Tracking and Enhancing Dialysis Care

Over the past three years, a comprehensive effort within the Division of Nephrology’s outpatient dialysis centers has resulted in better care coordination, reduced blood stream infection rates, and improved patient satisfaction and communication.

The effort, by physicians, nurses and staff, was part of an internal quality improvement project focused on multiple areas tracked by the Centers for Medicare and Medicaid Services as part of its national End-Stage Renal Disease Quality Incentive Program (QIP). The program annually evaluates outpatient dialysis facilities and reduces reimbursement rates for those that do not meet defined performance criteria, including infection control and hemodialysis adequacy benchmarks as well as results from independent patient satisfaction surveys.

“We had significant concerns because our patient population is typically urban, low-income and without regular access to transportation to get to and from dialysis appointments,” said Nephrology Division Chief Benjamin Humphreys, MD, PhD.

“Reduced reimbursement rates could have impacted the viability of our outpatient centers if we didn’t consistently focus on process improvements.”

After reviewing initial QIP scorecards, some of which were not optimal, the Division’s two outpatient dialysis centers zeroed in on three primary issues: monthly data tracking, infection control and overall communication between care providers and patients.

First, the Division created its own QIP scorecard that was reviewed monthly to highlight any trends that might negatively impact the federal QIP score. “Our own scorecard kept everything top of mind because we could look at the data faster and start making changes if we saw a downturn in outcomes,” says Forest Park Dialysis Nurse Administrator Patricia Anderson, RN.

Then, the dialysis centers each created a team of expert cannulators for new fistula cannulations. “At Chromalloy, our team comprises RNs, LPNs and technicians who have special expertise in all aspects of catheter care, including documentation, assessment and ongoing care,” says Brenda Bingle, RN, nurse administrator for the Chromalloy American Kidney Center. “We also work with physicians to remove the catheters as quickly as possible.”

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At this month’s ASN Kidney Week, one of our esteemed faculty, Anitha Vijayan, MD, is co-chairing the Nephrologists Transforming Dialysis Safety Project update. The lecture, titled “21st Century Killers – How Nephrologists Can Fight Back,” is a visible example on the national level of the aggressive efforts we need to all focus on to eliminate infections in dialysis patients. Not only is this effort a best-practice initiative, it also mirrors our internal efforts to improve the care of our own dialysis patients. As our lead story mentions, we were challenged with multiple quality improvements not only to improve care but also to improve our ratings — and resulting reimbursement rates — with the Centers for Medicare and Medicaid Services.

Moving the needle on quality efforts requires a team approach, but it’s a vital process to maintain or improve patient outcomes. By focusing on specific steps to tackle major issues, we have succeeded in lowering our infection rate, increasing patient satisfaction and improving on a host of other quality and safety metrics. I want to recognize all of our faculty and staff as well as our Director of Business Operations, Jodean Balauda, who worked so hard over the last year and a half to achieve this great result. We are excited about two new programs — an inpatient renal biopsy service and a new transplant nephrology clinic at the VA Medical Center. Both engage our nephrologists more with key patient populations and offer more opportunities to enhance our fellowship program. I’m pleased that we also are partnering with a former alumni, Steven Bander, MD, to open an interventional nephrology clinic in west St. Louis.

Our new fellows are off to a wonderful start to the year, and we are encouraged by the response we are getting on next year’s recruitment, which just wrapped up. As always, we hope to see you at ASN Kidney Week and at our Friends and Alumni Reception there. We look forward to receiving updates on your respective career paths. Feel free to also email Virginia Kelly (Virginia.Kelly@wustl.edu) with any news notes.

