patients with exceptional care. Our center serves as a resource for injury prevention and education for our primary service area and beyond.

FACULTY



**Jonathan I. Groner, MD**  
*Medical Director*



**Rajan Thakkar, MD**  
*Associate Trauma Medical Director*  
*Co-Director Burn Program*



**Renata Fabia, MD**  
*Co-Director Burn Program*

TRAUMA SURGEONS

- Jennifer H. Aldrink, MD
- Gail E. Besner, MD
- Christopher K. Breuer, MD
- Katherine J. Deans, MD
- Karen A. Diefenbach, MD
- Renata B. Fabia, MD, PhD
- Jeremy Fisher, MD
- Brian D. Kenney, MD, MPH
- Marc P. Michalsky, MD
- Peter C. Minneci, MD
- Benedict C. Nwomeh, MD
- Rajan K. Thakkar, MD
- Richard Wood, MD

PHYSICIAN TRAUMA/BURN LIAISONS

- Sri Aravapalli, MD (Emergency Medicine)
- Graciela Argote-Romero, MD (Anesthesia)
- Allan Beebe, MD (Orthopedics)
- Greg Cambier, MD (Anesthesia)
- Maria Estrada, DO (Critical Care)
- Mark Hogan, MD (Radiology)
- Jeff Lutmer, MD (Critical Care)
- David Martin, MD (Anesthesia)
- Ellen McManus, MD (Emergency Medicine)
- Eric Sribnik, MD (Neurosurgery)

TRAUMA PROGRAM MANAGER

Kathy Haley, MS, RN

Highlights from the past year:

- Jonathan Groner, MD, and Kathy Haley, RN, were re-appointed as board members of the Central Ohio Trauma System.
- Rajan Thakkar, MD, provided leadership for the Pediatric Injury Quality Improvement Collaborative, national injury quality collaborative.
- Jonathan Groner, MD, served as a member of the Committee on Trauma of the American College of Surgeons.

- Rajan Thakkar, MD, was awarded a K08 grant from the National Institutes of Health for his study, “Pediatric Immune Function Following Thermal Injury.” This is a four-year career development award.
- The Burn Program launched its Laser Therapy Program for burn scar reconstruction.
- The Burn Program, in collaboration with the other centers in the Pediatric Quality Improvement Collaborative, was awarded first place in the Quality Improvement category for its poster, “Identifying Best Practices in Burn Care across Five Children’s Hospitals” at the 2019 American Burn Association Annual Conference.

The Trauma team provides expertise and leadership locally through the Central Ohio Trauma System, the state trauma system, and nationally through the Pediatric Trauma Society, the Verification Review Committee of the American College of Surgeons, and other national trauma and burn organizations.

CENTER FOR PEDIATRIC TRAUMA RESEARCH

RESEARCH CENTER FACULTY



**Henry Xiang, MD, MPH, PhD**  
*Director*



**Jonathan I. Groner, MD**  
*Medical Director*



**Julie Leonard, MD, MPH**  
*Associate Director*

FACULTY

Jennifer Cooper, PhD  
Renata Fabia, MD, PhD  
Brian Kenney, MD, MPH  
Jeffrey Leonard, MD  
Eric Sribnick, MD, PhD  
Rachel Stanley, MD  
Gerry Taylor, PhD  
Rajan Thakkar, MD  
Ginger Yang, PhD, MPH

AFFILIATE FACULTY

Allan C. Beebe, MD  
Mark Hall, MD, FAAP, FCCM  
Bo Lu, PhD (The Ohio State University)  
Jennifer Lundine, PhD, CCC-SLP, BC-ANCDs  
Keith Yeates, PhD

NURSE RESEARCHERS

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

RESEARCH PROGRAM MANAGER

Krista K. Wheeler, MS

Center for Pediatric Trauma Research Achievements

- The Pediatric Trauma and Burn Research Affinity Group was awarded Research Institute funding to support collaborative efforts between clinicians at Nationwide Children’s and researchers in the Abigail Wexner Research Institute.
- Julie Leonard, MD, MPH, is serving as co-principal investigator on a National Institutes of Health (NIH) grant to validate the use of the PsySTART tool in pediatric injury patients in the emergency department and to determine a cutpoint for risk factors that will most accurately distinguish those children who are at highest risk of developing post-traumatic stress disorder.
- Jonathan I. Groner, MD, was named to lead the pediatric focus group for the National Trauma Research Action Plan (NTRAP). Henry Xiang, MD, MPH, PhD, and Rajan Thakkar, MD, will participate as experts.
- Ginger Yang, MD, PhD, received an NIH grant to determine the effectiveness of parent-focused driving safety interventions on safe driving practices among teen drivers who have committed a traffic violation.

- The Kate Granger Compassionate Care Award was awarded to Henry Xiang, MD, MPH, PhD. The Healthcare Information and Management Systems Society (HIMSS) North America presented this award for the research team’s work using virtual reality for pain distraction and for cognitive rehabilitation.

GRANTS AWARDED

JULY 1, 2018 – JUNE 30, 2019

Trauma-related research funding spans multiple centers which include Emergency Medicine, Pediatric Surgery, Center for Injury Research and Policy, and Center for Innovation in Pediatric Practices.

\$3,900,726

SELECTED PUBLICATIONS

Buchanan L, Bushroe K, Malthaner L, McCarthy T, Zhao S, Hade E, **Leonard JC**. Test Accuracy of the Screening Tool for Early Predictors of Post-traumatic Stress Disorder for Post-injury Mental Health in a Managed-Medicaid Population. *J Pediatr*. 2019;210:127-133.

Lever K, Peng J, **Lundine JP**, Caupp S, **Wheeler KK**, **Sribnick EA**, **Xiang H**. Attending Follow-up Appointments After Pediatric Traumatic Brain Injury: Caregiver-Perceived Barriers and Facilitators. *J Head Trauma Rehabil*. 2019 Mar/Apr;34(2):E21-E34.

Nordin A, Shi J, **Wheeler K**, **Xiang H**, **Kenney B**. Age-Adjusted Shock Index: From Injury to Arrival. *J Pediatr Surg*. 2019 May;54(5):984-988.

Tarimala A, Singichetti B, Yi HG, Huang LH, Doerschuk R, Tiso M, **Yang JZ**. Initial Emergency Department Visit and Follow-Up Care for Concussions among Children with Medicaid. *J Pediatr*. 2019;206:178-183.

**Thakkar RK**, Diltz Z, Drews JD, **Wheeler K**, Shi J, Devine R, **Fabia R**, **Hall M**. Abnormal Lymphocyte Response after Pediatric Thermal Injury is Associated with Adverse Outcomes. *J Surg Res*. 2018 Aug;228:221-227.

FAST FACTS

July 2018 through June 2019

|                                           |       |
|-------------------------------------------|-------|
| Admissions:.....                          | 1,457 |
| Average Length of Stay: .....             | 3.0   |
| Blunt Injury Admissions: .....            | 1,147 |
| Penetrating Injury Admissions: .....      | 101   |
| Burn Injury Admissions:.....              | 177   |
| Asphyxial Injury Admissions: .....        | 32    |
| Orthopedic Trauma Admissions: .....       | 481   |
| Neurosurgery Trauma Admissions: .....     | 171   |
| Pediatric Surgery Trauma Admissions:..... | 667   |
| Other Service Trauma Admissions: .....    | 138   |





## Urology

### Pushing the Boundaries of Regional Anesthesia for Complex Urological Surgery

In an effort to extend more regional anesthetic options to children undergoing urological procedures — and to obviate concerns about airway safety and theoretical neurocognitive effects of general anesthesia in the very young — a team of anesthesiologists and surgeons at Nationwide Children's Hospital developed a Spinal Anesthesia Program that now includes formal protocols for the use of combined spinal/caudal catheter (SCC) anesthesia. The combined approach has made it possible to perform even lengthy, complex procedures, such as ureteral implantation, under regional anesthesia.

"In most places, it's almost expected that any child who comes to the operating room has general anesthesia," says **Rama Jayanthi, MD**, chief of Urology at Nationwide Children's and lead author on a *Journal of Pediatric Urology* study detailing his team's experience in SCC. "We're suggesting that doesn't have to be the case. There are options. One can do more complex surgeries under regional anesthesia, and there may be some advantages to doing so."

Spinal anesthesia, which involves a single anesthetic injection into the subdural space, provides localized, lower-body anesthesia for 60-90 minutes. In 2015, surgeons at Nationwide Children's began employing it for routine procedures lasting less than 90 minutes such as circumcisions and revisions, orchidopexy, hernia repair and distal hypospadias repairs.

The study team began to place a caudal epidural catheter in selected cases to prolong the duration of the surgical block, refining their protocol as they gained experience. Now, 60 minutes after spinal anesthesia is administered, children receive an automatic bolus of chloroprocaine through the caudal catheter. This maintains pain relief, allowing for seamless anesthesia as the spinal block recedes. Children also receive an intravenous bolus of dexmedetomidine prior to catheter placement, as well as a gradual infusion throughout the surgery.

The study included 23 children, with a mean age of 16.5 months, in whom they attempted SCC. Spinal anesthesia was unsuccessful in three children, who were switched successfully to general anesthesia. The remaining 20 patients completed operations such as ureteral implantations, ureterocele excisions and reimplantations, megaureter repairs, first- and second-stage hypospadias repairs, feminizing genitoplasties and open pyeloplasty. All SCC children spontaneously breathed room air and completed surgery without airway intervention or other complications.

"Successfully starting a program requires a surgeon who is motivated and an anesthesiologist who wants to push the envelope," says Dr. Jayanthi. "I hope other hospitals will pursue this. We should be accepting that SCC may have specific advantages, with minimal use of systemic medications and lack of airway manipulation."

#### CITATION:

Jayanthi VR, Spisak K, Smith AE, Martin DP, Ching CB, Bhalla T, Tobias JD, Whitaker E. Combined Spinal/Caudal Catheter Anesthesia: Extending the Boundaries of Regional Anesthesia for Complex Pediatric Urological Surgery. *Journal of Pediatric Urology*. 2019 Apr 11. pii: S1477-5131(19)30079-8.



