Pediatric Insights

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An Update From the Division of Pediatric Urology

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UPMC CHILDREN'S HOSPITAL OF PITTSBURGH

New Research on POCUS and Pyeloplasty

UPMC Children's Hospital of Pittsburgh has one of the most extensive point-of-care ultrasound (POCUS) programs in the United States. Begun in 2015, the hospital-wide POCUS program encompasses 14 subspecialties. The Division of Pediatric Urology is one of the 14 subspecialties taking part in the program and has an extensive patient data history on its use that is being used for ongoing research projects.

One such project is an investigation of the use of POCUS in relation to follow-up care for cases of pyeloplasty for the treatment of uretero-pelvic junction obstruction (UPJO) anomalies.

Second-year pediatric urology fellow Jeffrey Villanueva, MD, along with his mentor Glenn M. Cannon, MD, division chief, have been investigating the efficacy and safety of POCUS for follow-up diagnostics in comparison to similar ultrasound procedures performed in the radiology department.

"Our goal is to see if our follow-up ultrasound imaging is efficient and cost-effective, that safety of the imaging is similar to those done in the radiology department, and that patient satisfaction is high," says Dr. Villanueva.

Performing the ultrasound scans in the clinic as opposed to radiology can cut down on the amount of time patients need to spend in the hospital and clinic.

The current research project is examining a small case series of 57 patients who have had a prior pyeloplasty for an UPJO. This series of patients have all had three to four clinic visits and follow-up ultrasounds postsurgery.

"We expect to have our preliminary results written up and submitted as an abstract to the next American Urological Association annual meeting, and then ultimately submitted for a peer-review publication describing our safety findings and any patient-centered benefits," says Dr. Villanueva.

More About Dr. Villanueva

Jeffrey Villanueva, MD, is a second-year pediatric urology fellow and junior clinical instructor at the UPMC Children's Hospital of Pittsburgh. A graduate of the University of Massachusetts Medical School, Dr. Villanueva completed his urology residency at the Medstar Georgetown University Hospital before arriving at UPMC Children's for his fellowship training. Dr. Villanueva has a special interest in minimally invasive procedures, as well as the medical and surgical management of children with neurogenic bladder.

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A Focused Approach to CAUTI Rate Reductions

Urinary tract infections (UTIs) are one of the most common types of hospital-acquired infections. Upwards of 75 to 80 percent of all hospital-acquired UTIs are a direct result of Foley catheter use. Catheter-associated urinary tract infections (CAUTI) can lead to increases in morbidity, length-of-stay, treatment costs, and other complications.

Over the last three years, a multidisciplinary team at UPMC Children's Hospital of Pittsburgh has developed and implemented a focused approach to CAUTI rate reductions. Since the program's inception, CAUTI rates at UPMC Children's have been reduced by more than 50 percent through a number of initiatives. Furthermore, the total number of Foley catheter days across the hospital has been cut by nearly 66 percent during the same three-year period.

"These successes across the hospital and its various care units are a direct result of the collaborative effort we developed between nursing leadership, pediatric urology, patient quality and safety, and specifically our partners in the intensive care units where the necessity of Foley catheter use is particularly high," says **Glenn M. Cannon, MD**, chief of the Division of Pediatric Urology.

A New Committee and Outside Assessment Lead the Way to Reform Catheter Practices

In 2017, **Lindsay Montoya, MPH, CIC**, a senior infection control preventionist in the Quality Services Department at UPMC Children's, worked to reconstitute a committee to tackle CAUTI rates across the hospital. One of the first steps in the process after reforming the multidisciplinary committee was an outside assessment by the hospital's catheter provider that looked at various practices and procedures to help identify areas that could be targeted for some intervention or process improvement.

"The assessment was very enlightening. It showed us two big areas that we needed to address. The first was that our Foley catheter practices and steps in place at the time lacked adherence. The second was that we realized we were using older catheter technologies and that we could upgrade to a newer, closed system that would help cut down on infection rates," says Ms. Montoya.

Later in 2017, new training was implemented at the same time a change was made to a closed Foley system, and it was timed such that it coincided with more robust annual competencies for nursing staff.

"Closed systems are safer for patients since there is much less manipulation to the catheter system once it's been sterilely inserted," says Ms. Montoya.