Thank you to the following donors: We thank the following who have generously donated to our division: Dr. John E. Buckert Mr. & Mrs. Grant and Kay Ehret Dr. Arvind Garg Dr. Herschel R. Harter Mr & Mrs. Martin E. Jaffe Miss Patricia M. McKevitt Dr. Victor N. Meltzer Ms. Mildred Menke Dr. Aubrey R. Morrison Mr. Daniel C. Perch Mr. & Mrs. Harry J. and Glenda Mohr Sterling

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If you would like to support our research and teaching mission or contribute to the Division of Nephrology’s programs and services, please send your contribution to: Washington University in St. Louis Office of Medical Alumni and Development Attn: Rachel A. Hartmann 7425 Forsyth Blvd., Campus Box 1247 St. Louis, MO 63105

You may also contact Rachel A. Hartmann directly at 314-935-9715 or by email at rachel_hartmann@wustl.edu if you are considering supporting the Division through appreciated stocks, deferred giving, or charitable bequests.

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Benjamin D. Humphreys, MD, PhD
Joseph P. Friedman Professor and Chief Division of Nephrology
Washington University School of Medicine

By Steven Cheng, MD, Director, Nephrology Fellowship Program

How do you maximize the learning environment in fellowship without exhausting trainees? It’s a critical question faced not only by our division, but also by large academic programs with a heavy influx of clinically complex cases.

In the Division of Nephrology, we’ve instituted numerous changes over the last several years to address this issue of burnout. We set a 20 patient note-writing cap and started a non-teaching service, staffed by our attending physicians and a nurse practitioner. Both steps are working well. Last year, however, a new issue cropped up: the expansion of ICU beds and the opening of a new patient tower at Barnes-Jewish Hospital led to a substantial increase in our volume of work, particularly with the number of home calls for late night nephrology consults.

In response, Dr. Goldberg (the associate program director) and I worked closely with our fellows to create a new Home Call Coverage service. Based on the night float system utilized by many primary services in the hospital, the designated Home Call Coverage fellow covers consults and questions from 4 PM to 7 AM. The fellow assigned to this service, from all other daytime duties and clinical responsibilities the ensuing day. In the morning, the coverage fellow provides a sign off of overnight events to our service fellows, who assume care in the morning after having had a free night to rest, read, and recharge. Facilitating this change is the timely implementation of the new EPIC electronic medical records system, which has helped to make transitions in patient care as seamless as possible.

The new Home Call Coverage service is a definite plus for the division. Fellows like guaranteed time to rest and reflect each night, even when they are on service. And the Home Call Coverage fellows have been able to cover the evening hours without having to worry about daytime responsibilities. It’s another example of how seriously our program takes the learning environment, the work-life balance, and the input of our outstanding fellows!

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“Compared to fistulas or grafts, dialysis catheters are associated with a significantly higher risk of infection, so we made concerted efforts to minimize the time they were needed,” adds George Jarad, MD, medical director for the Forest Park facility. “We also evaluated and started using specialized catheter caps impregnated with alcohol to minimize the risk of catheter-associated blood stream infections (BSIs).”

In addition, better hygiene steps reduced infection control issues, such as using a faster drying and less irritating hand disinfectant and placing gloves at every dialysis station.

Communications issues were two-fold between hospital and outpatient staff, and between staff and patients. Discussion with the hospital team prior to patient discharge helped with vein mapping, earlier catheter removal and adherence to follow-up patient visits.

More frequent and, frankly, more casual conversations with patients not only picked up issues that needed to be addressed, but also improved patient satisfaction and, in turn, satisfaction survey scores. “I pull up a chair and meet with every single dialysis patient just to get a better understanding of what they are going through and anything they need,” says Chromalloy medical director Daniel Coyne, MD. “And the nurses and staff were all asked to chat one-on-one with patients socially. We also impressed upon them the importance of filling out the satisfaction surveys. The end result was that the number of surveys completed went up and patient satisfaction improved overall.”

“It was a total staff effort,” agrees Bingle. “They had to go outside of their box and be aware of what other people think of them. We have to be professional but we don’t have to be overly clinical. I think the interactions worked both ways to enhance compassion and empathy.”

With more than 165 patients seen three times a week at the Chromalloy center and 200+ plus patients on in-center and home dialysis at the Forest Park facility, the overall QIP changes were outstanding — this year, both facilities earned significantly higher ratings by the CMS. “When we look at the numbers, everything we did had an incremental change, but together, it made a major impact,” says Coyne.
Brad Rovin, MD, believes that nephrology is the perfect career for him because it requires applying principles of engineering to solve practical medical problems.