*"Successfully starting a program requires a surgeon who is motivated and an anesthesiologist who wants to push the envelope."* —Rama Jayanthi, MD, Chief, Urology

UROLOGY

The Section of Urology at Nationwide Children’s Hospital provides comprehensive diagnostic and therapeutic services for a wide range of urological disorders in children of all ages, including teenagers and young adults. Advanced services include reconstructive surgery of the urinary tract, genitalia and urinary sphincter, as well as consultations for urinary tract abnormalities detected *in utero*. The section participates in several multispecialty clinics, including THRIVE (a program specializing in care for differences of sexual development, complex urological problems and gender concerns), Center for Colorectal and Pelvic Reconstruction, Urology-Nephrology Clinic, the Stone Clinic and the Myelomeningocele Clinic.

The mission of the Section of Urology is to provide the highest quality pediatric urological care in the safest and most child-friendly environment. The section includes members who are full-time pediatric urologists, hold faculty appointments in the Department of Urology at The Ohio State University College of Medicine and are committed to cutting-edge medical research and surgical education.

FACULTY



V. Rama Jayanthi, MD  
Chief

FULL-TIME NATIONWIDE CHILDREN’S FACULTY

- Seth A. Alpert, MD
- Christopher T. Brown, MD
- Christina B. Ching, MD
- Daniel G. DaJusta, MD
- Molly E. Fuchs, MD
- Daryl J. McLeod, MD
- Donald H. Nguyen, MD

COMMUNITY-BASED FACULTY

- Nima Baradaran, MD
- Roy R. Brown, Jr., MD
- George T. Ho, MD
- Adam C. Weiser, MD

The Section of Urology continues to provide care to multiple areas in the region, acknowledging that it is vital for a premier program to go to families as opposed to always having them come to main campus. To that end we have expanded long distance Ohio outreach clinics in Lima, Mansfield and Wheelersburg. In addition, the joint venture with Dayton Children’s Hospital continues to serve southwest Ohio, with two Nationwide Children’s Urology faculty members offering full-time service to the Dayton metropolitan area.

The Robot-Assisted Surgery Program is robust, performing a wide range of surgical procedures, from routine kidney level operations, such as pyeloplasties and nephrectomies, to more complex procedures such as bladder neck reconstructions and appendicovesicostomy. Only a handful of centers around the country are performing the latter but at Nationwide Children’s they have become commonplace. Our six robotically trained pediatric urologists are among the most active in the country with regard to surgical volumes.

Urology continues to place great importance on multispecialty collaborative clinics. These include the THRIVE program for differences in sexual development (DSD), the Center for Colorectal and Pelvic Reconstruction, and the Uro-Nephrology Clinic. The latter specifically has doubled over the last academic year allowing for more children with complex urinary pathologies and chronic kidney disease to be simultaneously evaluated and managed by both Urology and Nephrology.

The division continues to be an active member of the Pediatric Urology Midwest Alliance (PUMA), which consists of urology divisions in five major Midwestern children’s hospitals (Nationwide Children’s, Cincinnati, Riley, Lurie and the Mayo Clinic). The group continues

to perform collaborative multicenter research of uncommon conditions. In addition, the group held its second annual exstrophy surgical mission in India, caring for 18 children.

GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019

\$163,495

SELECTED PUBLICATIONS

Alpert SA, Ching CB, DaJusta DG, McLeod DJ, Fuchs ME, Jayanthi VR. Combination Treatment for Cicatrix after Neonatal Circumcision: An Office-Based Solution to a Challenging Problem. *J Pediatr Urol.* 2018 Oct;14(5):471-475.

Gargollo PC, Granberg C, Gong E, Tu D, Whittam B, DaJusta D. Complex Robotic Lower Urinary Tract Surgery in Patients with History of Open Surgery. *J Urol.* 2019 Jan;201(1):162-168.

McLeod DJ, Szymanski KM, Gong E, Granberg C, Reddy P, Sebastião Y, Fuchs M, Gargollo P, Whittam B, VanderBrink BA; Pediatric Urology Midwest Alliance (PUMA). Renal Replacement Therapy and Intermittent Catheterization Risk in Posterior Urethral Valves. *Pediatrics.* 2019 Mar;143(3).

Rentea RM, Halleran DR, Vilanova-Sanchez A, Lane VA, Reck CA, Weaver L, Booth K, DaJusta D, Ching C, Fuchs ME, Jayanthi RR, Levitt MA, Wood RJ. Diagnosis and Management of a Remnant of the Original Fistula (ROOF) in Males Following Surgery for Anorectal Malformations. *J Pediatr Surg.* 2019 Feb 28. pii: S0022-3468(19)30116-2.

| FAST FACTS                                           |        |
|------------------------------------------------------|--------|
| July 2018 through June 2019                          |        |
| Inpatient Discharges:.....                           | 162    |
| Observation and Outpatient–in-a-Bed Discharges:..... | 135    |
| Total Discharges:.....                               | 297    |
| Average Length of Stay*:.....                        | 2.9    |
| Average Daily Census*:.....                          | 1.3    |
| Patient Days*:.....                                  | 472    |
| Total Surgical Procedures:.....                      | 2,030  |
| Inpatient Consults:.....                             | 111    |
| Urodynamics:.....                                    | 828    |
| Canal Winchester Urology Clinic Visits:.....         | 272    |
| Dayton Children’s Clinic Visits:.....                | 623    |
| Dublin Urology Clinic Visits:.....                   | 1,311  |
| Lima Urology Clinic Visits:.....                     | 172    |
| Mansfield Urology Clinic Visits:.....                | 244    |
| Portsmouth Urology Clinic Visits:.....               | 288    |
| Urology (Main Campus) Clinic Visits:.....            | 7,242  |
| Urology/Nephrology (Main Campus) Clinic Visits:..... | 194    |
| Westerville Urology Clinic Visits:.....              | 1,364  |
| Total Urology Clinic Visits:.....                    | 11,650 |

\*Excludes observation and outpatient-in-a-bed patients.

2018 – 2019 NATIONWIDE CHILDREN’S FELLOWSHIP PROGRAM

PEDIATRIC UROLOGY

- Kristin Ebert, MD
- Alex Rehfuss, MD



**John A. Barnard, MD**  
*President*

**Dennis R. Durbin, MD, MSCE**  
*Chief Scientific Officer*

**THE ABIGAIL WEXNER RESEARCH INSTITUTE AT NATIONWIDE CHILDREN'S HOSPITAL**

As an international leader in pediatric research, science is thriving at Nationwide Children's. The behavioral, basic and clinician scientists within the Abigail Wexner Research Institute (AWRI) at Nationwide Children's are redefining pediatric health care with best outcomes for every child in mind. The AWRI occupies more than 500,000 square feet of dedicated research space on the Nationwide Children's campus. One of the largest pediatric research centers in the United States, the AWRI is ranked in the top six for National Institutes of Health funding among free-standing children's hospitals. The centers of emphasis are structured to support multidisciplinary team science and discovery, enabled by outstanding shared resources. Each center is home to faculty members working in contiguous space and collaborating with talented staff, postdoctoral fellows, graduate students, residents and other students.

**INSTITUTE LEADERSHIP**



**Lauren O. Bakaletz, PhD**  
*Vice President,  
Basic Sciences Research*



**Deena J. Chisolm, PhD**  
*Vice President,  
Health Services Research*



**William E. Smoyer, MD**  
*Vice President, Clinical Research*



**Veronica J. Vieland, PhD**  
*Vice President, Computational Research*

**INSTITUTES AND CENTERS OF EMPHASIS**

- Battelle Center for Mathematical Medicine
- Center for Clinical and Translational Research
- Center for Perinatal Research
- Biopathology Center
- Center for Gene Therapy
- Center for Regenerative Medicine
- Center for Biobehavioral Health
- Center for Injury Research and Policy
- Center for Vaccines and Immunity
- Center for Cardiovascular Research
- Center for Innovation in Pediatric Practice
- Steve and Cindy Rasmussen Institute for Genomic Medicine
- Center for Childhood Cancer and Blood Diseases
- Center for Microbial Pathogenesis

BATTELLE CENTER FOR MATHEMATICAL MEDICINE

Faculty from the Battelle Center for Mathematical Medicine in the Abigail Wexner Research Institute at Nationwide Children’s Hospital apply state-of-the-art quantitative methods to basic and clinical research in order to better inform and ultimately improve clinical care in pediatrics. A primary goal of the center is to provide a unique environment in which specialists from a variety of mathematical, statistical and computational areas can share their professional “home” in order to facilitate creative, collaborative research within the group.

FACULTY



Veronica J. Vieland, PhD  
Director

Christopher W. Bartlett, PhD

Jayajit Das, PhD

David A. Greenberg, PhD

Susan Hodge, DSc

Andrzej Kloczkowski, PhD

Paola Malerba, PhD

William C. Ray, PhD

William Stewart, PhD

Battelle Center for Mathematical Medicine faculty continued their tradition of active collaboration with one another, with investigators across the Nationwide Children’s organization and with colleagues at The Ohio State University and other institutions. This year saw the publication of 27 peer-reviewed research papers and several book chapters, as well as the presentation of 18 invited research talks at high-profile national and international venues spanning nine countries. Battelle Center for Mathematical Medicine faculty also participated in organizing four well-attended national/international conferences on several topics in computational biology. Finally, the center was pleased

to have a new faculty member join us, Paola Malerba, PhD, a mathematician who specializes in brain wave patterns during sleep and their roles in various clinical conditions.

GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019

\$606,214

SELECTED PUBLICATIONS

Backes CH, Söderström F, Ågren J, Sindelar R, **Bartlett CW**, Rivera BK, Mitchell CC, Frey HA, Shepherd EG, Nelin LD, Normann E. Outcomes Following a Comprehensive versus a Selective Approach for Infants Born at 22 Weeks of Gestation. *J Perinatol.* 2019 Jan;39(1):39-47.

Hicks SN, Chaiwatpongsakorn S, Costello HM, McLellan JS, **Ray W**, Peebles ME. Five Residues in the Apical Loop of the Respiratory Syncytial Virus Fusion Protein F(2) Subunit Are Critical for Its Fusion Activity. *J Virol.* 2018 Jul;92(15).

Kouza M, Banerji A, Kolinski A, Buhimschi I, **Kloczkowski A**. Role of Resultant Dipole Moment in Mechanical Dissociation of Biological Complexes. *Molecules.* 2018 Aug;23(8).

Mbiribindi B, Mukherjee S, Wellington D, **Das J**, Khakoo SI. Spatial Clustering of Receptors and Signaling Molecules Regulates NK Cell Response to Peptide Repertoire Changes. *Front Immunol.* 2019 Apr 5;10:605.

