Nephrology Times

Practical News, Trends, and Analysis

September 2020

VOLUME 12, NUMBER 6

International Variation in Rates of Peritonitis among Patients on Peritoneal Dialysis

Among patients receiving peritoneal dialysis, the leading cause of permanent transition to hemodialysis is peritoneal dialysis-related peritonitis, a complication associated with hospitalization and death, increased peritoneal dialysis-related treatment costs, and long-term adverse sequelae to peritoneal membrane structure and function. Peritoneal dialysis-related infection was identified in the multi-stakeholder SONG-PD (Standardized Outcomes in Nephrology-Peritoneal Dialysis) study as part of a core outcome set for trials among patients on peritoneal dialysis.

Jeffrey Perl, MD, SM, FRCP(C), and colleagues recently reported on results from the Peritoneal Dialysis and Outcomes Practice Patterns Study (PDOPPS), a large, international observational prospective cohort study designed to collect data in a uniform manner on the incidence of peritoneal dialysis-related peritonitis and on practices aimed at prevention of peritoneal dialysis-related peritonitis. Dr. Perl et al. reported data on the incidence, facility, variation, and microbiology of peritonitis across participating countries [*American Journal of Kidney Diseases*. 2020;76(1):42-53].

Study exposures were facility characteristics including census count, age of facility, and nurse-to-patient ratio, as well as selected facility practices

continued on page 6

Obstetric Deliveries among Women with ESRD in the United States Increasing

Management of pregnancy in women with end-stage renal disease (ERSD) presents a clinical challenge. There is a reduction in fertility as well as high rates of sexual dysfunction in women with ESRD. Women who are treated with dialysis have a high risk of maternal and fetal morbidities, including blood transfusion, severe hypertension, preeclampsia, and fetal demise. Kidney transplantation offers improvements in the biologic mechanisms of infertility in patients with ESRD; however, transplant recipients continue to experience pregnancy complications that include preeclampsia, cesarean delivery, and preterm delivery more frequently than women in the general population.

There are emerging data of successful pregnancies in women on hemodialysis. Data in the Australia and New Zealand Dialysis and Transplant Registry demonstrate

continued on page 4

Frequency of Goals-of-Care Discussions among Veterans with Incident Kidney Failure

Among patients with a serious illness such as advanced kidney failure, advance care planning is vital, as patients in that population will confront decisions such as initiating maintenance dialysis. There are guidelines that encourage shared decision making to ensure alignment of treatment with patient preferences, particularly among elderly patients. Results of surveys suggest, however, that the quality of conversations regarding dialysis initiation is generally poor.

There are limited data suggesting that even after initiation of dialysis, discussions between patients and health providers regarding goals of care are infrequent; it is also unlikely that patient preferences regarding their treatment are recorded in an advance directive. **Christina L. Bradshaw, MD,** and colleagues conducted a retrospective cohort study to examine the documentation, content, and timing of discussions regarding dialysis preferences in a national cohort of older veterans with incident kidney failure. Results of the study were reported in the *American Journal of Kidney Diseases* [2020;75(5):744-752].

The researchers utilized Veterans Health Administration (VA) medical records linked

continued on page 5

Print-only Content

Including Race in Estimating GFR… A Form of Racial Profiling?

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The question of whether to use race in estimating glomerular filtration rate (GFR) is being actively debated.

In the Modification of Diet in Renal Disease Study (MDRD) prediction equation[1] and the 2009 Chronic Kidney Disease Epidemiology Collaboration creatinine equation,[2,3] race is used with age and sex to estimate kidney function. For example, the MDRD estimated GFR [eGFR] = 175 x $SCr^{-1.154}$ x $age^{-0.203}$ x 0.742 [if female] x 1.212 [if Black] = eGFR in mL/min/1.73 m^2. In the original derivation of the MDRD equation, race was regarded as a surrogate for muscle mass.

However, writing in the *Clinical Journal of the American Society of Nephrology [CJASN],*[4] **Vanessa Grubbs, MD,** notes: "We must question our decisions to center biologic science around constructs that, instead of having a biologic basis beyond superficial classifications around skin color and hair texture, are muddled with complicated and unmeasurable societal factors. Dr. Grubbs, a nephrologist at UCSF, has a point. She goes on: "Let's stop playing the race card like it's a genetic marker. It simply is not."

Writing in *CJASN,*[5] **Andrew S. Levey, MD,** and colleagues write: "In that study [the 2009 Chronic Kidney Disease Epidemiology Collaboration creatinine equation study], Blacks had a 16% higher average measured GFR compared with nonblacks with the same age, sex, and serum creatinine. The reasons for this difference are only partly understood, and the use of race in GFR estimation has limitations. Some have proposed eliminating the race coefficient, but this would induce a systematic underestimation of measured GFR in Blacks, with potential unintended consequences at the individual and population levels. We propose a more cautious approach that maintains and improves accuracy of GFR estimates and avoids disadvantaging any racial group."

So this issue breaks down across a very difficult fault line. I imagine that everyone agrees that racially profiling patients in both the diagnosis and classification of chronic kidney disease (CKD) should be avoided. However, the unintended consequences of not including a coefficient pertaining to race in estimating GFR might actually worsen a disparity. No one wants that either.

In a thoughtful July 29 viewpoint published in the *Journal of the American Medical Association (JAMA),*[6] **Neil Powe, MD, MPH, MBA,** weighs in. He argues that by ignoring the use of "race" as a coefficient, one could actually cause harm: for example, relative under-dosing of medications, or denying screening to an individual for kidney donation. As well, losing precision in estimating GFR in Blacks might generate misclassification—a proportion of Black patients might get diagnosed with CKD when in fact they do not have CKD (i.e., their eGFR is actually higher when adjusted for Black race). Besides this, misclassification could "aggravate existing health disparities, or create anxiety, for Black patients."

Dr. Powe favors what he terms "raceless markers" as an ideal future solution. In the meantime, raceless reporting might be an option. This approach has been adopted by several Harvard hospitals—the Massachusetts General Hospital, the Beth Israel Deaconess Medical Center, and Brigham and Women's (where I practice), and University of Washington and Vanderbilt, among several others.

So what's the bottom line? Report eGFR without consideration of race, but provide a range that includes patients of all races. And above all, educate everyone on the importance of not misclassifying Blacks. This shouldn't be hard to do. ■

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Obstetric Deliveries

continued from page 1

an increasing rate of pregnancy in women receiving dialysis from 1976 to 2008, from 0.67 pregnancy per 1000 person-years in the period 1986 to 1995 to 3.3 per 1000 person-years in the period 1999 to 2008. There are few data available on a national level in the United States on childbirth in women with ERSD, particularly among women treated with dialysis.

Andrea L. Oliverio, MD, and colleagues conducted a retrospective cohort study to examine secular trends and outcomes of obstetric deliveries in a US cohort of women with ESRD. Results of the study were reported in the *American Journal of Kidney Diseases* [2020;75(5):762-771].

The researchers sought to test the hypothesis that there would be an association between shorter kidney replacement therapy vintage (time since ESRD) and a higher likelihood of delivery. In a subset of women receiving hemodialysis who delivered from 2012 to 2015, the study also examined the association between preterm delivery and intensity of prescribed hemodialysis.

The outcomes of interest were infant delivery, preterm delivery, and cesarean delivery.

Of 121,581 female Medicare beneficiaries 18 to 44 years of age with ESRD between January 1, 2002, and September 30, 2015, there were 1807 deliveries in 1607 women. Of women receiving hemodialysis, 11,718 had no delivery and 664 had 1+ deliveries; of those on peritoneal dialysis, 3225 had no delivery and 47 had 1+ deliveries; of those who underwent kidney transplantation, 25,446 had no delivery and 670 had 1+ deliveries; and of those with unknown modality, 79,585 had no delivery and 226 had 1+ deliveries.

Among all women 18 to 44 years of age with ESRD from 2002 to 2015, the majority were non-Hispanic white. The most common cause for ESRD was glomerulonephritis regardless of delivery status. Across all treatment modalities, delivering women were of shorter kidney replacement therapy vintage. During the study period, the average age at delivery increased from 29.1 years in 2002 to 31.9 years in 2015. Among women who delivered during the time period, the average age at ESRD incidence was 24.5 years, compared with 32.3 years among nondelivering women ($P<.001$). Of the cohort of delivering women, 81.8% received hemodialysis as their first treatment modality, 12% received peritoneal dialysis, 5.9% underwent transplantation first, and in 0.3% the first modality was unknown. At the time of delivery, 41% were being treated with hemodialysis, 2.8% with peritoneal dialysis, 42.8% with transplantation, and in 13% modality was unknown.

During the period 2002 to 2015, the unadjusted delivery rate among all women 18 to 44 years of age with ESRD increased from 2.6 to 3.8 per 1000 patient-years ($P<.001$). The delivery rate among women on hemodialysis increased from 2.1 to 3.6 per 100 patient-years ($P<.001$). Among transplant recipients with a functioning graft, the delivery rate increased from 3.1 to 4.6 per 1000 patient-years ($P<.001$). There was no significant increase in the delivery rate among women receiving peritoneal dialysis (range 0.5 to 1.4 delivery per 1000 patient-years during the study period and lower than for those receiving hemodialysis or a kidney transplant).

The odds ratio (OR) of delivery was higher in women with a functioning kidney transplant compared with women undergoing hemodialysis (2.14; 95% confidence interval [CI], 1.83-2.51). Women undergoing peritoneal dialysis had lower odds of delivery than those undergoing hemodialysis (OR, 0.32; 95% CI, 0.23-0.44). For each additional year after diagnosis of ESRD, the odds of delivery were lower by 1% (OR, 0.99; 95% CI, 0.97-1.00). There was an association between older age and lower odds of delivery (OR for each additional year, 0.91 (95% CI, 0.90-0.91).

Among the cohort of women with ESRD who delivered from 2002 to 2015, preterm delivery was seen in 41% of those on hemodialysis, 41% of those on peritoneal dialysis, and 33% of those with a functioning kidney transplant. The overall odds of preterm delivery during the study period decreased by 2% per year (OR per each additional year, 0.98; 95% CI, 0.97-0.99). Women with a functioning kidney transplant were less likely to deliver preterm compared with women undergoing hemodialysis (OR, 0.92; 95% CI, 0.84-1.00) and were more likely to have a cesarean delivery than women undergoing hemodialysis (OR, 1.18; 95% CI, 1.06-1.31).

The researchers cited some limitations to the study findings including limiting the analysis to women with Medicare as their primary insurer; relying on established *International Classification of Diseases, Ninth Revision, Clinical Modification* codes for identification of hospital deliveries of live-born infants, as well as preterm and cesarean deliveries; and the inability to control for residual kidney function in the analyses due to incomplete reporting in CROWNWeb.

In conclusion, the researchers said, "Obstetric delivery rates in women with ESRD increased by nearly 50% between 2002 and 2015, most notably for women receiving hemodialysis or with a functioning kidney transplant. These women are at high risk for preterm delivery, particularly among Black women with ESRD. To help understand best practices for improved outcomes in this high-risk population, future work should explore facilitators and barriers to implementation of outpatient intensified hemodialysis, as well as alternative settings for antenatal hemodialysis in the United States. Addressing family planning preferences of women of childbearing age with ESRD is an imperative for nephrologists and ESRD management teams as this challenging clinical scenario becomes more common over time." ■

TAKEAWAY POINTS

- Researchers conducted a retrospective cohort study to examine secular trends and outcomes of obstetric deliveries in a US cohort of women with end-stage renal disease (ESRD).
- During the study period 2002 to 2015, the delivery rate in women undergoing hemodialysis and women with a functioning kidney transplant increased form 2.1 to 3.6 and 3.1 to 4.6 per 1000 patient-years, respectively.
- Women with a functioning transplant were less likely to deliver preterm and more likely to have a cesarean delivery compared with women undergoing hemodialysis.

Nephrology Times
Practical News, Trends, and Analysis

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Nephrology Times (ISSN 1940-5960) is published monthly by AMC Media Group, at Madison Avenue, Manalapan, NJ 07726. Printed in the U.S.A.

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Goals-of-Care Discussions

continued from page 1

to Medicare claims and the US Renal Data System to identify veterans ≥67 years of age with incident kidney failure between January 1, 2005, and December 31, 2010. Incident kidney failure was defined as progression to a sustained estimated glomerular filtration rate (eGFR) <15 mL/min/1.73 m^2 using the Modification of Diet in Renal Disease Study equation or initiation of maintenance dialysis. Eligible patients had at least two eGFRs <15 mL/min/1.73 m^2 at least 5 days apart including one outpatient measurement or one outpatient eGFR <15 mL/min/1.73 m^2 and one VA or Medicare claim for end-stage kidney disease within a 12-month period.

The study exposures were demographic and facility characteristics, as well as predicted 6-month mortality risk following initiation of dialysis and documentation of preferences regarding resuscitation. The outcomes of interest were documented discussions of dialysis treatment and supportive care. Discussions about dialysis preference were defined as any documentation in provider notes with the veteran (or surrogate) about preparing for or initiating dialysis. A composite measure of supportive care was any discussion of conservative management without dialysis, hospice or palliative care, a trial of dialysis, or withdrawal from dialysis after initiation.

Following application of inclusion and exclusion criteria, the final study cohort included 349 veterans with incident kidney failure who initiated dialysis and 472 veterans with incident kidney failure who did not initiate dialysis. Of those who did initiate dialysis, 143 had a mortality risk score ≥5; of those who did not initiate dialysis, 163 had a mortality risk score ≥5. Compared with patients with a mortality risk score <5, those with a high score were older and more likely to be Black, have chronic conditions and functional impairments, reside in a nursing home, and have had nephrology care prior to developing incident kidney failure.

In the overall cohort, mean age was 80.9 years, 98.7% were men, and 70.2% were white. The participants were well distributed across geographic regions and 89.9% were seen in high-complexity VA facilities. Of the total cohort, 74% received some outpatient nephrology care prior to developing incident kidney failure. Documented discussions regarding discussions for resuscitation and dialysis were noted in 71.3% and 55.6% of patients, respectively. Overall, 32.4% of patients had a documented discussion of supportive care, but only 44% of patients at high risk for mortality with dialysis had such discussions noted in their records.

The pattern of documentation varied according to whether the patient ultimately started dialysis. Regardless of mortality risk, patients in the group that did not start dialysis were more likely to have documented discussions regarding dialysis, supportive care, and resuscitation (resuscitation discussions were documented most frequently) compared with patients in the group that did start dialysis. Among patients in the dialysis group with mortality risk score <5, <10% had documented discussion about supportive care, and 40% had no documentation of any goals-of-care discussion. Among patients in the dialysis group with mortality risk score ≥5, 23% had a documented discussion of supportive care and 24.% had no documentation of goals-of-care discussions.

Following adjustments, there were independent associations between facility region, outpatient nephrology care preceding incident kidney failure, and documentation of resuscitation preferences and the odds of having a documented dialysis or supportive care discussion. The practice of discussion varied by region, with the West less likely versus the rest of the country to document a dialysis-preferences discussion and more likely to document a supportive-care discussion.

While outpatient nephrology care was associated with higher odds of a documented dialysis discussion, it was also associated with lower odds of supportive-care discussions. Following multivariable adjustment, there was no association between mortality risk and the odds of a documented dialysis or supportive-care discussion.

Overall, 32.4% of patients had a documented discussion of supportive care, but only 44% of patients at high risk for mortality with dialysis had such discussions noted in their records.

The researchers cited some limitations to the study, including the possibility that the results are not generalizable to nonveteran populations, particularly those who receive care outside the VA health system, not capturing the type and specialty of the provider documenting the discussions, and the possibility that the medical records did not capture the full content or quality of the discussions between provider and patient.

In summary, the researchers said, "Discussions surrounding dialysis preferences, including supportive care, are infrequently documented and often decoupled from other aspects of advance care planning, which may result in dialysis decisions that are discordant with patient goals. A systematic redesign of the advance care planning process that encourages integration of these discussions into routine nephrology care is needed to ensure that the goals and preferences of persons with advanced kidney disease are better elicited and reflected in their treatment plans." ■

TAKEAWAY POINTS

- Researchers conducted a retrospective cohort study to examine the documentation, content, and timing of discussions about dialysis preferences between providers and patients with advanced kidney disease.
- In a cohort of US veterans with a mean age of 80.9 years, documented discussions regarding dialysis and resuscitation were noted in 55.6% and 77.1% of patients, respectively.
- The frequency of documentation varied by mortality risk and whether the patient ultimately initiated dialysis.