“I was called to see a young patient who was on ECMO and in renal failure,” he recalls. “My senior fellow and I had just read an article on continuous renal replacement therapies (CRRT) in Kidney International and decided to try it on this patient. CRRT had never been done before at Barnes. We hooked up the artificial kidney through the ECMO lines. This worked very well, to the point that it caused so much ultrafiltration, we had to cobble together a system to decrease fluid removal. The patient survived!”

Rovin, now the Director of the Division of Nephrology at Ohio State University, was drawn to renal diseases while studying chemical engineering at Northwestern University. “Biomedical engineering was not yet a major there, but I wanted to apply engineering principles to artificial organ design,” he says. “I thought developing an artificial kidney would be a challenging engineering problem. However, after I took my first immunology course in medical school, I realized this was my passion. Then I found out I could do immunology and nephrology if I focused on glomerular diseases.”

As a fellow, Rovin joined the lab of George Schreiner, MD, PhD, who established the first renal immunology lab at the medical center. After fellowship, he joined the faculty, but six months later, in 1990, he was recruited to Ohio State, where he has remained. In addition to being director of the nephrology division, Rovin oversees an advanced glomerular diseases fellowship and serves as vice chairman of research for the Department of Internal Medicine. He continues his own research investigating the transcription and proteome of the glomerular and tubulointerstitial compartments of kidney biopsies from lupus patients before and after treatment to try to develop molecular phenotypes of response and non-response to treatment.

“Clinically we also are interested in testing experimental therapeutics in patients with lupus nephritis (LN), and have just submitted a new proposal to repurpose an existing drug that we feel may be very effective for LN,” he adds.

For fun activities, he’s an outdoors enthusiast, hiking and biking whenever he can. He’s also an avid fisherman, saying, “I’ve fished in 18 states, including Missouri, as well as in Europe, Australia, Iceland, Brazil, Argentina, Panama, Belize, Canada and the Bahamas. I have a goal of fishing in every country to which I’m invited to lecture!”

New Transplant Nephrology Clinic at VA

In a collaborative effort between Washington University’s Division of Nephrology and the John Cochran Veterans Administration Medical Center in St. Louis, the first transplant nephrology clinic is anticipated to be open at the VA by the end of this year. The move brings a transplant nephrologist there to evaluate and care for both pre- and post-kidney transplant patients. “The kidney transplant patients at the VA are currently seen only by a general nephrology intensivist who will head the new service. “However, it’s a valuable skill to learn because ultrasound is an indispensable tool in the diagnosis, prognosis and management of patients with renal diseases.”

Nephrologists have been doing ultrasound-guided biopsies in transplanted kidneys here for several years. It is easier to biopsy a transplanted kidney, however, because it is anteriorly placed. A native kidney, which is located against the back muscles and is much deeper requires learning extra skills, says Tohme, such as manipulating and reading the ultrasound.

Tohme has expertise in the use of ultrasound for the care of renal patients. In addition to a fellowship in nephrology, he completed a fellowship in critical care medicine. As a renal intensivist, he says, “When we perform a thoracostomy or paracentesis in the ICU to tap fluid in the lung or belly, we usually do it under ultrasound. When we do central lines, we do that under ultrasound, too. Because nephrologists are intimately involved in the care of these patients and already are familiar with why a biopsy is needed, how much tissue to obtain, and the contraindications for biopsy such as high blood pressure, being on blood thinners, having only one kidney, having very small kidneys, etc., it makes sense to know how to do these ultrasounds.”

Along with Tohme, other faculty overseeing the training and certification of fellows for this procedure are: Anuja Java, MD, Andrew Malone, MD, BCh, and Seth Goldberg, MD.
In what could be a transformative advance in the way kidney biopsies are evaluated, WU nephrology researchers Haojia Wu, PhD and Andrew Maloney, MB, BCH, have published proof-of-principle research that single-cell transcriptional profiling can aid in disease subphenotyping and therefore improve diagnostic and prognostic accuracy of kidney disease.