Wang M, **Greenberg DA**, **Stewart WCL**. Replication, Reanalysis, and Gene Expression: ME2 and Genetic Generalized Epilepsy. *Epilepsia.* 2019 Mar;60(3):539-546.

BIOPATHOLOGY CENTER

The Biopathology Center, part of the Abigail Wexner Research Institute at Nationwide Children’s Hospital, provides a full range of services related to biospecimen procurement, banking, processing, testing and distribution. The center is accredited by the College of American Pathologists Biorepository Accreditation Program and houses numerous National Cancer Institute (NCI) funded biospecimen collection efforts, including the biorepositories of the Children’s Oncology Group, NRG Oncology-Columbus and SWOG. Also part of the Biopathology Center are the NCI-funded Pediatric Division of the Cooperative Human Tissue Network (pCHTN), the Biospecimen Core Resource of the Center for Cancer Genomics, and the Children’s Oncology Group Reference Laboratories as well as numerous biospecimen collections from other sponsors (e.g., Nationwide Children’s-funded investigators, the SARC Foundation).

FACULTY



Nilsa Del Carmen Ramirez-Milan, MD, FCAP  
Medical Director and Principal Investigator



Julie M. Gastier-Foster, PhD, FACMG  
Principal Investigator

This past year, more than 40 scientific articles published by national and international investigators were supported by biospecimens distributed by the Biopathology Center, including several published in high-impact journals (e.g., *Nature*, *Nature Genetics*, *Cell*). A “Pan-Cancer Atlas” collection of 27 scientific articles was published by *Cell Press* based on the analysis of data from the Cancer Genome Atlas cohort. The biospecimens and clinical data from more than 11,000 tumors of 33 different cancer types used in this analysis were received and processed by the Biospecimen Core Resource.

We continuously pursue grant-supported, biorepository based studies aimed to advance medical research. This year the Biopathology Center-based Biospecimen Core Resource was awarded contracts to support pathology review and nucleic acid isolation for the NCI Division of Cancer Epidemiology and Genetics (to study environmental causes of cancer), the NCI Center for Cancer Genomics’ Cancers of Unknown Primaries Project (to better understand metastatic tumors of unknown origin), and the Translational Breast Cancer Research Consortium’s AURORA project (to investigate metastatic breast cancer genomes and identify potential targets to prevent tumor spread).

The pCHTN grant was awarded to Nilsa Del Carmen Ramirez-Milan, MD, FCAP, for the period from 2019 to 2024; the Biopathology Center has hosted this grant since 1989, with her as PI since 2007. The Cooperative Human Tissue Network is comprised of five adult divisions and one pediatric division and provides access to biospecimens for discovery phase research that contributes to discoveries in cancer diagnosis and treatment.

Julie M. Gastier-Foster, PhD, FACMG, participated in several NCI-sponsored grant review committees. As part of international efforts, Dr. Gastier-Foster presented at the Latin-American Symposium and Training in Biobanking of the Barretos Cancer Hospital in Brazil and Dr. Ramirez-Milan presented at the 10th Asian Network of Research Resource Centers Conference in Seoul, South Korea.

GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019

\$16,133,394

SELECTED PUBLICATIONS

Hmeljak J, Sanchez-Vega F, Hoadley KA, Shih J, Stewart C, Heiman D, Tarpey P, Danilova L, Drill E, Gibb EA, Bowlby R, Kanchi R, Osmanbeyoglu HU, Sekido Y, Takeshita J, Newton Y, Graim K, Gupta M, Gay CM, Diao L, Gibbs DL, Thorsson V, Iype L, Kantheti H, Severson DT, Ravegnini G, Desmeules P, Jungbluth AA, Travis WD, Dacic S, Chirieac LR, Galateau-Sallé F, Fujimoto J, Husain AN, Silveira HC, Rusch VW, Rintoul RC, Pass H, Kindler H, Zauderer MG, Kwiatkowski DJ, Bueno R, Tsao AS, Creaney J, **Lichtenberg T, Leraas K, Bowen J, TCGA Research Network**, Felau I, Zenklusen JC, Akbani R, Cherniack AD, Byers LA, Noble MS, Fletcher JA, Robertson AG, Shen R, Aburatani H, Robinson BW, Campbell P, Ladanyi M. Integrative Molecular Characterization of Malignant Pleural Mesothelioma. *Cancer Discov*. 2018 Dec;8(12):1548-1565.

Qian M, Zhao X, Devidas M, Yang W, Gocho Y, Smith C, **Gastier-Foster JM**, Li Y, Xu H, Zhang S, Jeha S, Zhai X, Sanda T, Winter SS, Dunsmore KP, Raetz EA, Carroll WL, Winick NJ, Rabin KR, Zweidler-Mckay PA, Wood B, Pui CH, Evans WE, Hunger SP, Mullighan CG, Relling MV, Loh ML, Yang JJ. Genome-wide Association Study of Susceptibility Loci for T-cell Acute Lymphoblastic Leukemia in Children. *J Natl Cancer Inst*. 2019 Apr 2. pii: djz043.

Robinson KM, Yang W, Karol SE, Kornegay N, Jay D, Cheng C, Choi JK, Campana D, Pui CH, Wood B, Borowitz MJ, **Gastier-Foster J**, Larsen EC, Winick N, Carroll WL, Loh ML, Raetz EA, Hunger SP, Devidas M, **Mardis ER**, Fulton RS, Relling MV, Jeha S. No Evidence that G6PD Deficiency Affects the Efficacy or Safety of Daunorubicin in Acute Lymphoblastic Leukemia Induction Therapy. *Pediatr Blood Cancer*. 2019 Jun;66(6):e27681.

Research Institute Reports

CENTER FOR BIOBEHAVIORAL HEALTH

The mission of the Center for Biobehavioral Health in the Abigail Wexner Research Institute at Nationwide Children’s Hospital is to improve the health and health care of children and their families. This is achieved through state-of-the-art research using a biopsychosocial approach. A special focus is placed on identification of factors associated with developmental risk and resilience across the life span, design and evaluation of new interventions, and dissemination and implementation of effective interventions into routine practice.

FACULTY



Cynthia A. Gerhardt, PhD  
Director

FULL-TIME NATIONWIDE CHILDREN'S FACULTY

Canice E. Crerand, PhD

Kristen E. Hoskinson, PhD

Jamie L. Jackson, PhD

Sarah A. Keim, PhD

Laura Mackner, PhD

Leena Nahata, MD

Eric E. Nelson, PhD

Joseph R. Rausch, PhD

Jack H. Stevens, PhD

H. Gerry Taylor, PhD

Kathryn A. Vannatta, PhD

OSU-AFFILIATE FACULTY

Christine A. Fortney, PhD, RN

Tondi Harrison, PhD, RN

Kathy Lemanek, PhD

Kelly McNally, PhD

Our vision is to achieve the best possible outcomes for children and families by creating, disseminating and applying new knowledge related to the reciprocal influences of behavior and health. We are also committed to training the next generation of leaders in biobehavioral research.

Developmental, behavioral and social risk factors contribute to significant morbidity and mortality among youth. Childhood health conditions affect not only the psychosocial well-being of youth but also that of families.

Through our research, the center is transforming the health care and well-being of children and families in our community and worldwide.

Several new grants were awarded in the center. H. Gerry Taylor, PhD, received a grant from the National Institute of Child Health and Human Development (NICHD) as a co-PI. The study, referred to as “PediaTrac,” is a collaboration with the University of Eastern Michigan, University of Michigan, and Case Western Reserve University. The team will develop a parent report assessment of infant development from birth to 18 months that will provide developmental growth trajectories similar to physical growth trajectories.

Leena Nahata, MD, received a career development award (K08) from the National Cancer Institute (NCI) to develop and evaluate a family-centered psychoeducational intervention for adolescent and young adult males newly diagnosed with cancer. The intervention tests a decision tool to optimize fertility preservation prior to cancer treatment and decision quality.

Under the mentorship of Sarah Keim, PhD, Taniqua Ingol, MPH, received a diversity supplement from the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). Ms. Ingol will examine the association between maternal weight-change patterns across pregnancy and child overweight and obesity status at 18 months of age.

**Behavioral Health:** See page 131 for information about Behavioral Health services at Nationwide Children’s Hospital.

GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019  
\$2,757,599

SELECTED PUBLICATIONS

Fisher RS, **Rausch JR**, Ferrante AC, Prussien KV, Olshefski RS, **Vannatta K**, Compas BE, **Gerhardt CA**. Trajectories of Health Behaviors across Early Childhood Cancer Survivorship. *Psycho-Oncology*. 2019;28(1):68-75.

**Keim SA**, Boone KM, Klebanoff MA, Turner AN, **Rausch J**, Nelin MA, Rogers LK, Yeates KO, Nelin L, Sheppard KW. Effect of Docosahexaenoic Acid Supplementation vs Placebo on Developmental Outcomes of Toddlers Born Preterm: A Randomized Clinical Trial. *JAMA Pediatr*. 2018 Dec 1;172(12):1126-1134.

Morningstar M, Dirks MA, Rappaport BI, Pine DS, **Nelson EE**. Associations between Anxious and Depressive Symptoms and the Recognition of Vocal Socio-Emotional Expressions in Youth. *J Clin Child Adolesc Psychol*. 2019 May-Jun;48(3):491-500.

**Stevens J**, Splaingard D, Webster-Cheng S, **Rausch J**, Splaingard M. A Randomized Trial of a Self-Administered Parenting Intervention for Infant and Toddler Insomnia. *Clin Pediatr (Phila)*. 2019 Jun;58(6):633-640.

**Taylor HG**, Minich N, Schluchter M, Espy KA, Klein N. Resilience in Extremely Preterm/Extremely Low Birth Weight Kindergarten Children. *J Int Neuropsychol Soc*. 2019 Apr;25(4):362-374.

CENTER FOR CARDIOVASCULAR RESEARCH

The mission of the Center for Cardiovascular Research in the Abigail Wexner Research Institute at Nationwide Children’s Hospital is to conduct innovative, mechanism-based research leading to improved therapies and outcomes for pediatric cardiovascular diseases and to foster preventive strategies and promote cardiovascular health in adults.