CONFERENCE COVERAGE KIDNEY WEEK 2019

Metabolic Acidosis Predictor of Adverse Cardiovascular Outcomes

Studies have established metabolic acidosis as a risk factor for progression of chronic kidney disease (CKD). There are few data on the association between metabolic acidosis and cardiovascular disease in patients with CKD. **Nancy L. Reaven, MA,** and colleagues conducted a longitudinal observational study to examine the association of metabolic acidosis and adverse cardiovascular outcomes as well as the role of metabolic acidosis as an independent predictor of cardiovascular outcomes in patients with pre-dialysis CKD. Results of the study were reported during a poster session at Kidney Week 2019 in a poster titled *Association of Metabolic Acidosis with Adverse Cardiovascular Outcomes in Patients with CKD*.

The researchers utilized de-identified 2001-2017 electronic medical records (Optum® EMR) to identify patients with CKD stages 3-5. Inclusion criteria were more than two consistent serum bicarbonate values 28 to 365 days apart, more than three estimated glomerular filtration rate (eGFR) values >10 and <60 mL/min/1.73 m^2, and two or more years of post-index data (or until death). Follow up continued for up to 10 years for evidence of new onset heart failure.

Patients with metabolic acidosis and those with normal serum bicarbonate levels were defined by two serum bicarbonate values between 12 and <22 mEq/L and 22 to 29 mEq/L, respectively. Potential confounders, including age, sex, race, eGFR, diabetes, hypertension, heart failure, coronary artery disease, peripheral vascular disease, hemoglobin, and serum albumin, were examined using Cox proportional hazards models.

The study included 51,558 patients. At 2 years, the incidence of adverse cardiovascular events was significantly higher among the patients in the metabolic acidosis group compared with those with normal serum bicarbonate levels: heart failure, 29.8% vs 22.8%, $P<.001$; stroke, 19.5% vs 17.2%, $P<.001$; and myocardial infarction (MI), 17.2% vs 12.3%, $P<.0001$, respectively.

During follow-up, there was an independent association between serum bicarbonate and adverse cardiovascular outcomes. The hazard ratios per 1 mEq/L change were: new onset heart failure, 0.976, 95% confidence interval [CI], 0.971-0.981; stroke, 0.979; 95% CI, 0.973-0.985; and MI, 0.964; 95% CI, 0.958-0.970, respectively.

"In this longitudinal analysis of >51,000 non-dialysis CKD patients followed for up to 10 years, serum bicarbonate levels below 22 mEq/L were associated with increased incidence of major adverse cardiovascular events independent of age, comorbid conditions, and kidney function. Studies evaluating the mechanisms of these associations are needed," the researchers said.

Source: Reaven NL, Funk SE, Mathur VS, Tangri N. Association of metabolic acidosis with adverse cardiovascular outcomes in patients with CKD. Abstract of a poster presented at the American Society of Nephrology Kidney Week 2019 (Abstract TH-P0693), November 7, 2019, Washington, DC.

International Variation in Rates of Peritonitis

continued from page 1

including the use of automated peritoneal dialysis, use of icodextrin or biocompatible peritoneal solutions, antibiotic prophylaxis strategies, and duration of peritoneal dialysis training. Study outcomes of interest were the rate of peritonitis by country, overall, and the variation in rate across facilities, and microbiology patterns.

There were 2272 episodes of peritonitis during 7876 years of follow-up. Overall country-specific peritonitis rates ranged from 0.26 to 0.29 episode per patient-year in the United States, Japan, and Canada to 0.35 to 0.40 episode per patient-year in Australia/New Zealand, the United Kingdom, and Thailand. There was broad and overlapping variability in facility peritonitis rates among Australia/New Zealand, Canada, Japan, the United Kingdom, and the United States. Rates of peritonitis that were higher than the guideline limit from the International Society for Peritoneal Dialysis (ISPD) of 0.50 per patient-year were estimated for 10% of facilities overall, 18% of Thailand facilities, 22% of Australia/New Zealand facilities, and 33% of United Kingdom facilities.

> Rates of peritonitis that were higher than the guideline limit from the International Society for Peritoneal Dialysis of 0.50 per patient-year were estimated for 10% of facilities overall.

The analysis included data from 2014 to 2017 from all countries currently part of PDOPPS: Australia and New Zealand, Canada, Japan, Thailand, the United Kingdom, and the United States. A total of 209 facilities and 7051 patients were included. Mean patient ages varied by country: 56 years in Thailand, 58 to 61 years in the United States, Canada, and the United Kingdom, and 63 to 64 years in Australia/New Zealand and Japan. Vintage of kidney replacement therapy was highest in Japan and the United States (median, 1.3 years in each). Serum albumin levels were slightly lower in Thailand, while 24-hour urine volume was noticeably lower in Thailand compared with the other countries. Commonly reported comorbid conditions were cardiovascular disease (25%-51% by country) and diabetes (27%-51% by country).

With the exception of Thailand and Japan, automated peritoneal dialysis was the predominant peritoneal modality. In Thailand, there was essentially no use of icodextrin-based in solutions; use in US non-large dialysis organization (LDO) facilities was low. There was essentially no use of low-glucose-degradation product neutral-pH solutions in Thailand or US non-LDO facilities.

Among peritonitis episodes requiring hospitalization within 14 days of onset, median length of stay was less than 1 week in all countries except Japan and Thailand. In Japan and the United Kingdom, 19% to 20% of all peritonitis episodes had a concomitant exit-site infection reported; the rates were 6% in 10% in the other countries.

In analyses combining data from all countries, lower peritonitis rate ratios (RRs) were seen in facilities with a greater proportion of patients using automated peritoneal dialysis (RR per 10 percentage points greater, 0.95; 95% confidence interval [CI], 0.91-1.00); facilities using antibiotic prophylaxis at insertion of peritoneal catheter (RR vs none [Australia/New Zealand, Japan, Thailand, and United States only; contrast was not estimable for Canada or the United Kingdom], 0.83; 95% CI, 0.69-0.99); and in facilities using a training duration of ≥6 days (RR vs <6 days [Australia/New Zealand, Canada, Japan, Thailand, and United States only; contrast not estimable for the United Kingdom], 0.81; 95% CI, 0.68-0.96).

The risk of peritonitis was lower in facilities that used topical exit-site mupirocin or aminoglycoside ointment; however, the association did not achieve conventional levels of statistical significance (RR, 0.79; 95% CI, 0.62-1.10). Associations with other facility factors were weaker.

In analyses of associations of potential confounding patient-level variables with peritonitis, serum albumin level and residual urine volume were associated with lower peritonitis rate. There were also associations between Black race (United States only), male sex, heart disease, gastrointestinal bleeding, and previous hemodialysis experience and higher rates of peritonitis.

Limitations to the study cited by the authors included the observational design of the study, including upper-middle income and high-income countries that may have limited the generalizability of the findings, and unmeasured differences in patients or facility practices that may explain differences in the observed rates of peritonitis.

In summary, the researchers said, "We have identified important regional differences in the risk for peritonitis and potentially modifiable practices that may reduce these risks. Improvement in culture-negative peritonitis rates should be a priority for all participating countries. Because PDOPPS collects data for patient-reported outcome measures, it will also be important to relate these measures to the risk for peritonitis to develop and better understand strategies for patient engagement that will reduce risks for peritonitis. This study sets the stage for future PDOPPS studies of other practices related to peritonitis prevention; for example, highlighting differences in patient training strategies and novel technologies such as remote patient monitoring. In addition, PDOPPS had identified important gaps in translating best practices across facilities, including selected ISPD guideline recommendations that may affect the risk for peritonitis." ■

TAKEAWAY POINTS

- Peritonitis related to peritoneal dialysis is a common complication and carries a high morbidity for patients on peritoneal dialysis. Researchers reported results of the Peritoneal Dialysis Outcomes and Practice Patterns Study (PDOPPS).
- The study included data on the rates of peritonitis and the associations between selected facility practices and peritonitis risk in 209 facilities across seven countries.
- There were important international differences in the risk for peritonitis that may be the result of varied and potentially modifiable treatment practices.

CONFERENCE COVERAGE KIDNEY WEEK 2019

Disparities in IgA Nephropathy Progression Based on Gender

Results of previous studies have suggested sex-related disparities in the prognosis of chronic kidney disease (CKD). **Akihiko Koshino, MD,** and colleagues in Japan conducted a multicenter retrospective study to examine the influence of gender on the prognosis of immunoglobulin A nephropathy (IgA nephropathy). The researchers reported results of the study during a poster session at Kidney Week 2019 in a poster titled *Sex-Related Disparities in IgA Nephropathy Progression.*

Patients were divided into two groups according to sex. Clinical data at renal biopsy and data on renal outcomes were collected during follow-up. Renal outcomes were defined as 30% decline in estimated glomerular filtration rate (eGFR) from baseline. Cox regression models were used to evaluate the prognostic effects of gender.

The study enrolled 238 patients with IgA nephropathy (male, 124; female, 114). Body mass index (BMI) and high-density lipoprotein (HDL) cholesterol were higher in men than women. Other characteristics, including age, blood pressure, eGFR, and proteinuria were similar between the two groups. Median follow-up was 88 months.

In survival analysis, the hazard ratio (HR) of a 30% decline in eGFR was higher in men than in women (HR, 1.8; 95% confidence interval [CI], 1.1–3.4; P=.003). Gender was also seen as a prognostic factor in multivariable Cox regression analyses with matched BMI and HDL cholesterol (HR, 1.4; 95% CI, 1.1-2.2; P=.02).

Proteinuria and eGFR were common risk factors for 30% decline in eGFR in gender-based survival analysis. Hypertension in men and lower HDL cholesterol in women were gender-specific risk factors of 30% eGFR decline.

Study results suggested "sex-related disparities in progression of IgA nephropathy," the researchers said.

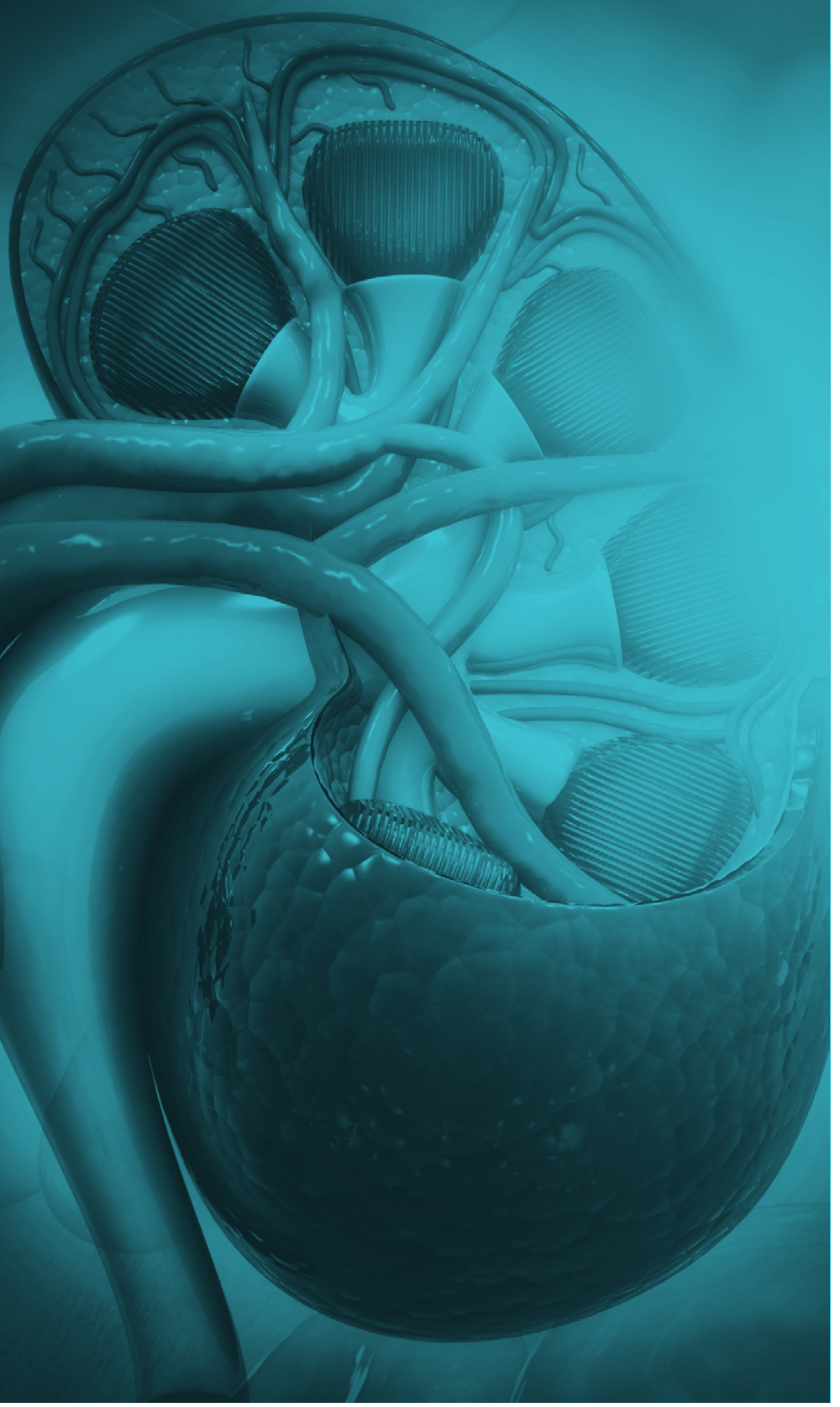
Source: Koshino A, Wada T, Ogura H, et al. Sex-related disparities in IgA nephropathy progression. Abstract of a poster presented at the American Society of Nephrology Kidney Week 2019 (Abstract TH-P01015), November 7, 2019, Washington, DC.

Print-only Content

Conference Coverage

May 30-June 3, 2020

AMERICAN TRANSPLANT CONGRESS 2020



The American Transplant Congress is the joint annual meeting of the American Society of Transplant Surgeons and the American Society of Transplantation. The Congress provides a forum for the exchange of new scientific and clinical information related to solid organ and tissue transplantation. Presentations and posters provide information on advances in research and care to transplant physicians, scientists, nurses, organ procurement professionals, pharmacists, and other transplant professionals.

Due to the coronavirus, the 2020 American Transplant Congress was held virtually, providing a showcase for the latest research and advances made by the transplant community in the past year. This is Part Two of our coverage of the meeting.

Outcomes at Centers Utilizing High Volumes of Hard-to-Place Kidneys

The number of patients on the wait list for a kidney transplant is increasing, yet the discard rate of donated kidneys remains high. There are data available from the United Network for Organ Sharing (UNOS) and Scientific Registry of Transplant Recipients (SRTR) databases on hard-to-place kidneys (HTPKs). HTPKs are defined as allografts allocated and transplanted after initial 100 offers.

D. Bahl and colleagues conducted an outcomes analysis study of centers performing high volumes of transplants using HTPKs; the analysis was also designed to provide a trends analysis for centers deemed as high volume in the previous data cycle. Results were reported during a virtual presentation at the American Transplant Congress 2020 in a presentation titled *Outcomes Analysis of Transplant Centers Performing High Volumes of Hard to Place Kidneys: An Update*.

Centers identified as high volume HTPK facilities were defined as those that performed more than 30 HTPK transplants per year. Data on both patient and graft survival were available. The analysis included transplants performed from January 1, 2018, to December 31, 2018; the outcomes analysis included the period January 1, 2016, to December 31, 2018. Data were compared with the time period January 1, 2017, to December 31, 2017.

During the specified study period, a total of 1888 HTPK transplants were performed. Only 19 of 223 of all transplant centers in the United States performed high volume HTPK transplants. Those 19 centers accounted for 60% (n=1080/1888) of HTPK transplants. Outcomes at six of the 19 centers (31.6%) were as expected, six had below expected outcomes (31.6%), and seven had outcomes above expected (36.8%).

In analysis of HTPK center locations by UNOS regions, region 9 had six of the 19 (32%), region 5 had five of the 19 (26%), and regions 2, 4, and 11 each had two centers (11% each). Regions 3 and 8 each had one center (5% each). New York, California, and Arizona accounted for 58% of the HTPK centers.