Rewriting the Book on Catheter Policy

Coinciding with these initial first changes, Foley catheter policy for the hospital was largely rewritten and expanded in a more step-wise, instructional manner. While this was done at the same time as the change to the new technology, other changes were made to the electronic medical record to facilitate charting for nursing staff so they could more easily find and notate the daily care and even daily necessity for the catheter.

This latter point speaks to what was put in place to end Foley catheter use when it is no longer necessary: a nurse-driven removal protocol.

"While the order for a Foley is always going to be physician-driven, we assessed the ability for our hospital to implement a nurse-driven removal protocol and determined that with the proper training and education, it would be a viable option. Assuming the patient meets all the criteria of the protocol, the nursing staff can discontinue catheter use without the need for direct permission from the physician," says Ms. Montoya.

Changing the Maintenance Bundle and Audit

Ms. Montoya indicates that one of the initiatives in the ongoing CAUTI fight launched in 2018 may have had the most significant impact on CAUTI rates to date: changing the maintenance bundle and audits for Foley use.

"We went from a three-point checklist to one that now incorporates 11 specific points in the maintenance of Foley catheters. The expanded checks include steps and procedures such as documenting cleaning, notes about why the catheter was in place, making sure it was necessary every day, and other areas," says Ms. Montoya.

Bag and line placement, such as their being off of the floor, lines secured to the patient for safety and comfort, intact seal present are some of the other aspects of the daily Foley audit now in place at UPMC Children's.

One impact over and above the reduction of CAUTI rates of these initiatives has been a reduction in the total number of Foley days across the hospital. It makes sense to assume

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About the Division of Pediatric Urology

The Division of Pediatric Urology offers diagnostic evaluation and surgical treatment for children with genitourinary disorders, including ureteropelvic junction obstructions, vesicoureteral reflux, hydronephrosis, and other conditions. The Division supports robust clinical and research programs, as well as offering an accredited two-year fellowship program featuring an active basic science research laboratory experience.

Our Division is a national leader in providing minimally invasive urologic surgical options for an array of urological conditions. Reconstructive and extirpative techniques can be accomplished laparoscopically, robotically, and endoscopically. Common conditions treated by these modalities include UPJO, duplication abnormalities, reflux disease, and complex stone disease.

Along with our nephrology and nutrition colleagues, we are one of the few pediatric urology divisions in the country that offers a multidisciplinary approach to the treatment of pediatric stone disease.

Disorders of sex development (DSD), formerly termed "intersex conditions," often require complex surgical reconstruction in addition to input from endocrinologists and psychiatrists.

UPMC Children's Hospital of Pittsburgh is one of the few pediatric hospitals offering a multidisciplinary DSD clinic. Our multidisciplinary Spina Bifida Clinic currently follows more than 400 patients and offers state-of-the-art reconstructive urologic surgery and ongoing care.

The UTI Center at UPMC Children's takes a multidisciplinary approach to addressing and investigating pediatric urinary tract infections (UTIs). This creates a unique setting for providing the highest level of clinical care and research. A resource for families and clinical partners, the Center focuses on UTI and the related conditions of vesicoureteral reflux and bladder and bowel dysfunction. With more than two decades of experience caring for children with UTI, our nationally recognized researchers have changed common practices for treating UTI, improving the lives of children in the process.

Faculty and Staff

Glenn M. Cannon, MD, Division Chief and Associate Professor of Urology

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Rajeev Chaudhry, MD, Assistant Professor of Urology

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New Research Study:
Hydronephrosis and Ultrasound Elastography

UPMC Children's Hospital of Pittsburgh Division of Pediatric Urology faculty member Rajeev Chaudhry, MD, has received Department of Urology funding to begin a new study using ultrasound elastography (UE) in patients with hydronephrosis caused by a ureteropelvic junction obstruction.

Hydronephrosis is the buildup of urine in the kidney that can be caused by a blockage (e.g., kidney stone, tumor) or congenital defect, usually at the ureteral pelvic junction, that does not allow urine to flow properly into the bladder and subsequently exit the body. Hydronephrosis in the setting of obstruction can occur uni- or bilaterally, and if not diagnosed and treated accordingly can cause varying degrees of permanent renal dysfunction. At UPMC Children's, pyeloplasty is the corrective surgical approach to most cases of ureteropelvic junction obstruction. The procedure can be done in an open manner, or through a minimally invasive robotic-assisted surgery (pyeloplasty is one of the top uses of robotic-assisted urologic surgery at UPMC Children's).