FACULTY



Vidu Garg, MD  
Director

Madhumita Basu, PhD

Brenda Lilly, PhD

Joy Lincoln, PhD

Kim L. McBride, MD, MS

Patrick I. McConnell, MD

Aaron J. Trask, PhD

Our cardiovascular research projects span the spectrum from basic research, which occurs in the Center for Cardiovascular Research, to translational and clinical research that is performed in collaboration with clinicians in The Heart Center at Nationwide Children’s. Areas of focus include investigation into the genes and gene-environment interactions that contribute to congenital heart defects, molecular pathways regulating normal cardiac heart valve and blood vessel development and signaling cascades that regulate valve and vascular remodeling and function during disease development and progression. The center faculty receive funding from the National Institutes of Health (NIH) and the American Heart Association (AHA) to support their cutting-edge research. This funding includes a new three-year NIH research award to develop a computational artificial intelligence model that will accurately predict coronary microvascular disease, an early sign of heart disease in metabolic syndrome and Type 2 Diabetes, using Doppler

echocardiography. Funding also includes a new AHA grant to study how elevated levels of glucose impact the severity of congenital heart defects in infants of diabetic mothers. Lastly, the center continues to support the cardiovascular research education of trainees at all levels. These efforts are supported by an NIH-funded T32 post-doctoral training grant, along with an American Heart Association training award that supports summer research fellowships for undergraduate students.

**The Heart Center:** See page 43 for information about cardiology and cardiovascular surgery services within The Heart Center at Nationwide Children’s Hospital.

GRANTS AWARDED TO HEART CENTER  
AND CARDIOVASCULAR RESEARCH FACULTY  
JULY 1, 2018 – JUNE 30, 2019

\$3,290,050

SELECTED PUBLICATIONS

**Basu M, Garg V.** Maternal Hyperglycemia and Fetal Cardiac Development: Clinical Impact and Underlying Mechanisms. *Birth Defects Res.* 2018 Dec;110(20):1504-1516.

Hershberger RE, Givertz MM, Ho CY, Judge DP, Kantor PE, **McBride KL**, Morales A, Taylor MRG, Vatta M, Ware SM, Practice AP, Guidelines C. Genetic Evaluation of Cardiomyopathy: A Clinical Practice Resource of the American College of Medical Genetics and Genomics (ACMG). *Genetics in Medicine: Official Journal of the American College of Medical Genetics.* 2018 Sep; 20(9): 899-909.

**Lilly B**, Dammeyer K, Marosis S, McCallinhart PE, **Trask AJ**, Lowe M, Sawant D. Endothelial Cell-Induced Cytoglobin Expression in Vascular Smooth Muscle Cells Contributes to Modulation of Nitric Oxide. *Vascular Pharmacology.* 2018 Nov;1107-15.

Pierpont ME, Brueckner M, Chung WK, **Garg V**, Lacro RV, McGuire AL, Mital S, Priest JR, Pu WT, Roberts A, Ware SM, Gelb BD, Russell MW; American Heart Association Council on Cardiovascular Disease in the Young; Council on Cardiovascular and Stroke Nursing; and Council on Genomic and Precision Medicine. Genetic Basis for Congenital Heart Disease: Revisited: A Scientific Statement from the American Heart Association. *Circulation.* 2018 Nov 20;138(21):e653-e711.

Sunycz IL, McCallinhart PE, Patel KU, McDermott MR, **Trask AJ**. Defining Coronary Flow Patterns: Comprehensive Automation of Transthoracic Doppler Coronary Blood Flow. *Scientific Reports.* 2018 Nov 22;8(1):17268.

CENTER FOR CHILDHOOD CANCER AND BLOOD DISEASES

The mission of the Center for Childhood Cancer and Blood Diseases in the Abigail Wexner Research Institute at Nationwide Children’s Hospital is to transform the care of children, adolescents and young adults with cancer and blood diseases through research and clinical translation. Center investigators collaborate closely to study how cells grow, divide and function, how these basic processes are usurped to allow cancers to develop, how the body responds to developing cancers, and how this knowledge can be used to better diagnose and treat these diseases. Investigators work closely with physicians at Nationwide Children’s, as well as with national and international colleagues, to translate these findings to the patient.

FACULTY



Stephen L. Lessnick, MD, PhD  
Director

Kevin Cassidy, MD

Dawn S. Chandler, PhD

Long-Sheng Chang, PhD

Timothy P. Cripe, MD, PhD

Dean Lee, MD, PhD

Jeffrey R. Leonard, MD

Ryan Roberts, MD, PhD

Dhvanit Shah, PhD

Benjamin Z. Stanton, PhD

Ruoning Wang, PhD

Benjamin Stanton, PhD, is a new investigator in the Center for Childhood Cancer and Blood Diseases. Dr. Stanton’s research focuses on how large molecular machines organize DNA (as chromatin) in the nucleus of cells. This organization includes creating areas of “open” chromatin where DNA is generally transcribed into RNA (and ultimately translated into proteins) and “closed” chromatin where DNA is generally more compacted and associated with less gene expression. This organization also includes three-dimensional packing of the DNA into the nucleus, and the writing, reading and erasing of specific epigenetic marks on chromatin that help to determine its function. Dr. Stanton’s particular focus is on how these processes function normally in the nucleus, and how they function abnormally during cancer development, including in leukemia and sarcoma.

The theme of “nuclear function” continues to grow in the center. Stephen Lessnick, MD, PhD, director of the center, was recently awarded a significant grant from the National Institutes of Health to study the nuclear functions of cancer-causing protein EWS/FLI in Ewing sarcoma, including how EWS/FLI changes the epigenetic state of the cell to cause tumors. Dawn Chandler, PhD, has been focused on the role of RNA-splicing in health and in cancer, and her work has demonstrated that changes in the splicing pattern of certain RNAs, such as the RNA that encodes the MDM2 protein, lead to cancer formation. Ryan Roberts, MD, PhD, has brought new technology to our center in the form of single-cell RNA-seq to understand the interplay between tumor cells and normal host tissues, such as the lung, during the spread of cancer from its primary site of disease to distant metastatic sites.

**Hematology/Oncology/BMT:** See page 81 for information about the Division of Hematology, Oncology & Blood and Marrow Transplant at Nationwide Children’s Hospital.

GRANTS AWARDED TO CENTER AND  
DIVISION CLINICAL AND RESEARCH FACULTY  
JULY 1, 2018 – JUNE 30, 2019

\$15,617,978

SELECTED PUBLICATIONS

Auletta JJ, Sánchez PJ, Meyer EK, O’Donnell LC, **Cassady KA**, **Ouellette CP**, Hecht S, Diaz A, Pavlek LR, Salamon DP, Gallagher CL, Bradbury H, Wellfley SL, Magers J, Armbruster DL, Lamb MG, Nakkula RJ, Bosse K, **Lee DA**. Adjuvant Haploidentical Virus-Specific T Lymphocytes for Treatment of Disseminated Adenovirus Infection in a Premature Infant. *J Allergy Clin Immunol.* 2019 Apr 23. pii: S0091-6749(19)30524-X.

Comiskey DF Jr, Jacob AG, Sanford BL, Montes M, Goodwin AK, Steiner H, Matsa E, Tapia-Santos AS, Bebee TW, Grieves J, La Perle K, Boyaka P, **Chandler DS**. A Novel Mouse Model Of Rhabdomyosarcoma Underscores the Dichotomy of MDM2-ALT1 Function In Vivo. *Oncogene.* 2018 Jan 4;37(1):95-106.

Denton NL, Chen CY, Hutzen B, Currier MA, Scott T, Nartker B, Leddon JL, Wang PY, Srinivas R, **Cassady KA**, Goins WF, **Cripe TP**. Myelolytic Treatments Enhance Oncolytic Herpes Virotherapy in Models of Ewing Sarcoma by Modulating the Immune Microenvironment. *Mol Ther Oncolytics.* 2018 Oct 18;11:62-74.

Gross AC, Cam H, Phelps DA, Saraf AJ, Bid HK, Cam M, London CA, Winget SA, Arnold MA, Brandolini L, Mo X, Hinckley JM, Houghton PJ, **Roberts RD**. IL-6 and CXCL8 Mediate Osteosarcoma-Lung Interactions Critical to Metastasis. *JCI Insight.* 2018 Aug 23;3(16), e99791.

Theisen, ER, Miller, KR, Showpnil, IA, Taslim, C, Pishas KI, and **Lessnick, SL**. Transcriptomic Analysis Functionally Maps the Intrinsically Disordered Domain of EWS/FLI and Reveals Novel Transcriptional Dependencies for Oncogenesis. *Genes Cancer* 2019 Feb;10(1-2):21-38.

CENTER FOR CLINICAL AND TRANSLATIONAL RESEARCH

The Center for Clinical and Translational Research in the Abigail Wexner Research Institute at Nationwide Children’s Hospital is committed to improving the diagnosis, treatment and outcomes of society’s most important pediatric diseases by integrating high-caliber basic science research with innovative patient-based research.

FACULTY



**William E. Smoyer, MD, FASN**  
*Director*

- Shipra Agrawal, PhD
- M. Brian Becknell, MD, PhD
- Andrea E. Bonny, MD
- David R. Brigstock, PhD
- Christina B. Ching, MD
- Mitchell H. Grayson, MD
- Mark W. Hall, MD, FAAP, FCCM
- Bryce A. Kerlin, MD
- Kirk M. McHugh, PhD
- Jennifer A. Muszynski, MD
- Lance M. Relland, MD, PhD
- John David Spencer, MD
- Eric A. Sribnick, MD, PhD
- Rachel M. Stanley, MD, MHSA
- Rajan K. Thakkar, MD

The Center for Clinical and Translational Research promotes an environment in which patient, family, researcher and clinician work together to ensure patients are provided the latest advances in medical knowledge, interventions and therapies to improve health now and in the future.

Our center has scientists investigating several diverse areas of research. The overarching theme of our research programs is to bring new knowledge from bedside to bench and from bench to bedside to improve the lives of children. Our faculty are from three departments, one basic science department and eight subspecialties: Nephrology, Hematology/Oncology, Adolescent

Medicine, Critical Care, Urology, Pediatric Surgery, Allergy/Immunology and Emergency Medicine. Our research programs are very diverse and include innate immunity in urinary tract infections, immunoparalysis after sepsis or trauma, pathophysiology of stored RBC-induced immune suppression, novel treatments for nephrotic syndrome, pathophysiology of thrombosis, pathophysiology of bladder dysfunction in urinary tract obstruction, burn injury, abdominal sepsis, hepatic fibrosis, adolescent addiction and interventions for traumatic brain injury, mechanisms behind viral infection and allergic disease, spinal cord injuries, neonatal pain assessments and how inadequate pain control may have detrimental effects on immune function.