In summary, the researchers said, "Our study demonstrated that only 8.5% of all US transplant centers are high volume utilizers of HTPK. Our study locates over 70% of such centers in four states: Arizona, California, Florida, and New York. Sixty-eight percent of the HTPK centers had acceptable outcomes or better, and best practice [data] at these centers are being captured by our ongoing study.

"Region 9 and region 5 continue to transplant the highest number of HTPKs and transplant more than 50% of all HTPKs. Analyzing these centers' practices is imperative to understand how to better allocate kidneys with expected outcomes or better. As new organ allocation policies are formulated, center preference needs to be captured in more granularity to identify centers likely to accept a HTPK.

"Our study suggests when new allocation policies are formulated, algorithms be considered specifically for organs likely to be classified as HTPK and center experience be factored. Expedited offers to such centers would increase the utilization and reduce discard."

Source: Bahl D, Mehta N, Qazi YA. Outcomes analysis of transplant centers preforming high volumes of hard to place kidneys: An update. Abstract of a presentation at the virtual American Transplant Congress 2020 (Abstract 230), May 30, 2020.

Rates of Post-Transplant Incident Malignancy by Age

Among kidney transplant recipients, the risk of malignancies varies based on type of induction immunosuppression therapy. Because the risk of experiencing immunosenescense is greater in older kidney transplant recipients, the risk of malignancy in older recipients may be greater than among younger recipients.

L. Wang and colleagues at Johns Hopkins University, Baltimore, Maryland, conducted an analysis to compare the risk of incident malignancy in younger (18 to 64 years of age) and older (≥65 years of age) kidney transplant recipients by use of the two most common induction immunosuppression agents: anti-thymocyte globulin (ATG, rATG, and eATG) and interleukin-2 receptor antagonist (IL-2 RA, basiliximab, and daclizumab). Results of the analysis were reported during a virtual presentation at the American Transplant Congress 2020. The presentation was titled *Incident Malignancies among Post Kidney Transplant Patients by Type of Induction Immunosuppression and by Age*.

Utilizing the United States Renal Data System linked to Medicare claims, the researchers identified 66,700 adults ≥18 years of age who were first-time kidney transplant recipients between January 1, 1999, and December 31, 2014. Of those, 40,443 used ATG and 26,327 used IL2-RA as induction immunosuppression. The cumulative incidence of first-diagnosed malignancy after kidney transplant was generated using the Kaplan-Meier estimator. Cox proportional hazard model was used to estimate hazard ratios (HRs) of any and specific incident malignancy comparing ATG with IL-2 RA.

The cumulative incidences of any malignancy at 6 months, 1 year, and 3 years were 2.32%, 4.46%, and 11.95%, respectively. Overall, there was an association between the use of ATG induction and higher risk of post kidney transplant malignancy (HR, 1.11; 95% confidence interval [CI], 1.05-1.17; $P<.001$) compared with the use of IL-2 RA induction. This effect of immunosuppression on incident malignancy was similar among younger recipients (HR, 1.12; 95% CI, 1.06-1.18; $P<.001$) and older recipients (HR, 1.07; 95% CI, 1.01-1.14; $P<.05$); P for interaction =.392.

For specific malignancy, there was an association between ATG induction and higher risk of post kidney transplant skin malignancy (HR, 1.22; 95% CI, 1.12-1.33; $P<.001$). There was no significant evidence suggesting an association between ATG induction and higher risk of kidney malignancy (HR, 1.03; 95% CI, 0.89-1.18; $P=.684$) or lymphoma malignancy (HR, 1.12; 95% CI, 0.99-1.27; $P=.064$).

In conclusion, the researchers said, "Compared with IL-2 RA induction, ATG induction is associated with elevated risk of post-transplant malignancy; these effects did not differ by age. Transplant centers do not need to tailor induction immunosuppression by age to mitigate malignancy risk."

Source: Wang L, Motter J, Bae S, Segev D, McAdams-DeMarco M. Incident malignancies among post kidney transplant patients by type of induction immunosuppression and by age. Abstract of a presentation at the virtual American Transplant Congress 2020 (Abstract 8), May 30, 2020.

Midodrine Use in Patients Undergoing Simultaneous Liver-Kidney Transplantation

A common complication among patients with cirrhosis is chronic hypotension, which is associated with renal dysfunction. Patients with hypotension can be managed with midodrine to improve hemodynamics and renal perfusion. Previous studies have suggested that there is an association between use of midodrine prior to kidney transplant and worse renal allograft outcomes.

There are few data available on the impact of pretransplant midodrine use on renal allograft outcomes following simultaneous liver-kidney transplant (SLKT). **P. Barman** at the University of California at San Diego, and colleagues conducted a retrospective study designed to determine whether the need for pre-transplant midodrine results in worse outcomes for patients undergoing SLKT. Results of the study were reported during a virtual poster session at the American Transplant Congress 2020 in a poster titled *Need for Pretransplant Midodrine Does Not Negatively Impact Outcomes after Simultaneous Liver-Kidney Transplant*.

The analysis included all adult SLKTs performed at a single academic transplant center from February 1, 2002, to June 30, 2019. Demographic and transplant-related clinical data were collected until the date of the last follow-up or death. Wither Wilcoxon rank sum and/or Fisher exact test were used to test descriptive statistics.

During the study period, the center performed 64 SLKTs. Of those, 43 patients were not taking midodrine prior to transplant and 17 were taking midodrine alone (four were on intravenous vasopressor). The patients in the midodrine group were significantly older (61.5 years vs 52.6 years; $P=.001$) and more commonly had hepatic encephalopathy and hepatorenal syndrome than patients not taking midodrine. There were no differences between the groups in sex, body mass index, or medical comorbidities (hypertension, diabetes mellitus, cardiovascular disease) between the groups.

In the midodrine group, nine patients were on midodrine for >3 months, nine were taking between 10 and 30 mg per day, and seven were taking >30 mg per day. In the midodrine cohort, blood pressure was significantly lower at listing (systolic blood pressure 110 vs 133; $P=.007$); MELD-NA (Model for End-Stage Liver Disease, Sodium) scores were significantly higher in the midodrine cohort at listing (30 vs 25; $P=.002$) and at time of transplant (31 vs 26; $P=.003$) compared with the no-midodrine group.

The two groups were similar in donor demographics and in transplant parameters including cold ischemia time, warm ischemia time, panel reactive antibodies, kidney donor profile index, and immunosuppression. There were no significant differences in estimated glomerular filtration rate at discharge post-transplant or at 1 year, regardless of the use of pre-transplant hemodialysis. In addition, there were no differences in hospital length of stay, the need for post-transplant hemodialysis, midodrine use at discharge, development of renal dysfunction during follow-up, number of hospitalizations in the first 6 months, or mortality.

"In our single center cohort, the need for pre-transplant midodrine did not negatively impact outcomes in the first year after SLKT, in contrast to kidney transplantation alone. Multi-center confirmation of these results would be desirable," the researchers said.

Source: Barman P, King L, Berg C, et al. Need for pre-transplant midodrine does not negatively impact outcomes after simultaneous liver-kidney transplant. Abstract of a poster presented at the virtual American Transplant Congress 2020 (Abstract C-126), May 30, 2020.

Outcomes in Dual Kidney Transplantation with Kidneys with Remuzzi Scores of ≥8

The Remuzzi score is a histologic assessment of donor kidneys based on degree of glomerulosclerosis, arterial narrowing, interstitial fibrosis, and tubular atrophy. Allocation of renal allografts can be guided with the Remuzzi score for both single and dual kidney transplantation.

Previous studies have shown that outcomes of dual kidney transplantation using kidneys with combined Remuzzi score of 5 to 12 are similar to outcomes of single kidney transplantations with Remuzzi score <5. Recommendations based on the previous studies call for dual kidney transplantation with combined Remuzzi score of up to 12. The outcomes of dual kidney transplantation with combined Remuzzi score >12 are uncertain.

V. Fleetwood and colleagues conducted a single-center retrospective review to assess whether outcomes after dual kidney transplantation are impacted by higher Remuzzi scores. Results of the review were reported during a virtual poster session at the American Transplant Congress 2020 in a poster titled *Is Dual Allocation Successful at Higher Remuzzi Scores? Outcomes of Dual Kidney Transplants at Remuzzi Scores of 8 or Greater.*

The analysis included 65 recipients of dual kidney transplantation from 2000 to 2015. Sixty of the 65 (92.3%) had complete biopsy data. The analysis was stratified by Remuzzi score: low (2-5, n=10), intermediate (6-8, n=29), and high (9-14, n=21). ANOVA was used to compare mean estimated glomerular filtration rates (eGFRs). Graft survival and patient survival were determined using Kaplan-Meier estimates; survival rates were compared with the log rank test.

TABLE | Estimated GFR Over TIme

GFR	1 year	3 years	5 years
Low	59.3	65.3	67.7
Intermediate	51.1	54.9	63.5
High	51.5	50.1	53.4

In the low and intermediate Remuzzi score groups, eGFR increased at 3 and 5 years but did not improve in the high Remuzzi score group (Table). At 3 years, death-censored graft survival appeared better in recipients of low Remuzzi score, but was similar between the intermediate and high Remuzzi score groups (90.0% in the low group versus 75.7% and 73.0% in the intermediate and high Remuzzi score groups, respectively; P=.077).

After 3 years, patient survival was higher in the low-risk group but similar in the intermediate and high-risk groups (P=.37) for up to 10 years.

In conclusion, the authors said, "The use of kidneys with high Remuzzi score for dual kidney transplantation is safe and effective, with similar death-censored graft survival and patient survival in intermediate and high Remuzzi score. At 5 years, eGFR is higher in intermediate Remuzzi score recipients than high Remuzzi score recipients; intermediate Remuzzi score recipients may develop better filtration ability over time than high Remuzzi score recipients. Despite having lower filtration, the high-risk group has similar graft survival and patient survival outcomes and is therefore appropriate for use."

Source: Fleetwood V, Kensinger C, Papageorge C, et al. Is dual allocation successful at higher Remuzzi score? Outcomes of dual kidney transplants at Remuzzi scores of 8 or greater. Abstract of a poster presented at the virtual American Transplant Congress 2020 (Abstract B-036), May 30, 2020.

New Approach for HLA Testing in Kidney Transplant Recipients

M. Herrmann and colleagues at University Hospital Erlangen, Erlangen, Germany, conducted a study to assess a new diagnostic approach to human leukocyte antigen (HLA) typing in kidney transplant recipients. The approach utilizes cultured renal tubular cells from urine samples to facilitate clinical assessment of donor specificity of de novo occurring HLA antibodies. Results of the assessment were reported during a virtual poster session at the American Transplant Congress 2020 in a poster titled *A New Diagnostic Approach to HLA Testing in Kidney Transplant Patients Using Renal Epithelial Cells.*

The researchers collected urine samples from 10 patients following allogenic kidney transplantation and a primary culture of renal tubular cells was established according to a published protocol (Zhou et al. 2012, *Nature* protocols). Following 2 to 4 weeks of tissue culture and the third passage of cells, DNA extraction was performed from a 10 cm^2 culture dish.

To validate the analysis, patients were selected for the existence of stored spleen tissue. Only kidney transplant recipients without residual urine excretion were included in order to avoid contamination with patients' autologous renal cells. HLA typing compared DNA from tubular cells to DNA from spleen, both derived from the donor. Potential contamination of urine samples with patients' autologous renal cells was further ruled out by performing fluorescence in situ hybridization (FISH) of tubular cultures, in addition to analysis for genetic polymorphic markers by human multiplex short tandem repeats.

Most attempts to establish a culture of renal tubular cells were successful; only rarely did microbial contamination or insufficient proliferation of cells require a repeat urine sample. Use of FISH or analysis of polymorphic markers successfully ruled out relevant contamination with autologous tubular cells. In all patient samples, there was a consistent match in comparison of HLA typing from cultured renal tubular cells with their respective control samples from the spleen. The researchers were able to clinically interpret the findings in the context of circulating HLA bodies in selected cases.

In summary, the researchers said, "Screening for HAL antibodies had broadly become a yearly routine after kidney transplantation. Detection of previously unidentifiable de novo HLA antibodies is common during the follow-up after kidney transplantation due to widespread use of highly sensitive single antigen solid phase tests specific for individual HLA alleles. Assessing donor specificity of these antibodies, however, is frequently limited by incomplete or unavailable donor HLA typing data and/or donor samples for retyping.

"Theoretically, a graft biopsy could deliver donor DNA for HLA typing. However, this avenue is not frequently used since it is an invasive procedure and the acquired tissue is heterogeneous with varying degrees of recipient cellular material. We suggest that this new diagnostic approach for HLA typing in kidney transplantation patients offers a non-invasive option to determine donor specificity of de novo HLA antibodies typically occurring many years after transplantation. We propose that this technique is valuable in clinical management of humoral allograft rejection."

Source: Herrmann M, Bach C, Knaup KX, Schiffer M, Spriewald B, Wiesener MS. A new diagnostic approach to HLA testing in kidney transplant patients using renal epithelial cells. Abstract of a poster presented at the virtual American Transplant Congress 2020 (Abstract A-281), May 30, 2020.

Immunosuppression and Quality of Life: A Qualitative Study

Survey data results suggest that kidney transplant recipients who are considered tolerant (off immunosuppression) report higher rated quality of life and a lower symptom burden compared with standard living kidney transplant recipients. **E. L. Wood** and colleagues at the Fielding School of Public Health at the University of California, Los Angeles, conducted a qualitative study designed to examine the ways recipients perceive the impact of immunosuppression on their quality of life.

The study utilized in-depth qualitative inquiry. Results were reported during a virtual poster session at the American Transplant Congress 2020. The poster was titled *Impact of Immunosuppression on Quality of Life among HLA-Identical Living Kidney Recipients at UCLA-A Qualitative Study.*

The inquiry included semi-structured in-depth interviews to explore the impact of immunosuppression on the quality of life of kidney transplant recipients. Initial screening included 117 sibling pairs who underwent kidney donation/transplantation at UCLA between November 2013 and July 2019. Of those 117 pairs, 36 were human leukocyte antigen (HLA)-identical. Eleven participants completed demographic questionnaires and the semi-structured in-depth interview. The research team reviewed the transcripts of the interviews; content analysis (Atlas TI7 Version 7.5.18) was the qualitative methodology used.

Seven of the 11 participants were male, and nine were non-Hispanic white. Mean age at time of surgery was 50 years. Overall, the cohort had high socioeconomic status (>13 years of education, mean income $110,000), and mean time since transplant was 3.6 years (six of the 11 transplants were pre-emptive).

Recipients reported an almost immediate improvement in fatigue, weakness, dyspnea, and pallor following transplant" "I feel stronger…now I can do everything. I went back to a normal life." The burden of lifestyle changes after the transplant was a frequent topic, including being cognizant of sun exposure, changes in diet such as avoiding raw meat or sushi, and changes in behavior such as avoiding crowds and hugging and shaking hands: "You can't fight all the germs in the airplane…it really affected travel and I love to travel." Other frequent topics were fear of death, returning to dialysis, and graft rejection.

When participants were asked hypothetically whether they would like to be off immunosuppression, seven of the 11 declined. "I haven't had any effects with the medication" and "The medications are…not that bad…I'm just taking [the] very minimum" were typical responses. Several recipients indicated they were comfortable in their routine: "I'm doing something on a daily basis that prevents organ rejection."

Of the four who indicated they would prefer to be off immunosuppression medication, two had trouble remembering to take the medication and two were maintained with belatacept due to drug toxicity or other adverse side effects.

In summary, the researchers said, "Three years after transplant, most HLA-identical recipients were minimally bothered by their immunosuppression. Evaluation of recipients further out from transplantation (who may be experiencing more sequelae of chronic immunosuppression) is warranted."

Source: Wood EL, George S, Kogut N, Lum E, Veale JL. Impact of immunosuppression on quality of life among HLA-identical living kidney recipients at UCLA-a qualitative study. Abstract of a poster presented at the virtual American Transplant Congress 2020 (Abstract B-248), May 30, 2020.

Managing Postoperative Hemorrhage after Kidney Transplant Surgery

Previous studies have reported rates of 14% of postoperative hemorrhage in kidney transplantation. There are few data available regarding the optimal strategy to manage postoperative hemorrhage in this patient population. **R. Shaw** and colleagues conducted a retrospective cohort study to test the hypothesis that there would be a difference in outcomes with operative versus non-operative management of hemorrhage following kidney transplantation. Results of the study were reported during a virtual poster session at the American Transplant Congress 2020 in a poster titled *Operative vs Non-Operative Management of Hemorrhage in the Postoperative Kidney Transplant.*

The study cohort included consecutive kidney transplants from 2012 to 2019 (living and deceased donors). Patients were classified as experiencing hemorrhage based on the objective finding of hematoma on either ultrasound or computed tomography (CT). Hemorrhage management was defined as operative (surgical intervention with or without transfusion) or non-operative (with or without transfusion).