UE is a relatively modern advance in the field of ultrasound imaging, one that allows for the noninvasive measurement of organ or vessel elasticity to aid in the diagnosis and assessment of disease states. Conversely, the imaging technology can detect levels of fibrosis in organs such as the liver or kidneys and lesions in the breast, and it can aid prostate biopsies, among other uses.

Dr. Chaudhry's pilot study of hydronephrosis using UE was conceived over the last several years in collaboration with **Judy Hereford Squires, MD**, director of Pediatric Ultrasound Imaging and assistant director of Radiology Residency Programs in the Department of Radiology at UPMC Children's. The pilot study began enrolling patients in fall 2019; 10 to 15 patients are the target goal for enrollment in the pilot study.

Study Aims and Design

At its root, Dr. Chaudhry's study is designed to see if UE can be a sensitive and specific (and noninvasive) imaging modality for diagnosing and monitoring hydronephrosis, particularly in very young children who are under the age of 2.

"Hydronephrosis, blockages, and kidney function can sometimes be difficult to assess, and even more so in the very young, primarily due to their still-developing kidneys. The standard that we have now is the mercapto-acetyltriglycine-3 (MAG 3) Lasix renal scan, which is a nuclear medicine study. While we can determine several pieces of information from this study, it requires an IV, is time consuming, expensive, and requires small doses of radiation. It is not a diagnostic procedure that you can or would want to do every three months in an infant if you are monitoring a patient's renal and urine function to determine if surgery is needed, and identify when to avoid permanent loss in kidney function," says Dr. Chaudhry.

The MAG 3 Lasix renal scan provides essentially two pieces of information to clinicians. The first is that it can determine if a kidney is obstructed by tracking the time it takes for the radiotracer to be excreted by the kidney. The second piece of information that the scan can reveal is a measurement of renal function in the obstructed kidney relative to the unobstructed kidney. The combination of these two readings can lead to a diagnosis of an obstruction for which surgical intervention may be required.

However, MAG 3 Lasix renal scans are not as accurate in children (under the age of 2) and neonates, specifically in those under the age of 3 months. Therefore, is there another imaging modality that can improve upon the accuracy of diagnosis for these young patients, and do so in a less invasive manner? One that can be performed routinely in the clinic or the radiology lab?

The study is designed to compare the effectiveness of UE versus MAG 3 scans, with each patient receiving two to three sequential UE scans while they are being monitored for obstruction and hydronephrosis in addition to a MAG 3 scan.

"We will compare the two studies to see if UE correlates with the MAG 3 findings over time and whether it helps us predict the progression and time to pyeloplasty," says Dr. Chaudhry. "Diagnosing some of these obstructions and cases of hydronephrosis can be tricky. We do not want to do surgery if it is not warranted, particularly on very young neonates, if it appears as though their function is not impaired or is improving.

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Division Expands With New Faculty Member

In September, the Division of Pediatric Urology at UPMC Children's Hospital of Pittsburgh welcomed its newest faculty member, **Janelle Fox, MD, FACS, CSSGB**. Dr. Fox comes to UPMC Children's after serving for six years as a pediatric urologist in the United States Navy, where she treated patients at the Naval Medical Center Portsmouth (Portsmouth, Virginia), Naval Medical Center Camp LeJeune (Jacksonville, North Carolina), and Joint Base Langley-Eustis (Newport News, Virginia). During her military practice, Dr. Fox was Assistant Department Head, Chair of Robotic Surgery, and Chair of the Performance Improvement Committee.

Dr. Fox earned her medical degree from the University of California San Diego and then completed her residency at the Mayo Clinic in Rochester, Minnesota, followed by fellowship training at UPMC Children's. Dr. Fox also is completing a master's degree in Healthcare Quality and Safety Management from Thomas Jefferson University in Philadelphia, Pennsylvania. In addition to her medical and health care training, Dr. Fox is a Six Sigma Green Belt with plans to pursue Six Sigma Black Belt certification while working on quality improvement projects with UPMC Children's and the Division of Pediatric of Urology.