Our vision is to use the delivery of care to each pediatric patient as an opportunity to learn how to improve future care. We believe it is our responsibility to learn from every patient so our care for the next child will be improved.

Clinical Research Services is a core service provided within the Center for Clinical and Translational Research and is designed to be a portal through which clinical investigators can access streamlined coordination of services necessary to initiate clinical research projects, regardless of the funding source. Clinical Research Services supports all clinical research studies, providing staff and/or services to manage investigators’ studies according to good clinical practice and federal, state and institutional regulations and guidelines.

**GRANTS AWARDED**  
**JULY 1, 2018 – JUNE 30, 2019**  
\$3,369,076

**SELECTED PUBLICATIONS**

Cheung DS, Sigua JA, Simpson PM, Yan K, Hussain SA, Santoro JL, Buell EJ, Hunter DA, Rohlfing M, Patadia D, **Grayson MH**. Cysteinyl Leukotriene Receptor 1 Expression Identifies a Subset of Neutrophils During the Antiviral Response that Contributes to Postviral Atopic Airway Disease. *J Allergy Clin Immunol*. 2018 Oct;142(4):1206-1217.e5.

**Ching CB, Becknell B**. Novel Role for Androgen Signaling in Pylonephritis. *Kidney Int*. 2018 Sep;94(3):455-457.

Manos BE, Bravender TD, Harrison TM, Lange HLH, Cottrill CB, Abdel-Rasoul M, **Bonny AE**. A Pilot Randomized Controlled Trial of Omega-3 Fatty Acid Supplementation for the Treatment of Anxiety in Adolescents with Anorexia Nervosa. *Int J Eat Disord*. 2018 Dec;51(12):1367-1372.

Murtha MJ, Eichler T, Bender K, Metheny J, Li B, Schwaderer AL, Mosquera C, James C, Schwartz L, **Becknell B, Spencer JD**. Insulin Receptor Signaling Regulates Renal Collecting Duct and Intercalated Cell Antibacterial Defenses. *J Clin Invest*. 2018 Dec 3;128(12):5634-5646.

**Muszynski JA**, Nofziger R, Moore-Clingenpeel M, Greathouse K, Anglim L, Steele L, Hensley J, Hanson-Huber L, Nateri J, Ramilo O, **Hall MW**. Early Immune Function and Duration of Organ Dysfunction in Critically Ill Children with Sepsis. *Am J Respir Crit Care Med*. 2018 Aug 1;198(3):361-369.

CENTER FOR GENE THERAPY

The primary mission of the Center for Gene Therapy in the Abigail Wexner Research Institute at Nationwide Children’s Hospital is to develop novel genetically-based therapies for inherited diseases in order to ease the burden of these diseases on children and their families. This mission is pursued by a dedicated team of laboratory scientists whose work is directed toward clinical applications, and by the efforts of clinician-scientists who are tasked with bringing these therapies into clinical trials. To do this, the center works closely with the regulatory expert staff of Nationwide Children’s Drug and Device Development Services, and the Nationwide Children’s Good Manufacturing Practice Clinical Manufacturing Facility. This integrated approach allows us to accelerate the transfer of promising therapies from the bench to the bedside.

FACULTY



**Kevin M. Flanigan, MD**  
*Director*

**PRINCIPAL INVESTIGATORS**

- Scott Harper, PhD
- Linda Lowes, PhD
- Paul Martin, PhD
- Jerry R. Mendell, MD
- Kathrin Meyer, PhD
- Zarife Sahenk, MD
- Megan Waldrop, MD
- Nicolas Wein, MD

**ASSOCIATE FACULTY**

- Kim McBride, MD
- Christopher Walker, PhD

**SUPPORT STAFF**

- Kathleen Church, *Project Manager*
- Tabatha Simmons, PhD, *Project Manager*

The Center for Gene Therapy has once again had a highly productive year. Collaborative interactions among faculty continued to grow, facilitated by the NIH/NIAMS

P50-funded Center of Research Translation in Muscular Dystrophy Therapeutic Development, which focuses on rapidly moving innovative therapies toward the clinic. This year was marked by a particularly gratifying event: the approval by the FDA of a Nationwide Children’s-developed adeno-associated virus (AAV) gene therapy for the devastating disorder spinal muscular atrophy type 1. The landmark paper reporting the results of the trial, conducted by the team led by Jerry Mendell, MD, was published in the *New England Journal of Medicine* in November 2017, and the vector received FDA approval for widespread use in May 2019.

Several other clinical trials using AAV are underway, including a trial in Duchenne muscular dystrophy (DMD) patients using a miniaturized version of the gene encoding partially functional version of the missing protein (a microdystrophin gene). An alternate approach to DMD is to deliver a surrogate gene that can substitute for dystrophin function. One such gene, for which a clinical trial is underway, is the GALGT2 gene. The lab of Paul Martin, PhD, showed that systemic delivery of of GALGT2 is protective of the heart. Other ongoing trials include a novel dual-viral vector approach in limb-girdle muscular dystrophy type 2B (LGMD2B) subjects and gene transfer of gamma-sarcoglycan for LGMD type 2D. Planning is underway for a trial of viral-based exon skipping in patients with duplications of exon 2 within DMD, with an expected outcome of full-length dystrophin expression.

Other AAV therapy trials include systemic delivery of the missing gene in each of two forms of Sanfilippo syndrome – SGSH in mucopolysaccharidosis (MPS) type IIIA, and NAGLU with MPS type IIIB – with evidence of biological effects and a promising safety profile, and intrathecal delivery of the CLN3 or CLN6 genes for children with Batten disease.

One highlight of the center’s basic science efforts was the description of a novel mouse model of facioscapulohumeral muscular dystrophy (FSHD), one of

the most common forms of muscular dystrophy, which is caused by a unique and complex molecular mechanism. This year the laboratory of Scott Harper, PhD, described a new mouse model that should become the standard for research into the disease, and uses this model to work on promising therapies for FSHD.

**Neurology:** See page 105 for related information about the Section of Neurology at Nationwide Children’s.

**GRANTS AWARDED TO CENTER FOR GENE THERAPY AND NEUROLOGY CLINICAL AND RESEARCH FACULTY  
JULY 1, 2018 – JUNE 30, 2019**

\$15,622,507

**SELECTED PUBLICATIONS**

Connolly AM, Zaidman CM, Golumbek PT, Cradock MM, **Flanigan KM**, Kuntz NL, Finkel RS, McDonald CM, Iannaccone ST, Anand P, Siener CA, Florence JM, **Lowes LP**, Alfano LN, Johnson LB, Nicorici A, Nelson LL, **Mendell JR**; MDA DMD Clinical Research Network. Twice-Weekly Glucocorticosteroids in Infants and Young Boys with Duchenne Muscular Dystrophy. *Muscle Nerve*. 2019 Jun;59(6):650-657.

Giesige CR, Wallace LM, Heller KN, Eidahl JO, Saad NY, Fowler AM, Pyne NK, Al-Kharsan M, Rashnonejad A, Chermahini GA, Domire JS, Mukweyi D, Garwick-Coppens SE, Guckes SM, McLaughlin KJ, **Meyer K**, Rodino-Klapac LR, **Harper SQ**. AAV-Mediated Follistatin Gene Therapy Improves Functional Outcomes in the TIC-DUX4 Mouse Model of FSHD. *JCI Insight*. 2018 Nov 15;3(22).

**Lowes LP**, Alfano LN, Arnold WD, Shell R, Prior TW, McColly M, Lehman KJ, Church K, Sproule DM, Nagendran S, Menier M, Feltner DE, Wells C, Kissel JT, Al-Zaidy S, **Mendell J**. Impact of Age and Motor Function in a Phase 1/2A Study of Infants with SMA Type 1 Receiving Single-Dose Gene Replacement Therapy. *Pediatr Neurol*. 2019 May 13. pii: S0887-8994(19)30280-2. [Epub ahead of print]

**Mendell JR**, Chicoine LG, Al-Zaidy SA, **Sahenk Z**, Lehman K, **Lowes L**, Miller N, Alfano L, Galliers B, Lewis S, Murrey D, Peterson E, Griffin DA, Church K, Cheatham S, Cheatham J, Hogan MJ, Rodino-Klapac LR. Gene Delivery for Limb-Girdle Muscular Dystrophy Type 2D by Isolated Limb Infusion. *Hum Gene Ther*. 2019 Jul;30(7):794-801. [Epub 2019 Apr 19]

Weiss RB, Vieland VJ, Dunn DM, Kaminoh Y, **Flanigan KM**; United Dystrophinopathy Project. Long-Range Genomic Regulators of THBS1 and LTBP4 Modify Disease Severity in Duchenne Muscular Dystrophy. *Ann Neurol*. 2018 Aug;84(2):234-245.

Xu R, Jia Y, Zygmunt DA, **Martin PT**. rAAVrh74.MCK.GALGT2 Protects against Loss of Hemodynamic Function in the Aging mdx Mouse Heart. *Mol Ther*. 2019 Mar 6;27(3):636-649.

Research Institute Reports

CENTER FOR INJURY RESEARCH AND POLICY

The Center for Injury Research and Policy located in the Abigail Wexner Research Institute at Nationwide Children’s Hospital works globally to reduce injury-related pediatric death and disability. Established in 1999, the center serves as a pioneer by translating cutting-edge injury research into education, advocacy and advances in clinical care. From design changes in consumer products to new public policy, the Center for Injury Research and Policy’s influence is leading the way to a safer world.

FACULTY



**Gary A. Smith, MD, DrPH**  
*Director*

Julie C. Leonard, MD, MPH

Lara B. McKenzie, PhD, MA

Henry Xiang, MD, MPH, PhD

Jinzghen (Ginger) Yang, PhD, MPH

Motao Zhu, MD, MS, PhD

The Center for Injury Research and Policy works from local to global levels to reduce death and disability due to injuries through research, education, advocacy and advances in clinical care. The center aims to improve the scientific understanding of the epidemiology, prevention, acute treatment, rehabilitation and biomechanics of injuries. It provides leadership in the development, implementation and scientific evaluation of public policy regarding control of injuries.