Of the 1758 kidney transplants performed at the center, 8% (n=135) demonstrated hematoma on ultrasound or CT scan; of those, 66 had operative management and 69 had non-operative management. In the overall cohort, the clinical signs and symptoms of postoperative hemorrhage that were 92.5% predictive of postoperative hemorrhage were low urine output (P=.044), drop in hemoglobin (P<.000), abdominal pain (P=.005), and mean arterial pressure <70 mm Hg (P=.034).

The two groups (operative vs non-operative management) were similar in medical history, pre-operative anticoagulation, anastomosis type, cold ischemia time, lowest hemoglobin, delayed graft function, and complications. Patients in the group with non-operative management of postoperative hemorrhage had shorter length of stay (P<.000), better graft survival (P=.01), and better patient survival (P=.01) compared with those in the operative management group.

In summary, the researchers said, "We found better outcomes of graft and patient survival with shorter lengths of stay when we utilized non-operative management of postoperative hemorrhage in kidney transplant patients. Our findings suggest a role for conservative non-operative management in select patients. Ultimately, it is the surgeon's choice of how best to manage the care of kidney transplant patients with postoperative hemorrhage."

Source: Shaw R, Reavis T, Meruva V, et al. Operative vs non-operative management of hemorrhage in the postoperative kidney transplant patient. Abstract of a poster presented at the virtual American Transplant Congress 2020 (Abstract C-109), May 30, 2020.

Late Switch from Calcineurin Inhibitors to Belatacept Offers Glycemic Benefits

There are strong associations between calcineurin inhibitors (CNIs) and steroids and adverse glycemic events including new-onset diabetes after transplantation (NODAT), worsening of pre-existing diabetes, as well as cardiovascular events. **J. Noble** and colleagues at the Nephrology and Transplant Unit, CHU Grenoble, Grenoble, France, conducted a single-center study to examine the benefit on glucose control and on cardiovascular risk factors of conversion from CNI-based immunosuppression to belatacept-based immunosuppression in kidney transplant recipients with diabetes.

Results of the retrospective, non-controlled study were reported during a virtual poster session at the American Transplant Congress 2020 in a poster titled *Late Conversion from Calcineurin Inhibitors to Belatacept in Kidney Transplant Recipients Has a Significant Beneficial Impact on Glycemic Parameters.*

The study was conducted between May 2016 and October 26, 2018. Eligible participants were kidney transplant recipients who converted from CNIs to belatacept a minimum of 6 months after transplantation. The primary end point of interest was the evolution of hemoglobin A1c (HbA1c) from baseline to after 6 months of treatment. Secondary end points were modifications to antidiabetic drugs, other cardiovascular risk factors, and renal function.

The study cohort included 103 kidney transplant recipients. Of those, 25% (n=26) had type 2 diabetes. Study participants were receiving either oral antidiabetic drugs (75%, n=21) or insulin therapy (54%, n=14). Overall, there was a significant decrease in HbA1c from 6.2% to 5.8% ($P<.0001$). In diabetic patients, HbA1c decreased from 7.2% to 6.5% ($P=.001$).

In the subgroup with NODAT, there was a significant decrease in HbA1c regardless of whether diabetes was controlled at study inclusion or not (i.e., HbA1c ≤7% or >7%). Further, no patient with diabetes increased the number of oral antidiabetic drugs, and there was no statistically significant difference in the dose of basal insulin from baseline to 6 months (16 UI at baseline and 16 UI at 6 months; $P=1$). Initiation of treatment by insulin pump was required for one patient.

During follow-up, all 103 patients remained stable in renal function, body mass index, and hemoglobin level. Two patients presented acute cellular rejection and no patient experienced graft loss.

"A late switch from CNI to belatacept was a valuable therapeutic option for diabetic kidney recipients and substantially improved glycemic parameters," the researchers said.

Source: Nobel J, Terrec F, Jouve T, et al. Late conversion from calcineurin inhibitors to belatacept in kidney transplant recipients has a significant beneficial impact on glycemic parameters. Abstract of a poster presented at the virtual American Transplant Congress 2020 (Abstract B-114), May 30, 2020.

Advances in Kidney Transplantation Following Multiple Myeloma

As a result of advances in treatment for multiple myeloma in patients with end-stage renal disease (ESRD), individuals in that patient population are increasingly being offered kidney transplantation. There are few data available on the risks and benefits of kidney transplantation in patients with multiple myeloma and ESRD.

V. Nair and colleagues at Northwell Health, Manhasset, New York, conducted an analysis of all reported cases in the last 19 years of patients with multiple myeloma who underwent kidney transplantation to identify the hematologic and transplant outcomes. Results of the analysis were reported during a virtual poster session at the American Transplant Congress 2020 in a poster titled *Kidney Transplantation after Multiple Myeloma: The Last 2 Decades*.

The researchers reviewed all publications from January 2000 to November 2019 that included patients with multiple myeloma who underwent kidney transplantation. The analysis was designed to evaluate variables and outcomes in that patient population including demographics, cause of ESRD, treatment for multiple myeloma, episodes of relapse, time to relapse, de novo malignancies, graft loss, and death.

The search identified ten publications and data on 36 patients. The majority (22/36) were published in 2019. Time from multiple myeloma treatment to kidney transplantation was shorter for patients for relapsed/progressed than for those who did not (34 months versus 51 months); the difference was not statistically significant.

The mean duration between multiple myeloma treatment and kidney transplantation was shorter in patients who died compared with patients who survived (39 months vs 57 months). The adjusted mean waiting time between treatment and transplantation was not a significant predictor for relapse/progression, death, or graft loss, and there was no impact of the type of multiple myeloma therapy on relapse. The only factor found to reduce the odds of relapse was increased age (odds ratio, 0.88; $P=.021$).

"Reports of kidney transplantation in patients with multiple myeloma are increasing. Our data help coalesce patient data over the last 20 years and can help inform clinicians and patients on expected hematologic and transplant outcomes in the complex population. Based on our analysis, only age influenced the risk of multiple myeloma relapse, although time from multiple myeloma treatment to kidney transplantation was numerically shorter in patients with relapse or death," the researchers said.

Source: Nair V, Jhaveri K, Abate M. Kidney transplantation after multiple myeloma: The last 2 decades. Abstract of a poster presented at the virtual American Transplant Congress 2020 (Abstract B-207), May 30, 2020.

Print-only Content

Aortic Stenosis Progression Varied by Race in Advanced CKD Patients

Aortic valve disease is associated with more than 17,000 deaths annually. The mortality of patients with symptomatic severe aortic stenosis (AS) is as high as 50% at year 1. Patients of European heritage with chronic kidney disease (CKD) have an increased risk of developing calcific AS. Data from previous studies have demonstrated a higher prevalence of AS in white adults, as well as increased AS-associated interventions in whites compared with Black patients.

Researchers have hypothesized that renal dysfunction may promote aortic valve calcification leading to AS by inducing high rates of inflammation, oxidative stress, and derangements in calcium and phosphorus homeostasis. However, there are few data available on whether the association between CKD and AS blunts the strong relationship between race and calcification of the aortic valve. **Aamir Husain, MD,** and colleagues conducted a study designed to compare the progression of AS between white and Black patients in a CKD population and to determine whether the genetic link between white adults and progression of AS remains among patients with CKD. Results were reported in *Cardiovascular Diagnosis and Therapy* [2020;10(1):24-30].

Patients with advanced CKD who were referred to the University of North Carolina Chapel Hill Cardiorenal Clinic from 2006 to 2016 for pre-operative kidney transplant evaluation were examined for aortic valve disease. All patients referred to the clinic were either receiving maintenance dialysis or had a glomerular filtration rate <25 mL/min/1.73 m^2. Inclusion criteria were documented AS (mild, moderate, or severe) at baseline over their 10-year trajectory by electrocardiography report. Also included were patients with a peak transvalvular velocity ≥2 meters per second (m/s) at any point during this time.

The researchers compared rates of change of three indices of AS severity (mean gradient, aortic valve area [AVA], and aortic valve velocity) between white and Black patients. The overall and race-stratified rate of progression for each index, adjusted for age, sex, smoking status, dialysis, and baseline cholesterol, were estimated using mixed effects linear models with repeated measures.

Of 1283 patients in the cardiorenal clinic's database, 148 met the inclusion criteria of having at least mild AS or a peak aortic transvalvular velocity of at least 2 m/s at any point during their follow-up trajectory, and at least one echocardiogram available for interpretation. Of those 148 patients, 93 were Black, 47 were white, and eight were other races. This resulted in 408 eligible transthoracic echocardiography (TTEs).

Patients had a median two visits and 101 patients (68%) had at least two TTEs during the study period. Among white patients, median time between TTEs was 362 days compared with 434 days for Black patients (P=.03). However, the median number of TTEs were the same between the two groups (median two).

Overall, median age in the study population was 58 years, 54% were male, 66% were Black, and 79% were on either hemodialysis or peritoneal dialysis. At baseline, 56% had diabetes, 100% were hypertensive, and 20% had either mild or moderate AS. Twenty-eight patients underwent renal transplant during the study period. The mean transvalvular gradient was 9 mmHg, the average estimated AVA was 1.8 cm^2, and the average transvalvular velocity was 2.0 m/s at the initial visit.

CONFERENCE COVERAGE KIDNEY WEEK 2019

Roxadustat for Treatment of Anemia in Patients with CKD

The oral hypoxia-inducible factor prolyl hydroxylase (HIF-PHI), roxadustat, is in last-stage development for the treatment of anemia in patients with chronic kidney disease (CKD). During a poster session at Kidney Week 2019, **Ciro Esposito, MD, PhD, MFAS,** of the University of Pavia, Pavia, Italy, and colleagues reported results of two phase 3 European studies of roxadustat: the ALPS study enrolled patients with non-dialysis-dependent CKD and anemia and the Pyrenees study enrolled patients with dialysis-dependent CKD and anemia. Results of the two studies were reported during a poster session at Kidney Week 2019 in a poster titled *Two Phase 3, Multicenter, Randomized Studies of Intermittent Oral Roxadustat in Anemic CKD Patients on (PYREENES) and Not on (APLS) Dialysis.*

In the double-blind ALPS study, patients with non-dialysis-dependent CKD with hemoglobin (Hb) ≤10 g/dL not treated with erythropoiesis-stimulating agents (ESAs) were randomized 2:1 to oral roxadustat or placebo for 52 to 104 weeks. In the open-label PYRENEES study, stable patients on hemodialysis or peritoneal dialysis with Hb 9.5 to 12 g/dL treated with ESAs were randomized 1:1 to oral roxadustat or ESAs for 52 to 104 weeks.

The primary end points were change of average Hb levels from baseline at weeks 28 to 52. Secondary end points were change of average low-density lipoprotein cholesterol from baseline at weeks 12 to 28, time to use of rescue therapy including transfusion, ESA, or intravenous (IV) iron (ALPS study), and mean monthly iron use through week 36 (PYRENEES study). The occurrence of adverse events was also examined.

The ALPS study included 594 non-dialysis-dependent patients; of those, 391 were randomized to roxadustat and 203 were randomized to placebo. The mean change in average Hb levels at weeks 28 to 52 from baseline was 1.988 in the roxadustat group versus 0.406 in the placebo group (P<.001). The least squares (LS) mean difference in LDL in the roxadustat group was -0.701 (95% confidence interval [CI], -0.83 to -0.57; P<.001) versus placebo. Roxadustat was superior to placebo in time to use of rescue therapy (hazard ratio, 0.238; 95% CI, 0.17-0.33; P<.001).

In the PYRENEES study, a total of 836 dialysis-dependent patients were randomized to roxadustat (n=415) or ESA (n=421). The mean change in average Hb levels at weeks 28 to 52 from baseline was 0.396 in the roxadustat group versus 0.183 for the ESA group (P<.001). The LS mean difference in LDL was -0.377 (95% CI, -0.451 to -0.304; P<.001) mmol/L in the roxadustat group versus ESA. Roxadustat was superior to ESA in mean monthly IV iron use (LS mean differences, -31.9 (95% CI, -4.14 to -22.4); P<.001.

Common adverse events in the ALPS study were end-stage renal disease, hypertension, peripheral edema, and decreased glomerular filtration rate; in the PYRENEES study, common adverse events were hypertension, arteriovenous fistula thrombosis, headache, and diarrhea.

In conclusion, the researchers said, "Roxadustat was effective in achieving and maintaining Hb levels compared with placebo and ESA in non-dialysis-dependent and dialysis-dependent CKD patients."

Source: Esposito C, Csiky B, Tataradze A, Reusch M, Han C, Sulowicz W. Two Phase 3, Multicenter, Randomized Studies of Intermittent Oral Roxadustat in Anemia CKD Patients on (PYRENEES) and Not on (ALPS) Dialysis. Abstract of a poster presented at American Society of Nephrology Kidney Week 2019 (Abstract SA-P0225), November 9, 2019, Washington, DC.

Compared with the white patients, Black patients were of similar age at first echocardiogram (58 vs 60 years), more likely to be female (54% vs 30%; *P*=.008), and more likely to be on dialysis (84% vs 66%; *P*=.01). The two groups were similar in proportions of diabetic patients (59% vs 49%), smoking (43% vs 60%), hypertension (100% vs 100%), and phosphorous levels (5.2 vs 5.0). Total cholesterol and high-density lipoprotein cholesterol were higher in Black patients than in white patients (175 vs 148; [*P*=.02] and 47 vs 40; respectively). At baseline, there were no differences between the two groups in the prevalence of AS and no significant differences in baseline values of the three AS indices between the two groups.

In measures of progression, mean transvalvular gradient increased at 1.26 mmHg per year (95% confidence interval [CI], 0.64 to 1.88), estimated AVA decreased at –0.07 (95% CI, –0.09 to –0.04) m^2 per year, and peak transvalvular velocity increased at 0.06 (95% CI, 0.02 to 0.10) m/s per year. Following adjustment for age, sex, smoking status, dialysis, and baseline total cholesterol, differences were minimal.

In white versus Black patients, mean gradient increased at 1.90 (95% CI, 0.79 to 3.01) mmHg per year versus 1.46 (95% CI, 0.79-2.14) mmHg per year; AVA decreased at –0.10 (95% CI, –0.15 to –0.05) m^2 per year versus –0.08 (95% CI, –0.11 to –0.05) m^2 per year; and transvalvular velocity increased at 0.11 (95% CI, 0.04 to 0.18) m/s per year versus 0.07 (95% CI, 0.03 to 0.11) m/s per year.

The researchers cited some limitations to the study including the single-center design and small sample size; the relatively young age of the study cohort; the majority of the population at baseline having mild AS rather than moderate or severe AS; and the pre-transplant evaluation possibly excluding otherwise sicker patients in the general CKD population.

In conclusion, the researchers said, "In this study investigating 148 advanced CKD patients who underwent serial echocardiography over a 10-year period, AS appears to progress at a faster pace in white patients compared to Black patients in each of the three AS indices (mean gradient, AVA, transvalvular velocity). These results suggest that the genetic predisposition for AS may be a strong risk factor for AS progression. Additional research is required to confirm the results of our study." ■

TAKEAWAY POINTS

- Researchers conducted a study to compare the progression of aortic stenosis between white and Black patients with advanced chronic kidney disease (CKD).
- The measures of interest were three indices of AS severity: mean gradient, aortic valve area, and aortic valve velocity.
- Study results suggested that progression of AS was more rapid in white patients compared with Black patients in each of the three AS indices.

Bariatric Surgery and 5-Year Kidney Outcomes in Adolescents

In the United States, diabetic kidney disease (DKD) and obesity-related nephropathy are leading causes of kidney failure, morbidity, and mortality. Medical treatments are only partially effective against DKD and obesity-related nephropathy. Bariatric surgery may confer renal protection in severely obese adolescents and adults, both with and without diabetes. Results of a recent study demonstrated that compared with bariatric surgery in severely obese youths with type 2 diabetes, there was an association between medical treatment and substantially higher odds of kidney disease over 5 years.