“Despite impressive technological advances in genomics over the last decade, there have been few changes in renal biopsy processing and interpretation in decades,” says Wu. “In our research, we used a massively parallel microfluidic droplet technology called inDrops to perform single cell RNA-seqencing of thousands of individual cells from a single kidney biopsy. This approach allowed us to measure the expression levels of thousands of different genes from thousands of individual cells. When we defined the heterogeneity of cell types and cell states in an allograft rejection biopsy at single cell resolution, Transcriptional profiling has been performed in whole in kidney before, but these approaches are limited in that cell-specific gene expression signatures may be lost within the integrated expression profiles of all the other kidney cell types. For example, bulk-tissue resolution profiling has established that endothelial cells play critical roles in ABMR. Single-cell resolution profiling revealed that there are actually three different EC states in ABMR. Endothelial cells are critical in the care of acute kidney injury and playing a causal role in disease progression remained unknown. In research published in the July 2018 issue of the Journal of Cell Biology, Wu and his research team examined the consequences of CA in both the developing embryonic kidney and in the adult kidney during homeostasis and after injury. They found that inducing CA disrupted cell proliferation and differentiation in the developing kidney. Significantly, CA induced rapid cyst growth and expansion shortly after birth. In the adult kidney, induction of CA caused ciliogenesis defects and resulted in cystogenesis upon ischemic renal injury. It was the first demonstration that CA is sufficient to cause a renal cystic disease phenotype.

Says Mahjoub, “Most of the studies regarding the consequences of CA have been focused on cancer (solid tumors), since it is well established that CA can induce genome instability and drive cell transformation. What our study shows is that we have to think about CA in human diseases other than cancer, specifically disorders such as polycystic kidney disease. Targeting these cells may provide a new avenue for therapy.”

Nephrologist Manasa M. Mettreddy, MD, joined the Division in October 2018. Mettreddy was by default at Christian Hospital in north St. Louis County where she will assist in taking care of patients in the new outpatient dialysis unit. Previously she worked at St. Joseph Hospital West in Lake St. Louis, Mo Mettreddy earned her medical degree in India and completed a residency in internal medicine at the Greater Baltimore Medical Center in Maryland. She then pursued a fellowship in nephrology at the University of Michigan in Ann Arbor.

Benjamin Humphreys, MD, PhD, the Joseph Friedman Professor of Renal Diseases in Medicine and chief of the Division of Nephrology, has been elected Secretary-Treasurer of the American Society for Clinical Investigation. Humphreys, nationally recognized for his research on kidney fibrosis, stem cells and regenerative medicine, will serve a three-year term. Membership into the ASCI, one of the oldest nonprofit honor societies of physician-scientists, is by election only. Researchers who are 50 years of age or younger and who have achieved significant scientific contributions in their respective field, are then nominated to the ASCI. Humphreys has been a member since 2013.

Andreas Herrlich, MD, PhD, has been named director of the EMBO lecture course “Molecular Mechanisms of Tissue Injury, Repair and Fibrosis.” EMBO is a European organization of leading scientists who focus on life sciences research. The fibrosis lecture course will be held May 23–31, 2019 in Sopot, Poland and will bring together leading researchers with doctoral and postdoctoral students to review the latest insights into the molecular pathogenesis of injury-repair and fibrosis in different organ systems.

Herrlich, who joined the division in 2016 after serving on the faculty of Harvard Medical School, researches kidney injury and repair mechanisms, focusing on understanding the biology of metaplasia/re-epithelialization and the state of organ repair and tissue regeneration. In particular, he is one of the largest programs in the country, with more than 5,000 kidney transplants since 1963. The team also helped to pioneer living donor kidney transplants.

In addition to maintaining our successful outcomes, which are among the best in the world, one of my main goals is to grow the living donor kidney transplant program by establishing new methods of educating kidney transplant candidates on how to find and handle the importance of living donors,” says Alhamad. “In addition, I want to broaden overall access to transplant nephrology services in both Missouri and Illinois.”