The center has been awarded designation as an Injury Control Research Center (ICRC) by the Centers for Disease Control and Prevention since 2008. This designation was recently renewed through 2024. CIRP is one of only 9 centers nationally with this designation, and it is the only ICRC focused on pediatric injury research and prevention.

The multidisciplinary Center for Pediatric Trauma Research at Nationwide Children’s, led by Henry Xiang, MD, MPH, PhD, conducts evidence-based trauma care and policy research to achieve the best outcomes for pediatric trauma patients. Focusing on pre-hospital emergency medical services, acute treatment and

rehabilitation care, researchers associated with the Center for Pediatric Trauma Research help promote the Center for Injury Research and Policy’s mission.

The Make Safe Happen® app helps parents and caregivers overcome a perceived “overwhelming amount of advice” to make their homes safer for children. Developed by a team led by Lara McKenzie, PhD, MA, it addresses the difficulties parents and caregivers face when trying to keep their homes safe for their children. It provides parents and caregivers with room-by-room safety checklists, and links to purchase recommended safety products. Recognizing that not all homes are the same, the app offers different solutions for different situations. Users can set reminders for activities such as monthly smoke alarm testing or annual replacement of smoke alarm batteries. In 2016, a Home Fire Drill feature was added so families can choose a safe meeting place and practice getting out in less than two minutes. The Nationwide Make Safe Happen campaign for Home Fire Drill Day was the winner of the 2017 Halo Award in the category of Best Message-Focused Campaign. The free app is available for iOS and Android systems and has been downloaded more than 60,000 times since early 2015.

**GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019**

\$3,556,477

**SELECTED PUBLICATIONS**

Hodges, NL, Spiller HA, Casavant MJ, Chounthirath T, **Smith GA**. Non-Health Care Facility Medication Errors Resulting in Serious Medical Outcomes. *Clin Toxicol*. 2018;56(1):43-50.

Lever K, Peng J, Lundine JP, Caupp S, Wheeler KK, Sribnick EA, and **Xiang H**. Attending Follow-up Appointments after Pediatric Traumatic Brain Injury: Caregiver-Perceived Barriers and Facilitators. *J Head Trauma Rehabil*. 2019;34(2):E21-E34.

Li L, Shults RA, Andridge RR, Yellman MA, **Xiang H**, **Zhu M**. Texting/Emailing While Driving Among High School Students in 35 States, United States, 2015. *Journal of Adolescent Health*. 2018;63(6):701-708.

Orsagh-Yentis D, McAdams RJ, Roberts KJ, **McKenzie LB**. Foreign-Body Ingestions of Young Children Treated in US Emergency Departments: 1995-2015. *Pediatrics*. 2019 May;143(5).

**Yang JZ**, Yeates KO, Sullivan L, Singichetti B, Newton A, Xun PC, Taylor HG, MacDonald J, Pommering T, Tiso M, Cohen DM, Huang YG, Patterson J, Lu ZL. Rest Evaluation for Active Concussion Treatment (ReAct) Protocol: A Prospective Cohort Study of Levels of Physical and Cognitive Rest after Youth Sports-Related Concussion. *BMJ Open*. 2019;9(4):e028386.

CENTER FOR INNOVATION IN PEDIATRIC PRACTICE

The mission of the Center for Innovation in Pediatric Practice in the Abigail Wexner Research Institute at Nationwide Children’s Hospital is to improve the health of children and their families through research on novel methods for delivering health services in the community. These methods include new computer and information technologies, as well as new statistical, therapeutic and communication techniques. Investigators at the center develop and test new health service delivery and payment systems in partnership with pediatricians, payers and Nationwide Children’s to improve quality and equity of care – especially for those patients most at risk.

FACULTY



Deena J. Chisolm, PhD  
Director

- Jeffrey A. Bridge, PhD
- Jennifer N. Cooper, PhD
- Susan E. Creary, MD, MSc
- Katherine J. Deans, MD, MHSc
- Jennifer L. Dotson, MD, MPH
- Elizabeth A. Erwin, MD
- Laura C. Hart, MD
- Amrik S. Khalsa, MD
- Kelly J. Kelleher, MD, MPH
- Alex R. Kemper, MD
- Daryl J. McLeod, MD
- Peter C. Minneci, MD, MHSc
- Sarah H. O’Brien, MD, MSc
- Arielle H. Sheftall, PhD

In 2018, the Center for Innovation in Pediatric Practice celebrated its founding director, Kelly J. Kelleher, MD, MPH, as he transitioned out of center leadership to focus on research and service at the intersection of community and health. As director, Dr. Kelleher oversaw the center’s early expansion and established its national reputation as a leader in health care quality, delivery and policy research. He continues as an active member of the center faculty and as the vice president of Community Health for Nationwide Children’s. Deena Chisolm, PhD, a member of the center faculty since its inception, has stepped into the roles of director and vice president of Health Services Research. As a

health services researcher and epidemiologist, Dr. Chisolm is excited to build upon the center’s rich history.

The Center for Innovation in Pediatric Practice faculty continue to explore relationships among clinical practice, health care policy, socioeconomic conditions and health for socially and medically complex children and their families. Newly awarded National Institutes of Health-funded research projects explore effects of Medicaid expansion on disparities in trauma care and outcomes (Cooper, NIMHD R01), development of a comprehensive program to increase sickle cell trait knowledge and awareness among parents of infants identified by newborn screening (Creary, NHLBI R03), and development of primary care screening algorithms for early identification of young women with bleeding disorders (O’Brien, NHLBI U34). Additionally, Dr. Chisolm joined with faculty of The Ohio State University main campus and around the state in the \$65.9 million Optimizing HEALing in Ohio Communities award (NIMH UM1) designed to significantly reduce statewide opioid mortality.

High impact publications explored changes in adolescent suicide rates in the wake of the “13 Reasons Why” Netflix series (Bridge, *J Am Acad Child Adolesc Psychiatry*), housing as an approach to healing “sick” neighborhoods (Kelleher, *Pediatrics*), and novel approaches to patient activation (Minneci, *JAMA Open Network*).

GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019  
\$2,953,920

SELECTED PUBLICATIONS

Bridge, JA, Greenhouse JB, Ruch D, Stevens J, Ackerman J, Sheftall AH, Horowitz LM, Kelleher KJ and Campo JV. Association Between the Release of Netflix’s 13 Reasons Why and Suicide Rates in the United States: An Interrupted Times Series Analysis. *J Am Acad Child Adolesc Psychiatry*. 2019 Apr 28. pii: S0890-8567(19)30288-6.

Chisolm, DJ., Gleeson SP, Kelleher KJ, Domino ME, Alexy E, Xu WY, Song PH. Implications of Eligibility Category Churn for Pediatric Payment in Medicaid. *Am J Manag Care*. 2019 Mar;25(3):114-118.

Kelleher KJ, Reece J, Sandel M. The Healthy Neighborhood, Healthy Families Initiative. *Pediatrics*. 2018 Sep;142(3). pii: e20180261.

Minneci, PC, Cooper JN, Leonhart K, Nacion K, Sulkowski J, Porter K, Wei L, Deans KJ. Effects of a Patient Activation Tool on Decision Making Between Surgery and Nonoperative Management for Pediatric Appendicitis: A Randomized Clinical Trial. *JAMA Network Open*. 2019;2(6):e195009.

O’Brien, SH., Saini S, Ziegler H, Christian-Rancy M, Ahuja S, Hege K, Savelli S, Vesely SK. An Open-Label, Single-Arm, Efficacy Study of Tranexamic Acid in Adolescents with Heavy Menstrual Bleeding. *Journal of Pediatric and Adolescent Gynecology*. 2019;32(3):305-311.

CENTER FOR MICROBIAL PATHOGENESIS

The emphasis of the Center for Microbial Pathogenesis in the Abigail Wexner Research Institute at Nationwide Children’s Hospital is to develop a greater understanding of the molecular mechanisms by which microorganisms cause disease, as well as how the host responds to these disease states. Faculty within the center identify virulence mechanisms and define host response patterns, with the overall objective of elucidating a detailed description of the structure, function and control of biological systems in health and disease via use of molecular and cellular, as well as genomic, proteomic, transcriptomic and metabolomic approaches. This information is then translated into novel diagnostics, improved therapeutics and more broadly effective vaccines.

FACULTY



Lauren O. Bakaletz, PhD  
Director

- Michael T. Bailey, PhD
- Jennifer L. Edwards, PhD
- Steven D. Goodman, PhD
- John S. Gunn, PhD
- Sheryl S. Justice, PhD
- Samantha J. King, PhD
- Benjamin T. Kopp, MD
- Ross M. Maltz, MD
- Kevin M. Mason, PhD
- Christopher P. Montgomery, MD
- Santiago Partida-Sanchez, PhD
- Chack-Yung Yu, PhD

Michael Bailey, PhD, presented the keynote address, “Prebiotics and probiotics attenuate the exacerbating effects of stress on intestinal inflammation,” at the annual meeting of the PsychoNeuroImmunology Research Society. Lauren Bakaletz, PhD, was invited to speak as part of the National Institutes of Health’s Directors Wednesday Afternoon Lecture Series – the NIH’s most visible and prestigious lecture series. Jennifer Edwards, PhD, accepted an invitation to serve as a permanent member of the Pregnancy and Neonatology Study Section. Steve Goodman, PhD, director of the Research Affinity Group in Oral and GI Microbiology,

recruited a new tenure-track faculty member – John Gunn, PhD, a noted GI microbiologist. Dr. Gunn was awarded a new R21 from NIAID entitled “Regulation of *Francisella* virulence by sRNAs.” Sheryl Justice, PhD, served as co-host/co-organizer of the Third Clinical and Scientific Advances in Urinary Tract Infections International Conference. Samantha King, PhD, was invited to present work on her laboratory’s discovery of a novel monolateral fibrillar adhesin at the inaugural Streptococcal Biology Gordon Research Conference. Ben Kopp, MD, received the American Thoracic Society Assembly on Pediatrics Scientific Abstract Award for work on how CFTR modulators alter immune function in persons with cystic fibrosis. The laboratory of Ross Maltz, MD, generated preliminary data that shows restraint stressor exposure significantly worsens the degree of colitis in a chronic murine model of colitis. Kevin Mason, PhD, was awarded a new R01 entitled “A Novel Multifunctional Role of Diverse Substrate Binding and Import by the *Haemophilus* Sap Transporter.” The laboratory of Christopher Montgomery, MD, identified a “signature” of protective immunity in mouse models of *S. aureus* skin infection and pneumonia to develop an experimental vaccine. Santiago Partida-Sanchez, PhD, was awarded a new Cystic Fibrosis Foundation grant, “CFTR Controls Calcium Signaling and Inflammatory Functions of Neutrophils.” Chack-Yung Yu, PhD, was awarded new R01 from the NIH to investigate the genetic diversity of complement genes and proteins in human systemic lupus erythematosus from multiple racial groups.