Petter Bjornstad, MD, and colleagues conducted an analysis to examine kidney outcomes of gastric bypass in a cohort of severely obese adolescents. The outcomes were compared with those in a cohort of adults who had been obese since adolescence. The researchers sought to test the hypothesis that there would be an association between gastric bypass surgery in severely obese adolescents and earlier and greater attenuation of markers of kidney disease compared with the same surgery performed in adults with longstanding obesity. Results were reported in *Kidney International* [2020;97:995-1005].

The analysis utilized data from the Teen-LABS (Teen Longitudinal Assessment of Bariatric Surgery) study that enrolled 242 adolescents. Of the 242 participants, 67% (n=161) underwent Roux-en-Y gastric bypass surgery and were included in the current analysis. In the LABS study (adult participants), 1738 participants underwent Roux-en-Y gastric bypass surgery. Of those, 396 reported history of obesity dating back to age 18 or earlier; the 396 adults were selected for comparison with the adolescents in the current analysis.

Fourteen percent of the adolescent cohort and 31% of the adult cohort had preoperative type 2 diabetes (*P*<.001). Further analyses were stratified by preoperative type 2 diabetes status.

In the cohorts with preoperative type 2 diabetes, distribution of sex, race, and ethnicity were similar between the adolescent and adult cohorts. Preoperative weight, body mass index (BMI), and hemoglobin A1c were also similar among adolescents and adults. Baseline levels of triglycerides and prevalence of hypertension were lower in adolescents compared with adults (121 mg/dL vs 157 mg/dL [*P*=.03] and 57% vs 80% [*P*=.006], respectively). Conversely, adolescents had higher baseline insulin concentrations (43.0 uU/mL vs 23.5 uU/mL; *P*=.002).

Among participants without preoperative diabetes, the distribution of sex, race, and ethnicity were similar between adolescent and adult populations. At baseline, BMI, weight, and insulin concentrations were higher in adolescents than in adults (53.5 kg/m^2 vs 50.0 kg/m^2, *P*<.001; 150.6 kg vs 143.9 kg, *P*=.03; and 25.2 uU/mL vs 19.0 uU/mL, *P*=.003, respectively). Adolescent participants had lower mean total cholesterol (157 mg/dL vs 182 mg/dL, *P*<.001), mean high-density lipoprotein cholesterol (37 mg/dL vs 43 mg/dL, *P*<.001), mean low-density lipoprotein cholesterol (92 mg/dL vs 112 mg/dL, *P*<.001), and prevalence of hypertension (31% vs 52%, *P*<.001).

In multivariable models, among adolescents with preoperative type 2 diabetes, there was an increased statistically significant prevalence of elevated urine albumin-to-creatinine ratio (UACR) at baseline compared with the adult cohort (22.5% vs 9.0%; *P*=.03). There were differences over time in the change in adjusted prevalence of elevated UACR in adolescents and adults with preoperative type diabetes. In the adolescent cohort, the adjusted prevalence of elevated UACR declined from baseline to year 1 (*P*=.06); the prevalence remained stable following year 1. Among adults, the adjusted prevalence of elevated UACR was stable from baseline to year 5 (*P*<.001).

In the cohorts without preoperative type 2 diabetes, the adjusted prevalence of elevated UACR at baseline was higher among adolescents compared with adults (9.4% vs 4.5%); the difference remained significant throughout the study (prevalence ratio, 2.04; 95% confidence interval [CI], 1.26-3.28; *P*=.004) in multivariable models.

In the cohorts with preoperative type 2 diabetes, hyperfiltration was more likely in continued on page 16

continued from page 15

the adolescent cohort than among the adults (prevalence ratio, 2.36; 95% CI, 1.03-5.33; *P*=.04) following multivariable adjustments. There was no change in the adjusted prevalence of hyperfiltration across the 5-year study period and the interaction term to test for a differential effect of bariatric surgery did not reach statistical significance.

Adjusted mean eGFR in the adolescent cohort was greater than that in the adult cohort over the 5-year period (mean difference, 7.4; 95% CI, –0.3 to 15.23 mL/min/1.73 m^2, *P*=.06). The adjusted mean eGFR increased significantly from baseline to year 1 (*P*<.001) and remained constant thereafter. In the cohorts without preoperative type 2 diabetes, the prevalence of hyperfiltration was similar in adolescents and adults after multivariable adjustments.

Over a 5-year period, adjusted mean eGFR was significantly greater in adolescents than in adults (mean difference, 3.1; 95% CI, 0.05-6.1 mL/min/1.73 m^2; *P*=.047). Over time, both groups experienced a significant change in eGFR (*P*<.001). The adjusted mean eGFR increased from baseline to year 1 (*P*<.001), year 1 to year 2 (*P*<.001), and then decreased from year 3 to year 4 (*P*=.002) and from year 4 to year 5 (*P*=.02). Baseline and 5-year eGFR were similar (*P*=.08). The adjusted trajectories of both groups during the study period were similar (*P*=.07).

Due to the small number of participants with preoperative eGFR <60 mL/min/1.73 m^2, the impact of bariatric surgery on impaired eGFR could not be evaluated.

Study limitations cited by the authors included the observational design, the low prevalence of certain outcomes, and the small sample size of adolescents with type 2 diabetes. Other limitations were the lack of nonsurgical control groups and the possibility that there may have been residual biases in the adult cohort that were unaccounted for.

In conclusion, the researchers said, "We report an increased prevalence of early kidney disease in severely obese adolescents with type 2 diabetes compared with adults before bariatric surgery. This might be due to a higher prevalence of hyperinsulinemia in Teen-LABS participants with type 2 diabetes. Earlier remission of elevated UACR following gastric bypass was apparent in adolescents with type 2 diabetes compared with their adult counterparts. Kidney disease is associated with increased risk for cardiovascular events and early death in patients with type 2 diabetes. However, it remains unclear whether earlier remission of DKD will translate to better long-term cardiovascular and kidney health. Therefore, further research with extended follow-up is needed to refine the risks and benefits of bariatric surgery on long-term health outcomes in severely obese adolescents with and without type 2 diabetes." ■

TAKEAWAY POINTS

- Researchers conducted an analysis of data from the Longitudinal Assessment of Bariatric Surgery (LABS) study and the Teen-LABS study to examine the differences in health effects of gastric bypass surgery between adolescents and adults with and without type 2 diabetes.
- In the adolescent cohort with preoperative type 2 diabetes, the prevalence of elevated urine albumin-to-creatinine ratio (UACR) was significantly higher compared with the adult cohort with preoperative type 2 diabetes.
- Earlier remission of elevated UACR following gastric bypass surgery was seen in adolescents with type 2 compared with their adult counterparts.

Coffee Consumption Provides Benefit to Kidney Function

Between 2007 and 2017, the prevalence of chronic kidney disease (CKD) increased by 27% and CKD is the 12th leading cause of death globally. CKD is associated with substantial healthcare costs and morbidity. Results of modeling studies project a continued increase in the burden of CKD and an increase in the number of years of life lost, from approximately 26 million annually in 2016 to 52.5 million in 2040. Progression to end-stage renal disease necessitating renal replacement therapy via dialysis or transplantation is a critical complication of CKD. There are associations between CKD and increased risk for cognitive impairment, renal bone disease, chronic anemia, and death from sepsis and cardiovascular disease.

There are limited strategies for the prevention and treatment of CKD. The recent focus has been on detection of mild to moderate CKD and progression to kidney failure, coupled with strategies to prevent and manage hypertension and diabetes in patients without CKD. However, according to **Oliver J. Kennedy, BM, BS, PhD,** and colleagues , there is a lack of effective population-based strategies aimed at achieving those goals.

Coffee, a complex mixture of chemicals, is commonly consumed and has been shown to be associated with mostly beneficial health outcomes. Results of epidemiologic studies suggest that coffee may protect against liver, neurologic, cardiovascular, and metabolic diseases, all-cause mortality, and some cancers. For many of those conditions, the benefits of coffee may be dose dependent.

Several previous studies among regular coffee drinkers have reported lower risks for reductions in estimated glomerular filtration rate (eGFR) and CKD. However, because individuals with risk factors for CKD such as high body mass index, hypertension, and smoking, also tend to drink more coffee, there is also the risk for

reverse causation if coffee intake decreases due to onset of CKD. To overcome those limitations, Dr. Kennedy et al. conducted a genome-wide association study (GWAS) using Mendelian randomization to examine the effects of coffee consumption on kidney health. Mendelian randomization exploits genetic variations that affect modifiable risk factor exposure to estimate a causal association. Study results were reported in the *American Journal of Kidney Diseases* [2020;75(5):753-761].

The study utilized baseline data from the UK Biobank cohort; the cohort included 227,666 participants. All participants provided samples for genetic analysis; at baseline, coffee consumption was identified from a dietary questionnaire. Kidney outcomes were identified using CKDGen Consortium data.

The study exposure was coffee consumption; the outcomes of interest were eGFR, CKD GFR categories 3 to 5 (G3-G5; eGFR <60 mL/min/1.73 m^2) and albuminuria, defined as urinary albumin-creatinine ratio >17 mg/g in men and >25 mg/g in women.

The eGFR GWAS included 48 studies, including cross-sectional case-control, cohort, and randomized controlled studies, and 13,814 participants of various ethnicities. The CKD GWAS included a subset of 43 studies and 117,165 participants (12,305 CKD cases/outcomes; 104,780 controls/noncases). In the included studies, mean age ranged from 37 to 81 years of age, mean eGFR ranged from 71.2 to 104.8 mL/min/1.73 m^2, the prevalence of CKD G3 to G5 ranged from 0.2% to 32.3%, and the prevalence of diabetes and hypertension both ranged from 0% to 100%.

The albuminuria GWAS included 54,450 participants of European ethnicity. In the included studies, mean age ranged from 44.9 to 77.8 years, median urinary albumin-creatinine ratio ranged from 2.5 to 15.6 mg/g, and the prevalence of albuminuria and diabetes ranged from 2.4% to 25.2% and from 1% to 100%, respectively. There were approximately 6000 cases of albuminuria. The data used in the current study were summary-level and had been published by the CDKGen Consortium in meta-analyzed form.

> Following removal of three SNPs responsible for significant heterogeneity, an extra cup of coffee was also associated with higher eGFR.

In the UK Biobank, 2126 single-nucleotide polymorphisms (SNPs) were associated with coffee consumption; of those, 574 were available in the CKDGen GWAS. Following removal of SNPs that were in linkage disequilibrium and one unrecorded palindromic SNP, 25 remaining SNPs were available for coffee-kidney Mendelian randomization analyses.

Results demonstrated that drinking an extra cup of coffee per day conferred a protective effect against CKD G3-G5 (odds ratio [OR], 0.84; 95% confidence interval [CI], 0.72-0.98; *P*=.03) and albuminuria (OR, 0.81; 95% CI, 0.67-0.97; *P*=.02). Following removal of three SNPs responsible for significant heterogeneity, an extra cup of coffee was also associated with higher eGFR.

Limitations to the study included the assays used to measure creatinine and albumin varied between the studies that contributed data, and using a sex-specific definition for albuminuria rather than Kidney Disease Improving Global Outcomes guideline recommendations.

In conclusion, the researchers said, "This Mendelian randomization analysis suggests a protective role of drinking coffee in maintaining kidney health among regular coffee drinkers. The importance of these findings is underlined by modeling predictions of growing CKD prevalence in the United States in the next decade, which are most sensitive to assumptions in rates of eGFR decline. This is in the context of a lack of effective interventions to prevent declines in eGFRs among populations with and without CKD. Next steps should include further Mendelian randomization studies to investigate associations of coffee with important risk factors, particularly diabetes and hypertension, which may mediate the effect on CKD. A nonlinear dose-response at higher levels of consumption should also be investigated. This will better define the potential role of coffee in preventing CKD onset and progression and inform the design of a randomized controlled trial with a coffee-based intervention." ■

TAKEAWAY POINTS

- Researchers in the United Kingdom conducted a genome-wide association study and Mendelian randomization to examine the impact of coffee consumption on kidney function.
- Results of the study suggested a beneficial effect of coffee consumption in kidney function and a protective role in maintaining kidney health.
- Further studies should examine associations of coffee with renal risk factors such as diabetes and hypertension.

CONFERENCE COVERAGE NKF 2020 SPRING CLINICAL MEETINGS

Online Education on Hyperkalemia for Patients/Caregivers

It is difficult for patients to manage hyperkalemia with a strict diet. **Amy Larkin, PharmD, CHCP,** and **Donald Blatherwick** of Medscape Education, (New York, New York), conducted an analysis of the impact of online education for patients and caregivers on knowledge and confidence regarding management of hyperkalemia as well as on promoting change among those populations.

Results of the analysis were reported during a poster session at the NKF 2020 Spring Clinical Meetings in a poster titled *Online Patient/Caregiver Education on Hyperkalemia Can Improve Knowledge, Confidence, and Prompt Real Life Changes.*

The educational experience was designed as two online, interactive activities. Both activities included text and integrated visuals; the second activity also included a patient commentary video. Demographic data were gathered via a questionnaire completed by the participants prior to initiating the activity. Learning gains were assessed using a knowledge question asked prior to and following completion of the activity; intent to change and confidence questions were also asked following the activity. The researchers calculated absolute improvements for pre- and post-questions. The activities launched in March and May 2019; data were collected through September 2019.

Activity 1 was headlined *Do you have high potassium? Here are some tips for managing potassium in your diet.* Of the 35,889 participants in activity 1, 4305 competed all questions and were included in outcomes analysis. Of the 4305 completers, 65% were female, 63% were non-Hispanic white, 67% were ≥54 years of age, 45% had hyperkalemia, and 42% were more interested in learning more about hyperkalemia.

Changes in knowledge assessed by the pre- and post-activity questions demonstrated a 24% improvement in recognizing foods high in potassium (50% pre-activity vs 74% post-activity). In the intent-to-act response section, 81% of completers indicated they planned to identify and avoid foods high in potassium. In responses regarding changes in confidence, 79% reported they felt increased confidence regarding talking to their physician about ways to lower potassium.

Activity 2 was headlined *Are medicines that lower potassium right for you?* Of the 36,511 participants, 2917 completed all questions in activity 2. Of the 2917 completers, 59% were female, 70% were non-Hispanic white, 82% were ≥54 years of age, 58% were interested in learning more about hyperkalemia, and 29% reported having hyperkalemia.

Changes in knowledge demonstrated a 23% improvement in recognizing how potassium binders work in managing hyperkalemia (42% pre-activity vs 65% post-activity). In the intent-to-act section, 69% indicated they planned to discuss medications to treat hyperkalemia with their healthcare provider. Results of changes in confidence questions showed 73% felt increased confidence in discussing medications to treat hyperkalemia with their physician.

"The metrics and outcomes gathered in this assessment are a strong indicator that these patient/caregiver-focused online educational activities improved knowledge and confidence, and prompted intent to act by patients/caregivers related to hyperkalemia," the researchers said.

Source: Larkin A, Blatherwick D. Online patient/caregiver education on hyperkalemia can improve knowledge, confidence, and prompt real life changes. Abstract of a poster presented during the National Kidney Foundation 2020 Spring Clinical Meetings; abstract #327.

KDIGO 2020 Clinical Practice Guideline for Evaluation of Kidney Transplant Candidates

The 2020 Kidney Disease: Improving Global Outcomes (KDIGO) Clinical Practice Guideline on the Evaluation and Management of Candidates for Kidney Transplantation was developed to assist healthcare professionals throughout the world evaluating and managing patients who are potential candidates for deceased or living donor kidney transplantation. Steven J. Chadban, BMed, PhD, and colleagues summarized the new guideline in *Transplantation* [2020; 104(4):708-714].

The guideline was developed by the Work Group Co-Chairs in cooperation with KDIGO staff. The draft scope of the work was distributed internationally in March 2016 and then revised and finalized based on comments and suggestions. A draft of the resulting guideline was available for public review in October 2018 and then revised further by the Work Group. The summary provided by Dr. Chadban et al. is organized by chapters as they appear in the full document.

SECTION 1: ACCESS TO TRANSPLANTATION

On average, transplantation is associated with optimal survival and quality of life at lower cost than dialysis. The guidelines call for all patients with chronic kidney disease grade 4-5 (glomerular filtration rate [GFR[<30 mL/min/1.73 m^2) who are expected to progress to end-stage renal disease (ESRD) to be "informed of, educated about, and considered for transplantation."