"Having trained at UPMC Children's for my fellowship, I knew the system well and had very positive learning experiences during my two years in fellowship. The mentorship that I experienced with Division faculty here at UPMC Children's, and more broadly in the adult urology program led by Dr. Joel Nelson, was so beneficial to my early career," says Dr. Fox.

Clinical, Education, and Research Interests

Dr. Fox has diverse interests and long-term plans now that she has arrived at UPMC Children's. Academic and resident mentorship is high on the list of priorities, specifically helping Urology trainees with research opportunities, authorship, and opportunities to present at national and regional conferences. Dr. Fox also hopes to participate in ongoing point-of-care ultrasound (POCUS) comparative effectiveness research from what is one of the largest pediatric urology series in the nation.

Quality improvement is another major area of interest for Dr. Fox, and she hopes to take part in both division-level and system-wide quality improvement and patient safety efforts where she can leverage her expertise and training in quality improvement to further improve surgical outcomes, safety, and quality.

Additionally, Dr. Fox will be involved in developing telemedicine initiatives for the Division in hopes of enhancing access to and experience of care for patients in distant locations who require subspecialty pediatric urologic care. She has prior experience with both asynchronous and synchronous telehealth consultation in the military.

Clinically, Dr. Fox has particular expertise in diagnosing and treating refractory voiding dysfunction with concurrent behavioral diagnoses. She also brings with her the ability to offer tertiary therapy in the forms of Botox, parasacral TENS, percutaneous tibial nerve stimulation, and sacral neuromodulation.

Dr. Fox also has volunteered her expertise and time to teach fellow urology colleagues in other countries. In the past, she has volunteered for 12 humanitarian training missions to Senegal, Ghana, Liberia, Dominican Republic, and Trinidad. She will continue these efforts in the future as a part of the UPMC Children's team.

"While these trips are about helping those in need, they also are about partnership to help our colleagues build their international programs by sharing knowledge, research, and contemporary surgical techniques. The goal of surgical humanitarian missions should be in supporting our colleagues and distant programs, such that our efforts will no longer be needed someday. It is challenging work, but one that has so many benefits both personally and professionally," she says.

POCUS and Pyeloplasty *Continued from Page 1*

More About the POCUS Program at UPMC Children's

Point-of-care ultrasound (POCUS) is a focused ultrasound exam performed directly at the bedside by clinicians. POCUS exams improve the accuracy, quality, and efficiency of clinical care by bringing the diagnostic imaging modality directly to the patient.

The hospital-wide POCUS program at UPMC Children's Hospital is one of only a handful in existence in the United States. The program is currently led by emergency medicine physician and Point-of-Care Ultrasound Medical Director Jennifer Marin, MD, MSc.

The goal of the POCUS program is to improve patient care across a mix of diverse clinical specialties by standardizing the performance of point-of-care diagnostic and procedural ultrasound for many conditions and care scenarios.

CAUTI Rate Reductions *Continued from Page 2*

that the fewer days catheters are placed, the lower the likelihood of infection occurring. While the CAUTI team does not have specific benchmarks for a reduction of Foley days, Dr. Cannon explains that in 2017, there were more than 6,000 days across the hospital. In 2018, that number was down to around 3,500.

"Along with everything we have been able to accomplish, I do not think we would have been as successful in our efforts so far without the full support and confidence of hospital leadership, who made it known this was a critical issue for the entire hospital. I think their level of involvement and support got people's attention and created a desire to be successful," says Ms. Montoya.

On the Horizon

While the initial steps in reducing CAUTI rates at UPMC Children's have been quite successful, there is still more that can and will be done to lower incidence even further, improve patient care and safety, and drive costs out of the system.

One such project in the planning phases, according to Dr. Cannon and Ms. Montoya, is a urine testing protocol — not just for Foley catheter patients but for any specimens collected across the hospital. A new reflex test is being assessed for use where urine analysis is done first, and cultures are subsequently done only if analysis shows signs of infection through white blood cells or other inflammatory markers. This process will help to eliminate testing and obtaining false-positive cultures on what could likely be asymptomatic colonization of the urine.