**Infectious Diseases:** See page 89 for information about the Division of Infectious Diseases at Nationwide Children’s.

GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019  
\$7,322,665

.....

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Hardison RL, Harrison A, Wallace RM, Heimlich DR, O'Bryan ME, Sebra RP, Pinkett HW, **Justice SS, Mason KM**. Microevolution in Response to Transient Heme-Iron Restriction Enhances Intracellular Bacterial Community Development and Persistence. *PLoS Pathogens*. Oct 2018;14(10):e1007355.

**Kopp BT**, Thompson R, Kim J, Konstan R, Diaz A, Smith B, Shrestha C, Rogers LK, Hayes D Jr, Tumin D, Woodley FW, Ramilo O, Sanders DB, Groner JA, Mejias A. Secondhand Smoke Alters Arachidonic Acid Metabolism and Inflammation in Infants and Children with Cystic Fibrosis. *Thorax*. Mar 2019;74(3):237-246.

Mokrzan EM, Novotny LA, Brockman KL, **Bakaletz LO**. Antibodies Against the Majority Subunit (PilA) of the Type IV Pilus of Nontypeable Haemophilus influenzae Disperse Moraxella catarrhalis from a Dual-Species Biofilm. *MBio*. Dec 2018;9(6):e02423-18.

Robledo-Avila F, Ruiz-Rosado JD, Brockman KL, **Kopp B**, Amer A, McCoy K, **Bakaletz LO, Partida-Sánchez S**. Dysregulated Calcium Homeostasis in Cystic Fibrosis Neutrophils Leads to Deficient Antimicrobial Responses. *Journal of Immunology*. Oct 2018;201(7):2016-2027.

Savelli SL, Roubey RAS, Kitzmiller KJ, Zhou D, Nagaraja HN, Mulvihill E, Barbar-Smiley F, Ardoin SP, Wu YL, and **Yu CY**. Opposite Profiles of Complement in Antiphospholipid Syndrome (APS) and Systemic Lupus Erythematosus (SLE) among Patients with Antiphospholipid Antibodies. *Frontiers in Immunology*. May 2019;10:885.

Research Institute Reports

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**CENTER FOR PERINATAL RESEARCH**

The Center for Perinatal Research in the Abigail Wexner Research Institute at Nationwide Children’s has a unique, integrative approach to prematurity research that extends from before birth to long after. In close collaboration with the Section of Neonatology, the mission of faculty in the Center for Perinatal Research is to conduct innovative basic, translational and clinical research focused on prevention of preterm birth and improvement of prematurity-related outcomes.

**FACULTY**



**Lynette K. Rogers, PhD**  
*Interim Director*

- Carl H. Backes, MD
- Kristen Benninger, MD
- Gail E. Besner, MD
- Rodney Britt, PhD
- Bernadette Chen, MD
- Jenn Gonya, PhD
- Mark Hester, PhD
- Sudarshan R. Jadcherla, MD
- Mark A. Klebanoff, MD, MPH
- Yusen Liu, PhD
- Nathalie Maitre, MD, PhD
- Mary Lauren Neel, MD
- Leif D. Nelin, MD
- Susan Reynolds, PhD
- Pablo Sanchez, MD
- Jonathan L. Slaughter, MD, MPH
- Maria M. Talavera, DO
- Jennifer K. Trittman, MD, MPH

Complications from preterm birth are the leading cause of infant mortality and morbidity. The investigators in the Center for Perinatal Research focus on prevention of prematurity and understanding and treating the complications that occur in as a result of preterm birth. Our diverse team encompasses expertise in both basic science and clinical investigations. The basic science group explores the mechanisms involved in development of chronic lung disease such as bronchopulmonary dysplasia (Rogers), pulmonary hypertension (Nelin, Chen, Trittman) and asthma (Britt), infection and inflammation (Liu), use of stem cell therapy in diagnosing and treating

neuro-developmental disorders (Hester) and cystic fibrosis (Reynolds), and GI disorders such as necrotizing enterocolitis (Besner, Talavera). Our diverse clinical research delves into prematurity prevention and maternal health (Klebanoff), infant feeding disorders (Jadcherla), infectious diseases (Sanchez), comparative effectiveness in pharmacoepidemiology (Slaughter), cardiopulmonary deficiencies (Backes), and development of novel treatments of approaches for improving outcomes in infants with neurological disorders or injuries (Maitre, Neel, Benninger). The center received more than \$1.8 million in new prime NIH funding this year with Drs. Backes and Slaughter receiving their first R01 and Dr. Britt receiving an R00. Collectively, the Center for Perinatal Research brought in \$5.8 million in NIH funding and \$600,000 in foundation and industry grants for the purpose of research. The center also is home to one site of the sites Neonatal Research Network, a consortium of 17 institutions from across the United States funded by the NIH to conduct randomized controlled trials of promising therapies and observational studies to advance care of highest risk newborns. In addition, our accomplished investigators have filed multiple patents for devices to improve infant outcomes.

**Neonatology:** See page 95 for information about Neonatology, home to one of the largest networks of clinical neonatal care in the United States.

**GRANTS AWARDED TO NEONATOLOGY CLINICAL AND RESEARCH FACULTY JULY 1, 2018 – JUNE 30, 2019**

\$6,540,917

**SELECTED PUBLICATIONS**

Abdi HH, **Maitre N, Benninger K, Hester M, Slaughter J**. Gabapentin Use for Hospitalized Neonates. *Pediatr Neurol*. 2019 Aug;97:64-70.

Heyob KM, Mieth S, Sugar SS, Graf AE, Lallier SW, **Britt RD Jr, Rogers LK**. Maternal High-Fat Diet Alters Lung Development and Function in the Offspring. *Am J Physiol Lung Cell Mol Physiol*. [Epub 2019 May 1]

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Nealon E, Rivera B, **Cua C, Ball M**, Stiver C, Boe B, **Slaughter J**, Chisolm J, Smith C, Cooper J, Armstrong A, Berman D, **Backes C**. Follow-up after Percutaneous Patent Ductus Arteriosus Occlusion in Lower Weight Infants. *J Pediatr*. 2019 Jun 28. pii: S0022-3476(19)30687-0.

CENTER FOR REGENERATIVE MEDICINE

The Center for Regenerative Medicine in the Abigail Wexner Research Institute at Nationwide Children’s Hospital applies the principles of engineering, computer modeling and life sciences to develop biological substitutes to restore or improve tissue function. Regenerative medicine is the process of creating living, functional tissues to repair or replace tissue or organ functions, lost primarily due to congenital defects or disease. The center currently focuses on producing blood vessels, valvular patches and heart valves, offering a positive impact on children with congenital heart disease. Other areas of regenerative medicine research in progress include intestinal and tracheal replacement.

FACULTY



Christopher K. Breuer, MD  
Director

Tendy Chiang, MD  
Toshiharu Shinoka, MD, PhD  
Mitchel R Stacy, PhD

Medical advances have made it possible to save more patients from life-threatening injuries, diseases and congenital conditions. However, after the onset of these conditions, the damage is occasionally life-long. Often, symptoms can be treated with success, but the underlying tissue or organ damage remains unhealed and can cause further complications over time. To develop new clinical applications that address the unmet needs of these patients, the Abigail Wexner Research Institute at Nationwide Children’s established the Center for Regenerative Medicine in 2017.

Center for Regenerative Medicine clinicians and researchers, led by Christopher Breuer, MD, are creating biological vessels and tracheas, identifying tissue progenitor cells, and developing ways to enhance blood vessel repair and growth. To further diversify the centers research strengths, we will recruit four principal investigators over the next three years.

Our vision is to pioneer new approaches in tissue regeneration and to develop next-generation reparative solutions. Further, we believe it is our responsibility to

learn from every patient so our care for the next child will be improved.

This has been an exciting year for the center. Not only have we made significant progress on our NIH funded research, we have fostered collaborations with outside sponsors to help develop the next generation of tissue engineered blood vessels. With this new knowledge, we are targeting 2020 to start the second phase of our human clinical trial.

Ultimately, this comprehensive approach means that the Center for Regenerative Medicine has the ability to turn promising laboratory discoveries into proven treatments and make them available to patients.

GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019

\$6,879,122

SELECTED PUBLICATIONS

Ruiz-Rosado JD, Lee YU, Mahler N, Yi T, Robledo-Avila F, Martinez-Saucedo D, Lee AY, Shoji T, Heuer E, Yates AR, Pober JS, **Shinoka T**, Partida-Sanchez S, **Breuer CK**. Angiotensin II Receptor I Blockade Prevents Stenosis of Tissue Engineered Vascular Grafts. *FASEB J*. 2018 Jun 15;6201800458.

**Stacy MR**, Best CA, Maxfield MW, Qiu M, Naito Y, Kurobe H, Mahler N, Rocco KA, Sinusas AJ, **Shinoka T**, Sampath S, **Breuer CK**. Magnetic Resonance Imaging of Shear Stress and Wall Thickness in Tissue-Engineered Vascular Grafts. *Tissue Eng Part C Methods*. 2018 Aug;24(8):465-473.

Szafron JM, B Ramachandra A, **Breuer CK**, Marsden AL, Humphrey JD. Optimization of Tissue Engineered Vascular Graft Design Using Computational Modeling. *Tissue Eng Part C Methods*. 2019 Jun 20.

Wiet MG, Dharmadhikari S, White A, Reynolds SD, Johnson J, **Breuer CK**, **Chiang T**. Seeding and Implantation of a Biosynthetic Tissue-engineered Tracheal Graft in a Mouse Model. *J Vis Exp*. 2019 Apr 1;(146).

CENTER FOR VACCINES AND IMMUNITY

The Center for Vaccines and Immunity in the Abigail Wexner Research Institute at Nationwide Children’s Hospital has a single purpose: to improve the health of children through fundamental and applied research leading to a new generation of safe, protective vaccines against infection, cancer and allergy.