The assessment may take weeks or months; referral for candidacy assessment should be sufficiently early to allow for preemptive transplantation wherever possible.

For patients at high-risk due to the cause of ESRD and/or comorbid conditions, assessment should be made by disease-specific experts.

The assessment team should be multidisciplinary, including at least a transplant physician, a transplant surgeon, a healthcare worker qualified to conduct a psychosocial assessment, and other professionals as needed and available. Participation of the patient throughout the process is essential, and when a patient is deemed unsuitable for transplantation, a second opinion should be provided.

SECTION 2: AGE

Patients should not be excluded from "kidney transplantation because of age alone but rather consider the context of other comorbidities, including frailty, that may impact outcome when deciding about suitability for kidney transplantation."

The number of older candidates for transplantation is increasing, creating a need for the development of predictive models that incorporate frailty and multimorbidity in addition to age. The new tools may improve the ability to assess candidacy in the older patient population.

SECTION 3: PEDIATRIC ISSUES

In assessing pediatric candidates <5 years of age, recognition of abnormalities in cognitive function and academic performance may suggest appropriate intervention and support both prior to and following transplantation, and facilitate pediatric-to-adult transition.

SECTION 4: PSYCHOSOCIAL ASSESSMENT

The psychosocial assessment is designed to identify areas needing management or support before and after transplantation.

CONFERENCE COVERAGE NKF 2020 SPRING CLINICAL MEETINGS

Simultaneous BNN and Kidney Transplantation in Patients with ADPKD

Patients with end-stage renal disease (ESRD) due to symptomatic autosomal dominant polycystic kidney disease (ADPKD) may require bilateral native nephrectomy (BNN). The optimal timing of BNN is unclear. Clinicians at the Mayo Clinic, Rochester, Minnesota, began offering laparoscopic BNN with hand-assisted method at the time of kidney transplant for patients with symptomatic disease.

At the NKF 2020 Spring Clinical Meetings **Nitin Abrol, MBBS, MS, MCh,** reported results of an retrospective analysis of the cohort of patients who underwent simultaneous BNN with kidney transplantation. The outcome of interest was allograft function recovery after the surgery. The presentation was titled *Simultaneous Laparoscopic Bilateral Native Nephrectomy with Kidney Transplantation Does Not Affect the Allograft Function in Patients with Symptomatic ADPKD and ESRD.*

The cohort included patients who underwent simultaneous laparoscopic BNN with kidney transplantation from 2014 to October 2019. Patients who underwent unilateral NN (n=5), no NN (n=121), or simultaneous liver transplant (n=6) at the time of kidney transplant were excluded.

During the study period, 185 adult patients with ADPKD underwent kidney transplantation. Of those, 53 had hand-assisted laparoscopic BNN at the time of the kidney transplant. A single surgeon performed all surgeries. Median age of the cohort was 53.1 years, 56.6% were male, and median body mass index was 28.8 kg/m^2. With the exception of one patient, all received a kidney from a living donor, the majority (84.8%) were induced with alemtuzumab, and 86.8% were pre-emptive.

One patient reported small bowel resection due to intraoperative small bowel injury. There was no solid organ injury during the procedure. The median duration of urethral catheter and ureteric stent was 3 days.

Immediate allograft function and steady decline in serum creatinine was seen in all patients. No patients required dialysis following kidney transplantation. On day 1 following the transplant, the median decline in creatinine and hemoglobin was 1.2 mg/dL and 2.2 g/dL, respectively. All patients completed 3 weeks of follow up; 35 patients completed 1 year of follow up. There was no graft loss in the first year following kidney transplantation. At 1 year, median creatinine was 1.5 mg/dL.

In conclusion, Dr. Abrol said, "Hand-assisted laparoscopic bilateral nephrectomy is feasible with kidney transplantation in patients with symptomatic ADPKD. Overall, the procedure is safe without compromising graft viability."

Source: Abrol N, Bentall A, Torres V, Prieto M. Simultaneous laparoscopic bilateral native nephrectomy with kidney transplantation does not affect the allograft function in patients with symptomatic ADPKD and ESRD. Abstract of a presentation at the National Kidney Foundation 2020 Spring Clinical Meetings; abstract #375.

Counseling and support services should be provided to candidates with a diagnosable psychiatric or psychological conditions, substance use disorder, or nonadherence.

SECTION 5: ADHERENCE

There are strong associations between immunosuppression regimen nonadherence and adverse outcomes including rejection, particularly antibody mediated, and subsequent premature graft failure. However, there are only weak associations between pre-transplant nonadherent behavior and post-transplant outcomes. Identification of pre-transplant patterns of nonadherence may provide opportunity for counseling, but, in most cases, should not preclude candidacy.

SECTION 6: TOBACCO

Smokers are at increased risk for perioperative respiratory complications as well as post-transplant cardiovascular events, cancer, and premature mortality. Smokers should be referred to smoking cessation programs. Screening among heavy smokers for occult lung cancer should be conducted using computed tomography; if occult lung cancer is detected, patients should undergo cancer treatment prior to further consideration of candidacy for transplantation.

SECTION 7: SURGICAL ISSUES INCLUDING OBESITY

Interventions such as dietary counseling or bariatric surgery should be considered for patients with body mass index ≥35 kg/m^2. In patients being treated with anticoagulants or antiplatelet agents, the risks of perioperative bleeding is increased; pre-transplant awareness of such therapies allows for proper surgical planning. Listing of patients requiring direct-acting oral anticoagulants or dual antiplatelet therapy should be considered only in centers with surgical experience of those agents, and in consultation with hematology and cardiology experts as appropriate.

SECTION 8: DIABETES

The guidelines state that "candidates with diabetes mellitus, type 1 or type 2, should not be excluded from kidney transplantation."

In candidates with type 1 diabetes, outcomes with simultaneous kidney-pancreas transplantation are superior to kidney alone transplantation. Patients in that population should be referred to a center that provides simultaneous kidney-pancreas transplantation.

The most common cause of ESRD is type 2 diabetes; patients in that population are at decreased risk for post-transplantation survival. However, most patients with type 2 diabetes have a survival advantage with transplantation compared with dialysis. Evaluation of transplant candidacy is particularly challenging in that patient population; candidates with type 2 diabetes should not be excluded by diabetes *per se,* but full consideration of comorbid status is required.

SECTION 9: CAUSE OF END-STAGE KIDNEY DISEASE

The guideline calls for determination of the cause of ESRD where possible to inform the risks and needed management post-transplant. Post-transplant outcomes are superior to dialysis for the majority of patients with glomerulonephritis or metabolic diseases that may recur in the allograft. Identification of the cause of kidney failure is an essential prerequisite for optimal risk evaluation, patient education, and management of candidates with a disease that may recur.

SECTION 10: INFECTIONS

In kidney transplant recipients, particularly those in low- and middle-income countries, infection is a common cause of morbidity and mortality. Transplant immunosuppression may accelerate active infections; diagnosis and treatment prior to transplant is prudent. Cure of infection pre-surgery is ideal; however, control of the infection prior to transplantation in combination with ongoing therapy to achieve a post-transplant cure is acceptable for some infections, such as peritoneal dialysis exit-site infection. Transplantation is not precluded in the case of screen detected infections such as occult TB and strongyloides; however, those infections may be indications for treatment to prevent post-transplant disease, subject to local practice patterns and epidemiology.

SECTION 11: MALIGNANCY

Previous guidelines have varied in recommendations for candidates with cancer. The new guideline calls for routine cancer screening for all candidates, per local guidelines for the general population. With the exception of indolent and low-grade cancers such as prostate cancer (Gleason score ≤6), superficial non-melanoma skin cancer, and incidentally detected renal tumors (≤1 cm in maximum diameter), candidates with active malignancy should be excluded from kidney transplantation until in remission following potentially curative therapy.

SECTION 12: PULMONARY DISEASE

Candidates with severe, irreversible lung disease and ESRD are at high risk of premature post-transplant death. Patients in that population may benefit from combined kidney-lung or heart-lung transplantation and should be referred to centers that specialize in multiorgan transplantation.

continued on page 20

CONFERENCE COVERAGE NKF 2020 SPRING CLINICAL MEETINGS

Post-Operative Transplant Care: ICU or Surgical Floor

There are no clear recommendations for the optimal location of post-operative care of kidney transplant patients; some facilities treat post-operative transplant recipients in the intensive care unit (ICU), while others utilize non-ICU facilities on the surgical floor. **Jacentha Buggs, MD,** and colleagues conducted a retrospective cohort study to test the hypothesis that there would be a difference in graft and overall patient survival based on care location in the first 24 hours post-operatively (ICU vs surgical floor).

Results of the study were reported during the NKF 2020 Spring Clinical Meetings in a presentation titled *Post-Operative Kidney Transplant Management Location: ICU vs Surgical Floor.*

The cohort included consecutive adult deceased donor kidney transplant patients from 2013 to 2018. Following exclusion of pediatric donors and recipients, living donors, and multi-organ recipients, the cohort included 748 eligible patients; of those, 277 received care in the ICU and 471 had no ICU care.

Mean age of patients in the ICU group was 56.1 years, 45.8% had diabetes, and 28.2% had coronary artery disease; mean age of patients in the non-ICU group was 51.5 years, 32.8% had diabetes, and 15.3% had coronary artery disease. Non-ICU stay versus ICU stay was associated with a statistically significant improvement in graft survival (hazard ratio [HR], 0.35; 95% confidence interval [CI], 0.19-0.64; P=.001). The benefit remained significant following analysis that adjusted for baseline characteristics (age, diabetes, coronary artery disease, kidney donor profile index, and expected post-transplant survival score): HR, 0.33; 95% CI, 0.15-0.72; P=.005.

In unadjusted analysis, there was a statistically significant overall patient survival benefit associated with non-ICU stay versus ICU stay (HR, 0.37; 95% CI, 0.22-0.63; P<.0001). The association was not significant in adjusted analyses (HR, 0.69; 95% CI, 0.34-1.42; P=.31).

Patients in the ICU group versus those in the non-ICU group had significantly higher rates of delayed graft function (30% vs 18%; P<.0001), 30-day readmission rates (37% vs 27%; P=.007), and length of stay (8.9 days vs 6.7 days; P<.001).

In conclusion, the researchers said, "The results show that care in the ICU compared with non-ICU care is not associated with improvement in graft or overall patient survival. These findings show the need for the development of decision-making tools to assist physicians with the ICU referral process to improve patient outcomes."

Source: Buggs J, Branch A, Azevedo MJ, et al. Post-operative kidney transplant management location: ICU vs surgical floor. Abstract of a presentation at the National Kidney Foundation 2020 Spring Clinical Meetings; abstract #456.

continued from page 19

SECTION 13: CARDIAC DISEASE

The most common cause of death among patients on dialysis and post-transplantation is cardiovascular disease. Due to the stresses of surgery, fluid resuscitation, and high-dose immunosuppression, the incidence of major cardiac events is highest in the first month after transplantation. The guidelines recommend screening candidates deemed to be at high risk for cardiovascular disease at the time of the evaluation for transplantation. They do not recommend exclusion from transplantation of patients with asymptomatic cardiovascular disease.

Patients with known cardiovascular disease should be managed in collaboration with a cardiologist familiar with transplantation. For candidates with recent revascularization or infarction, the risk of complications, including further ischemic events or arrhythmia, are highest soon after the event and diminish with time. The minimum waiting period is not well established; the evaluation team should weigh the risk of vascular events, particularly if transplant listing will require a reduction in antiplatelet therapy, with the risk of delaying access to transplantation.

SECTION 14: PERIPHERAL ARTERIAL DISEASE

All candidates should be evaluated for the presence and severity of peripheral artery disease (PAD). Non-invasive vascular testing should be conducted on those without apparent PAD, but at high risk for PAD. For patients with PAD, the evaluation should include a vascular surgeon. In candidates with non-healing extremity wounds with active infection, transplantation should be delayed until the infection is resolved. Severe aorto-iliac disease or distal vascular disease should not exclude patients from transplantation, but the risk of progression following transplantation should be discussed with the patient.

SECTION 15: NEUROLOGIC DISEASE

Mental status in candidates with known or suspected cognitive impairment should be assessed; non-progressive intellectual, developmental, or cognitive disability should not exclude patients from transplantation. Peripheral neuropathy should also not exclude patients from transplantation.

For patients who experienced a stroke, a waiting time of 6 months is suggested before kidney transplantation; for patients who experienced a transient ischemic attack, a waiting time of 3 months is suggested.

For patients with autosomal dominant polycystic kidney disease, screening for intracranial aneurysms may be warranted if the patient is at high risk due to prior history or has a family history of subarachnoid hemorrhage.

SECTION 16: GASTROINTESTINAL AND LIVER DISEASE

Candidates should be screened for gastrointestinal disease, including liver disease. Those with a history of peptic ulcer disease, diverticulitis, acute or chronic pancreatitis, asymptomatic cholelithiasis, or inflammatory bowel disease should not be excluded from transplantation; transplantation should be delayed until symptoms have resolved.

In the presence of acute hepatitis, transplantation should be delayed until a long-term strategy for managing liver disease has been implemented. Those with cirrhosis or suspected cirrhosis should be referred to a specialist with expertise in combined liver-kidney transplant. Candidates with cirrhosis should be screened for hepatocellular carcinoma prior to transplantation using techniques and frequency per local guidelines.

SECTION 17: HEMATOLOGIC DISORDERS

Optimal strategies for anticoagulation intra- and perioperatively for candidates with a demonstrated thrombophilia are not clear. In clinical practice, the use of direct-acting oral anticoagulants is increasing, but this approach presents significant difficulties for management of the patient at the time of transplantation because the effects are not currently reliably reversable.

The guidelines avoid recommending waiting times between completion of potentially curative therapy for hematological cancers and subsequent kidney transplantation. Research is needed to validate the approach of transplanting once the transplant physicians and hematologists agree that a stable remission has been achieved.

SECTION 18: BONE AND MINERAL METABOLISM

The transplant evaluation should include measurement of serum parathyroid hormone. Because severe hyperparathyroidism may compromise outcomes through post-transplant hypercalcemia and graft dysfunction, correction prior to transplantation is advisable.

Transplant recipients may experience bone demineralization, putting them at increased risk for fracture. Currently, there are no proven strategies to prevent post-transplant fracture.

SECTION 19: IMMUNOLOGICAL ASSESSMENT

The transplant evaluation should include human leukocyte antigen (HLA) testing. The testing should be conducted at the time of evaluation, at regular intervals prior to transplantation, and following a sensitizing event or a clinical event that can impact panel reactive antibody.

The presence of donor-specific antibodies, particularly when directed against HLA molecules, is a key risk factor for rejection and graft failure, and is a key barrier to transplantation. ■

The authors and KDIGO gratefully acknowledge the financial support from the Transplantation Society that helped make this guideline possible.

CONFERENCE COVERAGE NKF 2020 SPRING CLINICAL MEETINGS

Loss of Kidney Allograft Due to BK Virus Nephropathy

In kidney transplant recipients, BK virus infection can lead to graft dysfunction and loss. Previous single center studies have examined the incidence and prevalence of BK viremia (BKV) and BK virus nephropathy (BKVN). **Het Patel, MD,** and colleagues conducted a retrospective cohort analysis to assess the incidence and risk factors of kidney allograft loss due to BKVN in the United Network for Organ Sharing (UNOS) data set. Results of the analysis were reported at the NKF 2020 Spring Clinical Meetings in a presentation titled *Incidence and Risk Factors of Kidney Allograft Loss Due to BK Virus: UNOS Data Set*.

All patients who received a kidney, simultaneous kidney pancreas, pancreas after kidney, and kidney with other organ transplant between January 2000 and December 2018 were identified utilizing the UNOS data. The researchers compared the risk factors of graft loss due to BK virus nephropathy with a functioning kidney graft. Student t-test was used to compare baseline donor and recipient characteristics; the Kruskal Wallis test was used for continuous variables and Chi-2 tests were used to categorize variables. Graft survival time was measured using the Kaplan-Meier curve.

The analysis included 332,649 patients; of those, 0.42% (n=1392) suffered graft loss due to BK virus nephropathy. Risk factors associated with graft loss due to BK virus nephropathy included African-American race, human leukocyte antigen mismatch ≥3, cold ischemia time, non-pre-emptive transplant, dialysis duration, high risk cytomegalovirus, donor type, and donor age.