Alhamad completed a general nephrology fellowship at Penn State College of Medicine and a transplant nephrology fellowship at the Mayo Clinic in Scottsdale, Ariz. Among his research activities, Alhamad is the principal investigator of several clinical trials investigating new medications and diagnostic measures for monitoring rejection and other complications after transplant.

Potentially New Approach to Evaluate Kidney Biopsies

In a study that combined high-throughput single-cell sequencing of kidney biopsies, researchers from Washington University School of Medicine and at Lahey Hospital and Medical Center in Massachusetts, the researchers identified a specific combination of genes that is able to distinguish between different types of kidney cells.

“The kidney contains more than 100 distinct cell types, each with a unique function,” said study lead author Tarek Alhamad, MD, medical director of transplant nephrology, who is also an associate professor of medicine at Washington University School of Medicine and chief of the Division of Nephrology at Barnes-Jewish Hospital and Associate Director of the Division of Nephrology at Washington University School of Medicine and at Lahey Hospital and Medical Center in Massachusetts.

The researchers used a technique called single-cell sequencing to analyze thousands of individual cells from kidney biopsies. They found that the expression of certain genes is highly specific to different cell types in the kidney, allowing them to identify and classify these cells with high accuracy.

“By combining high-throughput single-cell sequencing with machine learning algorithms, we were able to identify a specific combination of genes that is highly indicative of different cell types,” said study co-author Hani Suleiman, MD, PhD, professor of medicine and chief of the Division of Nephrology at Washington University School of Medicine and chief of the Division of Nephrology at Lahey Hospital and Medical Center in Massachusetts.

The researchers hope that their findings will lead to new diagnostic tools and therapeutic strategies for kidney disease.

“By identifying specific gene expression profiles for different cell types, we can gain a better understanding of kidney disease and develop targeted treatments for these conditions,” said study co-author Andreas Herrlich, MD, PhD, professor of medicine and chief of the Division of Nephrology at Washington University School of Medicine and chief of the Division of Nephrology at Lahey Hospital and Medical Center in Massachusetts.

The researchers are now working to validate these findings in a larger population of patients and to develop diagnostic and therapeutic applications for their findings.

Faculty News and Awards

Patricia Kao, MD, MS, has been named the new Associate Program Director of the Internal Medicine Training Program. Kao specializes in the care of acute kidney injury and chronic kidney disease as well as renal disease in pregnant and elderly patients. She also has a strong interest in teaching and curriculum development for clinical educators. Last year, she was honored with the Carol B. and Jerome T. Loeb Teaching Fellowship to continue her development of the Washington University Teaching Physician Pathway (WUTPP), the first structured resident teaching physician pathway at the university.

Anitha Vijayan, MD, is co-chairing a national collaborative effort to eliminate infections in dialysis facilities. The Nephrologists Transforming Dialysis Safety Project (NTDS) by the American Society for Nephrology and the Centers for Disease Control is focused on raising awareness of infection control issues in hemodialysis facilities and sharing best practices to prevent infections in dialysis patients. The project began two years ago and now includes webinars, conferences, journal articles and other activities focused on infection prevention. At this month’s ASN Kidney Week, join Vijayan for the NTDS Annual Session, 21st Century Killers – How Nephrologists Can Fight Back.
Escape to the White House!

For the second year in a row, our incoming fellows proved they were up to the task of figuring out clues and getting out of an escape room. As part of a fun get-together, fellowship program leaders Seth Goldberg, MD, and Steven Cheng, MD, have started an annual escape night out with new fellows — and it’s a definite success!

This year, the group went to the “White House” to unlock multiple clues and puzzles so they could figure out how to deploy an anti-missile defense system before the building would be destroyed.

“This is the second time we’ve done something like this,” says Goldberg. “Last year was a different location and our team won with about four minutes to spare. This year, we also won with about four minutes to spare, so we’re keeping our record intact!”

Thanks for keeping the “White House” safe for us this time. We hope the Division’s escape record continues next year!