FACULTY



Chris Walker, PhD  
Director

Zongdi Feng, PhD  
Jonathan Honegger, MD  
Amit Kapoor, PhD  
Asuncion Mejias, MD, PhD, MSCS  
Mark Peeples, PhD  
Octavio Ramilo, MD  
Masako Shimamura, MD

Zhaohui Xu, PhD

Nine investigators in the Center for Vaccines and Immunity study viral diseases of childhood. The respiratory syncytial virus (RSV) is the leading cause of hospitalization for young children. Over the past year, a team of center investigators (Mejias, Ramilo, Peeples) made notable advances in RSV vaccine design and our understanding of factors contributing to the severity of airway disease. A group of center researchers (Feng, Kapoor, Honegger, and Walker) study hepatitis virus infections. The hepatitis C virus (HCV) that causes a persistent life-long infection is of particular concern as it is transmitted to children from mothers at birth, and by injection drug use during adolescence. Dr. Kapoor made significant progress towards a small animal model of HCV infection. This model will almost certainly facilitate studies of protective immunity against HCV and how it can be reproduced by vaccination. Of note, Dr. Feng who studies hepatitis virus infection

was awarded the prestigious Ann Palmenberg Young Investigator Prize by the American Society for Virology for his significant contributions to the field of virology and exceptional future promise. Cytomegalovirus (CMV) is a leading cause of hearing loss in very young children and also a significant medical problem in those with compromised immunity. Dr. Shimamura studies rejection of transplanted kidneys caused by CMV infection. Her new research provides insight into immune responses that contribute to rejection of transplanted kidneys in CMV infected patients with compromised immunity. Finally, The center welcomed its newest faculty member this year. Dr. Xu moved from the University of Texas Southwestern Medical Center. He brings a wealth of experience in bioinformatic analysis of how human genes respond to virus infection, and their role in providing immunity and protecting against severe disease.

**Infectious Diseases:** See page 89 for information about the Division of Infectious Diseases at Nationwide Children’s.

GRANTS AWARDED  
JULY 1, 2018 – JUNE 30, 2019

\$6,842,926

SELECTED PUBLICATIONS

Diaz-Diaz A, Garcia-Maurino C, Jordan-Villegas A, Naples J, **Ramilo O**, **Mejias A**. Viral Bacterial Interactions in Children: Impact on Clinical Outcomes. *Pediatr Infect Dis J*. 2019 Jun;38(6S Suppl 1):S14-S19.

Hardage AS, Murthy S, Kumar A, Trivedi S, Dravid P, Sharma H, **Walker CM**, **Kapoor A**. Vaccination to Prevent T Cell Subversion Can Protect Against Persistent Hepacivirus Infection. *Nat Commun*. 2019 Mar 7;10(1):1113.

Hicks SN, Chaiwatpongsakorn S, Costello HM, McLellan JS, Ray W, **Peeples ME**. Five Residues in the Apical Loop of the Respiratory Syncytial Virus Fusion Protein F2 Subunit Are Critical for Its Fusion Activity. *J Virol*. 2018 Jul 17;92(15). pii: e00621-18.

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Trivedi S, Murthy S, Sharma H, Hartlage AS, Kumar A, Gadi SV, Simmonds P, Chauhan LV, Scheel TKH, Billerbeck E, Burbelo PD, Rice CM, Lipkin WI, Vandegrift K, Cullen JM, **Kapoor A**. Viral Persistence, Liver Disease, and Host Response in a Hepatitis C-like Virus Rat Model. *Hepatology*. 2018 Aug;68(2):435-448.

STEVE AND CINDY RASMUSSEN INSTITUTE FOR GENOMIC MEDICINE

The Steve and Cindy Rasmussen Institute for Genomic Medicine at Nationwide Children’s Hospital is passionate about improving outcomes for our patients with genetic disorders, cancer and undiagnosed disease. Since its inception in 2016, the mission of the institute is to build a seamless continuum between research, clinical testing and patient care. The institute combines robust clinical diagnostics, leading-edge research and development, and high-performance computing to enable precision genomic medicine. The institute also emphasizes educational opportunities for care providers and all levels of students, encouraging their training as a means to make genome-based results accessible and meaningful to the patients and families we serve.

FACULTY



**Richard K. Wilson, PhD**  
*Executive Director*



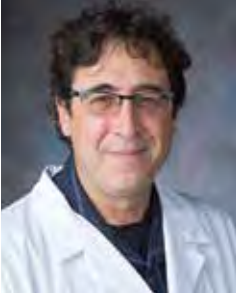
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RESEARCH FELLOWS

Stephanie D. LaHaye, PhD  
Katherine E. Miller, PhD  
Blythe S. Moreland, PhD  
Kathleen M. Schieffer, PhD, MLS(ASCP)

In 2018, the Steve and Cindy Rasmussen Institute for Genomic Medicine launched a comprehensive protocol studying the genomes of children with cancer and hematologic disease. With a focus on rare, relapsed or treatment-refractory cancers, we can identify new treatment options, potentially leading to improved outcomes. All pertinent research results are confirmed under CAP/CLIA standards and communicated to our oncology providers to inform patient management, including prognostication, diagnosis and eligibility for targeted therapeutics and clinical trials. To date, we have studied more than 100 pediatric cancer patients on this protocol.

Similarly, when pediatric patients display treatment refractory epilepsy, DNA from the affected brain tissue removed by surgery for curative intent can be evaluated by highly sensitive exome sequencing to detect mosaic

genetic variation associated with disease. These results inform diagnosis, treatment and management options. Importantly, these results have dual benefit: They better inform patients and parents about the root cause of the seizures, and they fuel additional research into how these altered genes lead to epilepsy. This is just one example of the virtuous cycle of discovery leading to treatment leading to discovery that fuels advances in our understanding of genetic diseases and their optimal treatment.

In 2018, the institute launched several new programs in genomic medicine, including:

- A microbiome research platform utilizing novel laboratory and computational approaches to assess the role of microbial communities in pediatric disease
- An exploratory program to provide rapid turnaround, whole genome sequencing-based diagnosis of patients in our neonatal intensive care unit who exhibit signs of genetically linked difficulties
- Initial discussions to apply the basic genomic discoveries around autism and psychiatric genetics of bipolar disease and suicidality/depression in families who are being treated in the new Big Lots Behavioral Health Pavilion

For children with rare or undiagnosed diseases, genomic testing often can provide additional resolution of the genetic causes, information relevant to reproductive decisions, and new treatment directions. Since early 2017, the institute has performed clinical exome sequencing to identify alterations in the protein-coding regions (“exons”) of all human genes. This testing has elucidated a genetic diagnosis for greater than one-third of families. For patients in whom this test does not reveal a diagnostic answer, enrollment in the institute’s Rare Disease Genomics Study examines the genome more broadly for genetic clues underlying their disease. Clinical genetic testing was further expanded in 2019 to include Fragile X testing of a genetic locus associated with intellectual disability and developmental delays.

The Big Data nature of genome-based clinical tests and research studies requires state-of-the-art cloud computing and bioinformatics pipelines to rapidly analyze and interpret the billions of data points from each patient’s genome. Our Computational Genomics Group provides accurate and timely analysis of the complex genomic data required to move Nationwide Children’s into the era of

precision medicine. We are advancing the understanding of the molecular underpinnings of genetic disease through the development of novel computational tools and the application of big data technologies. By combining novel laboratory methods, state-of-the-art bioinformatics solutions and machine learning technologies, we are driven to create a future where no child with genetic disease goes undiagnosed and every child with cancer receives optimal treatment based upon their genomic profile.

**GRANTS AWARDED**  
**JULY 1, 2018 – JUNE 30, 2019**  
\$1,665,085

**SELECTED PUBLICATIONS**

Audano PA, Sulovari A, Graves-Lindsay TA, Cantilieri S, Sorensen M, Welch AE, Dougherty ML, Nelson BJ, Shah A, Dutcher SK, Warren WC, **Magrini V, McGrath SD, Li Yi, Wilson RK, Eichler EE.** Characterizing the Major Structural Variant Alleles of the Human Genome. *Cell*. 2019 Jan;176(3):663-675.

**Koboldt DC,** Kastury RD, Waldrop MA, **Kelly BJ, Mosher TM,** McLaughlin H, **Corsmeier D,** Slaughter JL, Flanigan KM, McBride KL, Mehta L, **Wilson RK, White P.** In-Frame De Novo Mutation in BICD2 in Two Patients with Muscular Atrophy and Arthrogryposis. *Cold Spring Harb Mol Case Stud*. 2018 Oct 1;4(5).

Roberts KG, **Reshmi SC,** Harvey RC, Chen IM, Patel K, **Stonerock E,** Jenkins H, Dai Y, Valentine M, Gu Z, Zhao Y, Zhang J, Payne-Turner D, Devidas M, Heerema NA, Carroll AJ, Raetz EA, Borowitz MJ, Wood BL, Mattano LA Jr, Maloney KW, Carroll WL, Loh ML, Willman CL, **Gastier-Foster JM,** Mullighan CG, Hunger SP. Genomic and Outcome Analysis of Ph-Like ALL in NCI Standard-Risk Patients: A Report from the Children's Oncology Group. *Blood*. 2018 Aug;132(8):815-824.

**Schieffer KM,** Varga E, **Miller KE,** Agarwal V, **Koboldt DC, Brennan P, Kelly B, Dave-Wala A,** Pierson CR, Finlay JL, AbdelBaki MS, **White P, Magrini V, Wilson RK, Mardis ER, Cottrell CE.** Expanding the Clinical History Associated with Syndromic Klippel-Feil: A Unique Case of Comorbidity with Medulloblastoma. *Eur J Med Genet*. 2019;62(8):103701. [Epub 2019 Jun 10]

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**PediatricsNationwide.org** is an online publication providing articles on global pediatric issues, clinical programs, professional commentaries and novel research.



# Acknowledgements

---

## LEADERSHIP

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Children's Hospital  
Chair, Department of Pediatrics,  
The Ohio State University College of Medicine*

### Richard J. Brilli, MD

*Chief Medical Officer, Nationwide Children's Hospital  
Professor of Pediatrics, Department of Pediatrics,  
The Ohio State University College of Medicine*

### Oluyinka Olutoye, MD, PhD

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The Ohio State University College of Medicine*

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*Senior Director, Communication and Content Strategy*

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### Jeb Phillips

*Managing Editor, Executive Communication*

### Abbie Roth

*Managing Editor, Science Communication*

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