Following simultaneous pancreas kidney transplant, the incidence of graft loss due to BK virus nephropathy was 0.53%. Following pancreas after kidney transplant, the incidence was 0.41%. The incidence of graft loss due to BK virus nephropathy tended to be higher among recipients of simultaneous heart and kidney transplant (0.72%).

"Seventy point one percent of patients who lost their graft due to BK virus nephropathy developed renal failure within the first four years after transplant, which confirms that BK virus nephropathy is more prevalent during the first few years after transplant and is associated with early graft failure," the researchers said.

Source: Patel H, Agarwal K, Pawar A, Leeaphorn N, Agrawal N, Cardarelli F. Incidence and risk factors of kidney allograft loss due to BK virus: UNOS data set. Abstract of a presentation at the National Kidney Foundation 2020 Spring Clinical Meetings; abstract #465.

AKF Calls for Action to Protect ESRD Patients from COVID-19

Preliminary data from the Centers for Medicare & Medicaid Services (CMS) indicated that patients with end-stage renal disease (ESRD) and Black Americans had significantly higher rates of hospitalization for COVID-19. The data covered the period from January 1 to May 16.

In a press release from the American Kidney Fund (AKF), **LaVarne A. Burton,** AKF president and CEO, said. "The new CMS data on COVID hospitalizations among Medicare patients is the tip of the pandemic iceberg. Racial and ethnic minorities are already disproportionately affected by kidney failure, and the double-whammy impact of COVID on Black Americans and those with kidney failure requires an urgent response from the federal government.

"It is absolutely urgent that we see all the data pertaining to the experience of minority populations with COVID-19, overlaid with chronic disease data to give us a full picture that will inform appropriate action to address the disproportionate impact."

The press release noted that while more than half of the dialysis patients in the United States are <65 years of age, most qualify for Medicare due to their kidney failure. The rates of development of chronic kidney disease are similar across race and ethnicity; however, minorities, including Blacks and Hispanics are more likely to progress to kidney failure. Of the patients with ESRD who are receiving help from the AKF Coronavirus Emergency Fund, most are people of color.

Fresenius Kidney Care to Open 100 New TCUs

Fresenius Kidney Care is the dialysis services division of Fresenius Medical Care North America and a provider of a network of dialysis facilities in the United States. In a summer press release, the company announced its intention to open more than 100 new transitional care units (TCUs) through the end of the year. The units are designed to educate patients recently diagnosed with kidney failure regarding available treatment options, including home dialysis, and to empower patients to become involved in management of their disease.

TCUs will be in separate spaces within dialysis centers and will employ staff dedicated to working with patients new to dialysis during their first weeks of treatments, assisting patients who are transitioning between treatment modalities, and supporting patients returning to dialysis following transplant. According to the press release, the TCUs will provide patients both the education and time to choose a therapy best suited for them, and greatly increase the chance that they will select a home therapy.

Joe Turk, president, home and critical care therapies, said, "TCUs provide an incredible resource to help ensure that our patients have a smooth start to their dialysis treatment while aiming to reduce the risk of treatment gaps and hospitalization. Best of all, TCUs help empower patients to make informed decisions about their therapy, while increasing the likelihood that they will take advantage of the many benefits that come with receiving their treatment at home."

Jeffery Hymes, MD, chief medical officer for Fresenius Kidney Care, said, "Home dialysis allows patients to receive life-sustaining treatment in the comfort of their homes, on a schedule that works best for their medical and lifestyle priorities. Patients in a TCU are able to receive one-on-one education and support on home dialysis in a low-risk environment so they can gain experience and confidence before dialyzing at home."

In July 2018, the US Department of Health and Human Services launched the Advancing American Kidney Health Initiative that seeks to have 80% of newly diagnosed patients with kidney failure receive a transplant or home dialysis by 2025.

AKF Announces Corporate Membership Program

The American Kidney Fund (AKF) has announced a corporate membership program open to institutional partners that support AKF's mission of fighting kidney disease and helping people live healthier lives.

In a press release from AKF, **LaVarne A. Burton,** AKF president and CEO, said, "Through our new corporate membership program, AKF's institutional partners are giving a clear vote of confidence to our broad range of programs and services that make a clear and tangible difference every day in the lives of Americans living with kidney disease and those at risk. This program provides essential direct support that helps fund our work fighting kidney disease on all fronts—from prevention through post-transplant living."

The charter members of the program are Amgen, AstraZeneca, and GSK at the Champion level; Tricida, Inc. at the Patron level; as well as Akebia Therapeutics, Inc.; Alexion Pharmaceuticals, Inc.; Ardelyx; Biotechnology Innovation Organization; Horizon Therapeutics plc; Omeros Corporation; Otsuka America Pharmaceutical, Inc.; Relypsa, Inc.; Sanofi Genzyme; and Vertex Pharmaceuticals Incorporated.

In a separate press release, AKF and AstraZeneca announced that they have partnered on an educational campaign, Beyond Bananas™, to increase understanding of hyperkalemia and to educate patients regarding potassium management through diet and appropriate treatment. **Martha Orzechowski,** AstraZeneca US head of advocacy and alliance, said, "As a science-led, patient-driven company, we could not be more proud to join AKF as a corporate member. We remain humbled by AKF's relentless efforts to change the paradigm for those impacted by kidney disease and look forward to continuing our collaboration."

NephU, Online Healthcare Community, Launched

In a press release from Otsuka Pharmaceutical Development & Commercialization, Inc., (OPDC) the company announced the launch of NephU (formerly PKDnetwork), a community and online resource library for healthcare professionals in nephrology to collaborate and share resources for people living with kidney disease.

The library will provide access to educational materials and tools, including disease simulators and other resources curated for the healthcare community caring for patients with kidney disease. Formats will include video, audio, webinars, podcasts, and social media sites.

"We are excited to launch NephU as a value-added resource to the nephrology community," **Reza Moghadam, PharmD, MBA,** senior director, field medical affairs at OPDC said. "We plan to offer a wide range of information and resources in areas such as polycystic kidney disease and other hereditary kidney diseases, general chronic kidney disease (CKD), anemia associated with CKD, renal replacement therapy options, and behavioral health for people living with kidney conditions. Our goal is to expand and excite the conversation regarding best practices for kidney care and health. In the future, we plan to offer a microsite where patients and caregivers can directly access content."

For more information, visit www.nephU.org.

continued on page 22

continued from page 21

CHF Solutions and RenalSense, Ltd, Sign Distribution Agreement

CHF Solutions and RenalSense, Ltd, have announced a distribution agreement to market and sell Clarity RMS™ (real-time monitoring system) in certain US territories. Clarity RMS is a critical care monitoring system that continuously measures urine flow rates and automatically transmits real-time data and fluctuation notifications to medical staff on a 24/7 basis. The data reflect changes in renal function and provide an early sign of acute kidney injury risk, enabling rapid intervention with therapeutic solutions such as CHF Solutions' Aquadex SmartFlow™ ultrafiltration system.

In a press release, **John Erb,** CEO of CHF Solutions, said, "At CHF Solutions, we continue to evaluate innovative products and tools that advance the quality of care clinicians can offer their patients. Early intervention saves lives, and RenalSense has developed a solution that allows healthcare providers to initiate preventive clinical action early. Partnering with RenalSense demonstrates our commitment to collaboration and improving patient care."

Avi Kleiman, CEO of RenalSense, added, "Our common goal is for urine output and fluid status to be electronically monitored in real time, as is the standard practice for other vital signs in the OR and ICU. With help from CHF Solutions, we can expand distribution of Clarity RMS in the US and bring monitoring of real-time urine output to physician and medical staff treating fluid-overloaded patients."

AKF Programs Receive Awards for Quality and Creativity

During the first half of 2020, the American Kidney Fund (AKF) programs received several awards for quality and creativity. Kidney Kitchen™ and Beyond Bananas™, two of AKF's newest educational resources for persons living with kidney disease, each received multiple awards.

Kidney Kitchen provides nutritional education and advice for patients with chronic kidney disease and end-stage renal disease and their caregivers. The campaign includes recipes suitable for the renal diet, and information on the specific nutrients kidney patients should track, and how to eat healthy for patients at all stages of kidney disease. The program received a Platinum Hermes Creative Award, a Gold AVA Digital Award, a Gold Aster Award, and Two Gold Omni Awards. Beyond Bananas, a campaign to increase patient understanding and management of hyperkalemia, received a Gold Aster Award and a Silver Bulldog PR Award. Other AKF materials and initiatives also received awards.

AKF's education campaigns are made possible through support from its corporate partners. Kidney Kitchen is funded with support from Akebia Therapeutics, Inc., AstraZeneca, Sanofi-Genzyme, and Satellite Healthcare. AstraZeneca is the sole supporter of the Beyond Bananas campaign. Supporters of other AKF programs include Horizon Therapeutics, and Janssen Inc., part of the Janssen Pharmaceutical Companies of Johnson & Johnson.

RenalytixAI Announces Partnerships and Testing Approval

RenalytixAI plc has announced receipt of approval from the New York State Department of Health to provide commercial testing of KidneyIntelX™. The approval will allow RenalytixAI to move to complete its full commercial launch of KidneyIntelX with the Mount Sinai Health System and begin reporting patient results in the third quarter of 2020. KidneyIntelX is intended to be used in conjunction with clinical evaluation as an aid in the risk assessment of progressive decline in kidney function within a period of up to 5 years.

In separate press releases, RenalytixAI also announced partnerships with the University of Michigan and America's Choice Provider Network (ACPN). Under the partnership with the University of Michigan, RenalytixAI will be given access to the Clinical Phenotyping Resources and Biobank Core (C-Probe) of the UM George M. O'Brien Kidney Translational Care Center that included more than 800 patients with a broad etiology of chronic kidney disease (CKD) with up to 10 years of follow-up. **Matthias Kretzler, MD,** Warner-Lambert/Parke-David Professor of Medicine, Nephrology/Internal Medicine, and Computational Medicine and Bioinformatics at the University of Michigan Medical School, said, "We are very excited to partner with RenalytixAI in this endeavor and firmly believe that KidneyIntelX platform is an ideal vehicle to integrate the results of our work on [the biomarker] urinary epithelial growth factor with other biomarkers, bioinformatics, and clinical research, with the goal of providing new, powerful solutions in managing CKD."

Under the partnership agreement with ACPN, RenalytixAI will be able to offer KidneyIntelX testing to patients with diabetic kidney disease among the more than 30 million ACPN members in the United States. **Todd Breeden,** CEO of ACPN, said, "ACPN is very excited to announce our new relationship with RenalytixAI. We are pleased to offer their first of its kind KidneyIntelX test to help guide chronic kidney disease care delivery. CKD is a significant challenge faced by our network of providers, payers, and members. This test is uniquely positioned to potentially improve care and outcomes and reduce healthcare spending. Our partnership with RenalytixAI shows ACPN's commitment to add progressive, cutting edge companies to our national provider network."

Thomas McLain, president and chief commercial officer of RenalytixAI, said, "We appreciate the opportunity to become one of ACPN's preferred providers. Their network aligns well with the new health systems targeted for our planned roll-out of KidneyIntelX and we believe it will support accelerated commercial adoption of our test. Being an ACPN provider demonstrates the value of KidneyIntelX testing to both clinicians and regional payers and assures access across the ACPN members served by these health systems. We look at this as a true partnership as we at RenalytixAI share ACPN's commitment to offer the highest quality of healthcare to their members."

Terlipressin Improves Kidney Function in Patients with HRS-1

In a press release, Mallinckrodt plc announced publication of findings from a medical chart study that was designed to examine the real-world use of terlipressin and other vasopressors in hospitalized patients with hepatorenal syndrome type 1 (HRS-1), an acute and life-threatening syndrome involving acute kidney failure in patients with cirrhosis. The study, funded by Mallinckrodt, demonstrated an association between terlipressin and an improvement in kidney function, measured by a reduction in serum creatinine, among patients with HRS-1. Results were reported in *Alimentary Pharmacology and Therapeutics*.

Kevin Moore, MD, UCL Institute of Liver and Digestive Health, Royal Free Hospital, University College London, and lead author of the study, said, "While there are limitations to medical chart study, the findings from this real-world data are encouraging for patients with HRS-1 who have limited treatment options and are often facing a poor prognosis."

HRS-1 has a median survival of approximately 2 weeks and more than 80% mortality within 3 months if left untreated. At present, there are no approved drug therapies for HRS-1 in the United States or Canada. Mallinckrodt is investigating terlipressin for the treatment of HRS-1 in the United States; its safety and effectiveness have not yet been established by the US FDA.

In July, the US FDA Cardiovascular and Renal Drugs Advisory Committee voted to recommend approval for terlipressin to treat adults with HRS-1. While the recommendations of the advisory committee are not binding, the FDA will consider the advice provided by the committee as part of the New Drug Application (NDA) review. The FDA assigned terlipressin a Prescription Drug User Fee Act target date of September 12, 2020.

Phase 2 Study of Treatment for COVID-19 Patients with Acute Liver or Kidney Injury

In a recent press release, DURECT Corporation announced initiation of patient recruitment for a phase 2 safety and efficacy study of DUR-928 in COVID-19 patients with acute liver or kidney injury. The primary efficacy end point of the randomized, double-blind, placebo-controlled, multi-center study is a composite of survival and being free of organ failure at day 28. Free of organ failure is defined as free of mechanical ventilation, free of liver failure events, and free of renal replacement therapy. The trial expects to enroll approximately 80 patients.

Patients will receive a dose of 150 mg of DUR-928 or placebo by intravenous infusion on day 1 and day 4 in combination with standard of care therapy, which will be determined by the principal investigator at each clinical trial site. Follow-up will continue for 60 days. If, during the trial period, the US FDA approves any drug product to be safe and effective for the treatment of COVID-19, such treatments may be offered, at the discretion of each principal investigator, to any remaining and future trial participants.

James E. Brown, DVM, president and CEO of DURECT, said, "Unfortunately, acute liver or kidney injury is associated with a significantly increased risk of death in hospitalized COVID-19 patients. Multi-organ failure is the cause of death in many critically ill COVID-19 patients just as it is in severe alcoholic hepatitis (AH), a life-threatening disease with a 28-day mortality rate of 26%. Based on positive clinical results of DUR-928 in AH patients from our phase 2a trial, and our preclinical data in multi-organ failure models, we believe that DUR-928, in combination with standard of care, has the potential to help COVID-19 patients with acute liver or kidney injury. There is a great need to explore life-saving treatment options for these high risk patients." ■

ACUTE KIDNEY INJURY

Predicting AKI in Hospitalized Children

Journal of the American Society of Nephrology. 2020;31(6):1348-1357

Targeted interventions for the treatment of acute kidney injury (AKI) in children are facilitated with timely prediction. However, according to **Ibrahim Sandokji, MD,** at Yale University, New Haven, Connecticut, the amount of data available in electronic health records (EHRs) presents modeling challenges in that patient population.

Dr. Sandokji and colleagues conducted a retrospective review of the EHRs of all children <18 years of age with a minimum of two creatinine values measured during a hospitalization from January 2014 through January 2018. The study population was divided into derivation and internal and external validation cohorts and used five feature selection techniques to select 10 of 720 potentially predictable variables from the EHRs. The primary outcome of interest was the development of AKI, defined using the Kidney Disease Improving Global Outcomes creatinine definition, within a moving 48-hour window. Secondary outcomes were severe AKI (stage 2 or 3), inpatient mortality, and length of stay.

Overall, a total of 8473 encounters were studied. Of those, AKI occurred in 10.2% (n=516), 9% (n=207), and 2.5% (n=27) encounters in the derivation and internal and external validation cohorts, respectively. The highest performing model used a machine learning-based genetic algorithm with an overall receiver operating characteristic curve in the internal validation cohort of 0.76 (95% confidence interval [CI], 0.72-0.79) for AKI, 0.79 (95% CI, 0.74-0.83) for severe AKI, and 0.81 (95% CI, 0.77-0.86) for neonatal AKI. The researchers identified high- and low-risk threshold points to translate the prediction model into a clinical risk stratification tool.

"Using various machine learning algorithms, we identified and validated a time-updated prediction model of ten readily available electronic health record variables to accurately predict imminent AKI in hospitalized children," the researchers said.