UPMC Physician Resources

For the latest news, events, videos, and free CME courses presented by UPMC clinicians and researchers, visit **UPMCPhysicianResources.com/Pediatrics.**

CME Courses

Kidney Transplantation in the Pediatric Patient
Presented by Armando Ganoza, MD

Video Rounds

Video Rounds is a series of short, informative, and educational videos created for physicians and covering a variety of medical and surgical disciplines. Current topics in urology include:

- **OncoFertility Program** *with Glenn M. Cannon, MD*
- **Robotics in Pediatric Urologic Surgery** *with Glenn M. Cannon, MD*

Hydronephrosis and Ultrasound Elastography *Continued from Page 4*

However, we also do not want to wait too long and risk permanent renal injury if surgery is warranted. With the ultrasound, we can take readings virtually anytime the patient is in the clinic — monthly, for example — and very closely monitor their status."

Time will tell if UE is a viable monitoring methodology for these hydronephrosis patients; if the pilot results are promising, Dr. Chaudhry and his collaborators will seek to expand their study into a larger trial with more power to show efficacy.

Avoiding renal injury in these cases takes on special significance. Because many of these patients are so young, any permanent kidney damage sustained may be a life-long issue with potentially life-altering consequences. Having a noninvasive, cost-effective, repeatable monitoring framework and algorithm in place should UE ultimately prove efficacious would be a practice-changing development for pediatric urologists.

More About Dr. Chaudhry

Rajeev Chaudhry, MD, is an assistant professor of urology in the Department of Urology at the University of Pittsburgh School of Medicine and a pediatric urologist in the Division of Pediatric Urology at UPMC Children's. Dr. Chaudhry earned his medical degree from the Warren Alpert Medical School of Brown University. Dr. Chaudhry completed a residency in urology and a urology research fellowship at Duke University Medical Center in Durham, North Carolina. He then completed a fellowship in pediatric urology at UPMC Children's prior to joining the Division as a faculty member. Dr. Chaudhry's research interests include the application of bioengineering and robotics in surgery, disorders of sexual differentiation, and neurogenic bladder. His clinical interests include pediatric robotic surgery and complex reconstruction in patients with spina bifida.

UPMC Children's "That's Pediatrics" Research Podcast Series

UPMC Children's Hospital of Pittsburgh medical podcast series for physicians, scientists, and other health care professionals features compelling interviews with the hospital's leading researchers and clinicians discussing innovative basic, translational, and clinical research. New episodes are released every two weeks.

"Going back to the polio vaccine, Pittsburgh has always been a hub of very innovative research, and in recent years has really become a nexus for some groundbreaking research in pediatric medicine," says **John Williams, MD**, chief of the Division of Pediatric Infectious Diseases at UPMC Children's and one of the podcast hosts. "There is a spirit of collaboration here in Pittsburgh that makes it somewhat unique nationally and we really want to explore the research that is happening here and how we have a real opportunity to change the way pediatric medicine is practiced around the world."

In addition to Dr. Williams, "That's Pediatrics" hosts are:

Carolyn Coyne, PhD, director of the Center for Microbial Pathogenesis, UPMC Children's Hospital

Stephanie Dewar, MD, director of Pediatric Residency Training Program, UPMC Children's Hospital

Brian Martin, DMD, vice president, Medical Affairs, UPMC Children's Hospital

That's PEDIATRICS
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Current episodes of "That's Pediatrics" in **urology** and related topics include:

- *Falling in Love With the Bladder* with ***Carlton Bates, MD***

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Division Publications

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About UPMC Children's Hospital of Pittsburgh

Regionally, nationally, and globally, UPMC Children's Hospital of Pittsburgh is a leader in the treatment of childhood conditions and diseases, a pioneer in the development of new and improved therapies, and a top educator of the next generation of pediatricians and pediatric subspecialists. With generous community support, UPMC Children's Hospital has fulfilled this mission since its founding in 1890. UPMC Children's is recognized consistently for its clinical, research, educational, and advocacy-related accomplishments, including ranking 15th among children's hospitals and schools of medicine in funding for pediatric research provided by the National Institutes of Health (FY2018) and ranking on *U.S. News & World Report's* Honor Roll of America's Best Children's Hospitals (2019–20).

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