EPIDEMIOLOGY

Declines in GFR in Healthy Older Individuals

Journal of the American Society of Nephrology. doi.org/10.1681/ASN.2020020151

In the general population, mean glomerular filtration rate (GFR) is lower in older age; however, it is unclear whether healthy aging is associated with preserved versus lower GFR in some individuals. **Bjørn O. Eriksen, MD, PhD,** and colleagues conducted an meta-analysis to examine the cross-sectional association between measured GFR, age, and health in individuals 50 to 97 years of age in the general population. The analysis utilized data on measurements of iohexol clearance in three large European-based cohorts. The study defined a healthy person as having no major

chronic disease or risk factors for chronic kidney disease; all others were defined as unhealthy. A generalized additive model was used to study GFR distribution by age according to health status.

The analysis included 935 GFR measurements in healthy individuals and 3274 in unhealthy individuals. Mean GFR was lower in older age by –0.72 mL/min/1.73 m^2 per year (95% confidence interval [CI], –0.96 to –0.48) in healthy men versus –1.03 mL/min/1.73 m^2 per year (95% CI, –1.25 to –0.80) in unhealthy men. In healthy women, mean GFR was lower in older age by –0.92 mL/min/1.73 m^2 per year (95% CI, –1.14 to –0.70) versus –1.22 mL/min/1.73 m^2 per year (95% CI, –1.43 to –1.02) in unhealthy women.

There was a negative linear association with age in both the 97.5th and 2.5th GFR percentiles in both healthy and unhealthy individuals of both sexes.

In conclusion, the researchers said, "Healthy aging is associated with a higher mean GFR compared with unhealthy aging. However, both the mean and 97.5 percentiles of the GFR distribution are lower in older persons who are healthy. This suggests that healthy aging is not associated with preserved GFR in old age."

Incidence of CKD in Hispanic/Latino Populations

Journal of the American Society of Nephrology. 2020;31(6):1315-1324

Hispanics/Latinos in the United States are commonly considered a single ethnic group; in reality, however, they represent a mixture of ancestries who can self-identify as any race defined by the US Census. Individuals in this population have a higher incidence of end-stage renal disease compared with non-Hispanics but there are few data available on the incidence of chronic kidney disease (CKD) among Hispanics/Latinos.

Using data from 8774 adults in the Hispanic Community Health Study/Study of Latinos, **Ana C. Ricardo, MD, MPH, MS,** and colleagues conducted a study of the rates and risk factors of new-onset CKD in that patient population. Incident CKD was defined as estimated glomerular filtration rate <60 mL/min/1.73 m^2 with eGFR decline ≥1 mL/min/1.73 m^2 per year, or urine albumin/creatinine ratio ≥30 mg/g.

Mean age of the study population at baseline was 40.3 years and 51.6% were women. In 5.9 years of follow-up, 648 study participants developed CKD, a rate of 10.6 per 1000 person-years. Age- and sex-adjusted incidence rates ranged from 6.6 (other Hispanic/mixed background) to 15.0 (Puerto Rican) per 1000 person-years. There was an association between Puerto Rican background and 79% increased risk for incident CKD compared with Mexican background (incidence rate 1.79; 95% confidence interval, 1.33-2.40). The increased risk was accounted for by differences in sociodemographic characteristics, acculturation, and clinical characteristics.

Following adjustment for multiple variables, predictors of incident CKD included blood pressure >140/90 mm Hg, higher glycated hemoglobin, lower baseline eGFR, and higher baseline urine albumin/creatinine ratio.

In summary, the researchers said, "CKD incidence varies by Hispanic/Latino heritage and this disparity may be in part attributed to differences in sociodemographic characteristics. Culturally tailored public health interventions focusing on the prevention and control of risk factors might ameliorate the CKD burden in this population."

FABRY DISEASE

Prevalence of GLA Mutations in Patients with Fabry Disease

Journal of Nephrology. 2020;33(3):569-581

Fabry disease is a rare, X-linked genetic disorder of glycosphingolipid catabolism caused by mutations in the *GLA* gene. Diagnosis of Fabry disease is often delayed or missed due to the scarcity of specific early markers and the lack of a genotype–phenotype correlation, and the prevalence of Fabry disease is unclear.

Ivana Capuano, MD, and colleagues at the University of Naples, Italy, performed a systematic search of studies of screening for Fabry disease in dialysis patients published from January 1995 to January 2019. The researchers sought to reanalyze the prevalence of GLA mutations in the population of patients with Fabry disease following assignment of correct phenotype.

The search identified 25 studies involving 39,621 patients on dialysis. Of those, 116 males and 25 females were positive to the *GLA* sequencing analysis; 56 (48.2%) had benign variant, 52 (44.8%) had a pathogenic *GLA* mutation (39 classic and 13 late onset mutations), and eight (6.9%) had a mutation of uncertain significance. Overall, the prevalence of *GLA* variants was 0.24% (95% confidence interval [CI], 0.17-0.32); the overall prevalence recalculated on the basis of only pathogenic mutations was 0.14% (95% CI, 0.08-0.20), a statistically significant difference (*P*=.048).

In conclusion, the researchers said, "Although the real prevalence of classic Fabry disease is low, the screening in the high-risk renal population remains of primary interest as an early diagnosis is fundamental for a timely specific therapy; moreover, the identification of index cases could allow patients' relatives to be investigated and promptly treated."

LUPUS NEPHRITIS

CD163 Predictive Biomarker for Active Lupus Nephritis Inflammation

Journal of the American Society of Nephrology. 2020;31(6):1335-1347

It remains challenging to identify the clinical distinction between patients with lupus nephritis who have active inflammation and those who have chronic kidney damage. Previous studies have shown a correlation between soluble CD163, which derives from cleavage of the CD 163 M2c macrophage receptor and can be identified in urine, and active lupus nephritis.

Juan M. Mejia-Vilet, MD, MSc, and colleagues conducted an analysis of measurements of urine CD163 at the time of lupus nephritis flares among patients from a Mexican cohort and cross-sectional and longitudinal US cohorts. The researchers also performed serial urine CD163 measurements during treatment of flares in a subset of patients from the Mexican and the longitudinal US cohorts, and examined the response to therapy at 12 months. Finally, a secondary analysis evaluated urinary CD163 agreement with histologic activity in 19 patients in the Mexican cohort who had repeated kidney biopsy results on follow-up.

Compared with patients with active extrarenal systemic lupus erythematosus (SLE), those with active lupus nephritis had significantly higher levels of urinary CD163. Patients in the active lupus nephritis cohort also had higher levels of CD163 than those with inactive SLE and other glomerular diseases. The higher levels of urinary CD163 correlated with disease clinical severity, histologic class, and the histologic activity index in patients with active lupus nephritis.

Urinary CD163 increased from 6 months prior to active lupus nephritis flare, diminishing progressively in complete and partial responders. Conversely, urinary CD163 remained elevated in nonresponders. Urinary CD163 <370 ng/mmol at 6 months was a predictor of complete renal response at 12 months (>87% sensitivity and >87% specificity). Urinary CD163 <370 ng/mmol or >370 ng/mmol perfectly agreed (k=1.0) with a histologic activity index of ≤1 or >1 in repeated biopsies, respectively. In patients with persistent proteinuria, evaluation of urinary CD163 at 6 months improved the prediction of complete renal response at 12 months.

In summary, the researchers said, "Urinary CD163 reflects histologic inflammation in lupus nephritis and is a promising activity biomarker that varies over time with lupus nephritis activity and treatment."

continued on page 26

continued from page 25

PERITONEAL DIALYSIS

Remote Treatment Monitoring Application

Kidney 360. Doi.org/10.34067/KID.0000302019

In 2016, an integrated kidney disease healthcare company implemented a peritoneal dialysis remote treatment monitoring (RTM) application. **Sheetal Chaudhuri, MS,** and colleagues conducted a study to examine the association between utilization of the application and rates of hospitalization and technique failure. The study utilized data from adult patients on peritoneal dialysis from October 2016 through May 2019 who registered online for RTM.

Patients were stratified according to RTM use during a 30-day baseline period after registration. The study groups were: (1) nonusers, defined as never entered data; (2) moderate users, defined as entered one to 15 treatments; and (3) frequent users, defined as entered >15 treatments. Poisson and Cox models adjusted for patient/clinical characteristics were used to compare hospital admission rates and sustained technique failure (defined as requiring >6 consecutive weeks of hemodialysis) over 3, 6, 9, and 12 months of follow-up.

The total cohort included 6343 patients. Of those, 64.5% were nonusers, 10.6% were moderate users, and 24.9% were frequent users. In frequent users, compared with nonusers, the incidence rate of hospital admission was 22% (incidence rate ratio [IRR], 0.775; *P*=.002), 24% (IRR, 0.762; *P*<.001), 23% (IRR, 0.78; *P*<.001), and 26% (IRR, 0.737; *P*<.001) lower after 3, 6, 9, and 12 months, respectively. Hospital length of stay was also significantly shorter at all time points among frequent users compared with nonusers. Sustained technique failure risk at 3, 6, 9, and 12 months was 33% (hazard ratio [HR], 0.671; *P*=.020), 31% (HR, 0.686; *P*=.003), 31% (HR, 0.687; *P*=.001), and 27% (HR, 0.726; *P*=.001) lower in frequent users compared with nonusers.

In conclusion, the researchers said, "Our findings suggest frequent use of a RTM application associates with less hospital admissions, shorter hospital length of stay, and lower technique failure rates. Adoption of RTM applications may have the potential to improve timely identification/intervention of complications."

Decline in Serum Uric Acid and All-Cause Mortality in Peritoneal Dialysis

Journal of Nephrology. 2020;33(3):591-599

In patients on peritoneal dialysis, there is an association between the level of serum uric acid in treatment follow-up and mortality; it is unclear whether longitudinal changes in serum uric acid affect mortality. **Wenxiu Chang** and colleagues conducted a study to examine the association between longitudinal changes in serum uric acid and mortality in peritoneal dialysis patients.

The study enrolled 309 peritoneal dialysis patients who were not using uric acid-lowering agents. Serum uric acid levels were compared between the run-in and the follow-up periods to estimate the longitudinal change. Based on the calculated values, patients were categorized as serum uric acid decliner or serum uric acid non-decliner. The parameters measured in the run-in period were used to calculate a propensity score. Following propensity score matching, the time-to-event analysis was conducted for all-cause mortality.

Following propensity score matching, the study included 86 patients in each group (decliners and non-decliners). In the serum uric acid decliner group, there was a higher mortality rate compared with the serum uric acid non-decliner group (19/86 vs 3/86, respectively; *P*<.001). In Kaplan-Meier analysis in a subcohort, survival was worse in the serum uric acid decliner group. Results of standard and stratified Cox regression analysis suggested that decline in serum uric acid level was an independent risk factor for all-cause mortality in patients on peritoneal dialysis.

"The decline in serum uric acid in the follow-up may predict the all-cause mortality of peritoneal patients, the reason of which may result from reducing scavenging effects of serum uric acid or may reflect general condition. More studies need to be done," the researchers said.

TRANSPLANTATION

TEMRA CD8⁺ T Cells Predict Risk of Kidney Transplant Failure

Journal of the American Society of Nephrology. 2020;31(4):876-891

A comprehensive understanding of the immune response to chronic allogeneic stimulation is key to identifying biomarkers predicting kidney transplant failure and defining novel therapeutic targets. **Lola Jacquemont, MD, PhD,** and colleagues conducted a study to examine the frequency and function of CD8⁺ T cell subsets, including effector memory (EM) and terminally differentiated EM (TEMRA) CD8⁺ T cells, in blood samples from kidney transplant recipients.

The study cohort included 284 kidney transplant recipients who were recruited at 1 year post-transplant and were followed-up for a median of 8.3 years. The researchers also examined CD8⁺ T cell reactivity to donor-specific peripheral blood mononuclear cells in 24 patients who were recipients of living-donor transplants.

There was an association between increased frequency of circulating TEMRA CD8⁺ T cells at 1 year post-transplant and increased risk of graft failure during follow-up. The association remained following adjustment for the Kidney Transplant Failure score, a previously reported composite of eight clinical values. Conversely, increased frequency of EM CD8⁺ T cells was associated with a reduced risk of graft failure.

The analysis identified a distinct TEMRA CD8⁺ T cell subpopulation characterized by expression of FcgRIIIA (CD16) and by high levels of proinflammatory cytokine secretion and cytotoxic activity. Donor-specific stimulation induced a similar rapid, early response in EM and TEMRA CD8⁺ T cells; however, CD16 engagement resulted in selective activation of TEMRA CD8⁺ T cells, mediating antibody-dependent cytotoxicity.

In summary, the researchers said, "At 1 year post-transplant, the composition of memory CD8⁺ T cell subsets in blood improved prediction of 8-year kidney transplant compared with a clinical-variables score alone. A subpopulation of TEMRA CD8⁺ T cells displays a novel dual mechanism of activation mediated by engagement of the T-cell receptor or of CD16. These findings suggest that TEMRA CD8⁺ T cells play a pivotal role in humoral and cellulate rejection and reveal the potential value of memory CD8⁺ T cell monitoring for predicting risk of kidney transplant failure." ■

Sarah Tolson

Reimbursement for Home Dialysis Training: A Primer

Recently, I have received several questions from readers regarding reimbursement for home dialysis training. There have also been several threads in renal industry forums regarding this topic. Home training reimbursement is an area where, over the years, I have learned that there are many interpretations of Medicare's reimbursement to physicians and dialysis programs for home dialysis training. It is easy to see how there could be confusion regarding reimbursement for home dialysis training as the nephrologist and dialysis program work together to provide dialysis training, but their reimbursements are separate and structured differently. Being able to receive appropriate reimbursement for home dialysis training is important to every dialysis program and nephrologist as it is critical to maximize reimbursement for services rendered to dialysis patients in order to maintain financial viability for your program or practice. To better understand what may be reimbursed, it is beneficial to understand which services are covered.

There is also coverage for a patient or their caregiver to receive retraining under specific circumstance; instances where reimbursement for retraining is permissible are changes in equipment, dialysis partner, or modality.

MEDICARE COVERAGE FOR HOME DIALYSIS TRAINING

Medicare provides coverage for Medicare beneficiaries to receive home dialysis training from a Medicare-certified end-stage renal disease (ESRD) facility that teaches ESRD patients and their caregivers to perform dialysis at home with little to no assistance from the staff at the ESRD facility. Home dialysis training can take place in the dialysis facility or at the patient's home. According to the Medicare Benefit Policy Manual, the Centers for Medicare & Medicaid Services expects that patients opting to receive home dialysis will be able to complete their training without exceeding the maximum allotted number of home training sessions.

Currently, Medicare covers 25 training sessions for home hemodialysis and 15 training sessions for peritoneal dialysis. There is also coverage for a patient or their caregiver to receive retraining under specific circumstance; instances where reimbursement for retraining is permissible are changes in equipment, dialysis partner, or modality.

DIALYSIS PROGRAM REIMBURSEMENT FOR HOME DIALYSIS TRAINING

Medicare provides reimbursement to a dialysis program via a training and retraining add-on payment. This add-on payment, as its name implies, is added on to the ESRD PPS payment for the date(s) of service for which training was provided and is intended to account for one and a half hours of nursing time. To receive appropriate reimbursement for home dialysis training, the dialysis program would bill Medicare for each date on which training services were rendered. Both the Medicare Benefit Policy Manual and the Medicare Claims Processing Manual are very clear in stating that a dialysis facility should not expect reimbursement above and beyond the 25 maximum home hemodialysis training sessions and the 15 sessions for peritoneal dialysis.

PHYSICIAN REIMBURSEMENT FOR HOME DIALYSIS TRAINING

Physician reimbursement for home dialysis training is structured differently than training reimbursement for the dialysis program. Where the dialysis facility is intended to be reimbursed for each training session rendered, at the time of this writing, Medicare provides a physician with reimbursement at a flat rate of $500 upon a patient completing their course of home dialysis training. In the event a patient does not complete their home training, Medicare will provide the physician reimbursement at a rate of $20 per training session, regardless of modality.

Just as a dialysis facility may need to provide a patient with retraining sessions due to changes in dialysis equipment or modality, the patient's physician would be a part of the retraining. The Medicare manual indicates subsequent training sessions may be reimbursed after the initial training course if the retraining is required due to a change in the patient's treatment machine, modality, setting, or dialysis partner. ■

Questions?

Do you have questions about billing compliance? Is there an aspect of renal reimbursement you would like more information on? Are you experiencing a dialysis reimbursement dilemma? Questions from the readers of this column help to keep the content relevant and interesting. I would love to address your questions in a future edition of From the Field. Please send your questions to me at stolson@sceptremanagement.com.

As always, your information will be kept confidential.

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