# Nephrology Times

Practical News, Trends, and Analysis

May/June 2023

VOLUME 15, NUMBER 4




## Somatic Growth Patterns in Infants With End-Stage Kidney Disease

Clinicians treating infants with end-stage kidney disease (ESKD) face the challenge of managing fluid balance with adequate nutritional provision to prevent catabolism and encourage somatic growth. Infants with ESKD may have fluid overload, making the use of weight alone unreliable as a measurement of nutritional status. Providers use z scores of head circumference and linear growth to monitor nutritional status in this patient population.

Results of previous studies have demonstrated that the younger a person is at diagnosis of chronic kidney disease, the worse the height deficit during adulthood. Further, severe growth retardation in ESKD is associated with increased morbidity, mortality, and mental health problems in children and adults. Infants with ESKD are at risk for neurodevelopmental impairments, including cognitive delays.

According to **Cara L. Slagle, MD,** and colleagues at Cincinnati Children's Hospital Medical Center in Ohio, there are few data available on infants with severe congenital abnormalities of the kidney and urinary tract (CAKUT). The researchers conducted a single-center pilot study and retrospective review to examine somatic growth patterns in infants with CAKUT requiring dialysis within the first 30 days of life. Growth patterns were compared with those in infants with CAKUT

continued on page 6

## Care for Children With CKD: An NKF Scientific Workshop

In 2018, the estimated prevalence of pediatric chronic kidney disease (CKD) was 2.7 cases per 1000 children. There are guidelines and recommendations for the management of children with CKD; however, they are based primarily on limited observational data, small clinical trials, and input from nephrology health care providers. Input from patients and their parents/caregivers is not generally included in the formation of treatment guidelines.

In December 2018, a multidisciplinary group of nephrology health care professionals, children and adolescents living with CKD, and their parents/caregivers took part in a scientific workshop sponsored by the National Kidney Foundation

continued on page 3

## Anemia and Growth Impairment in Children With Nonglomerular CKD

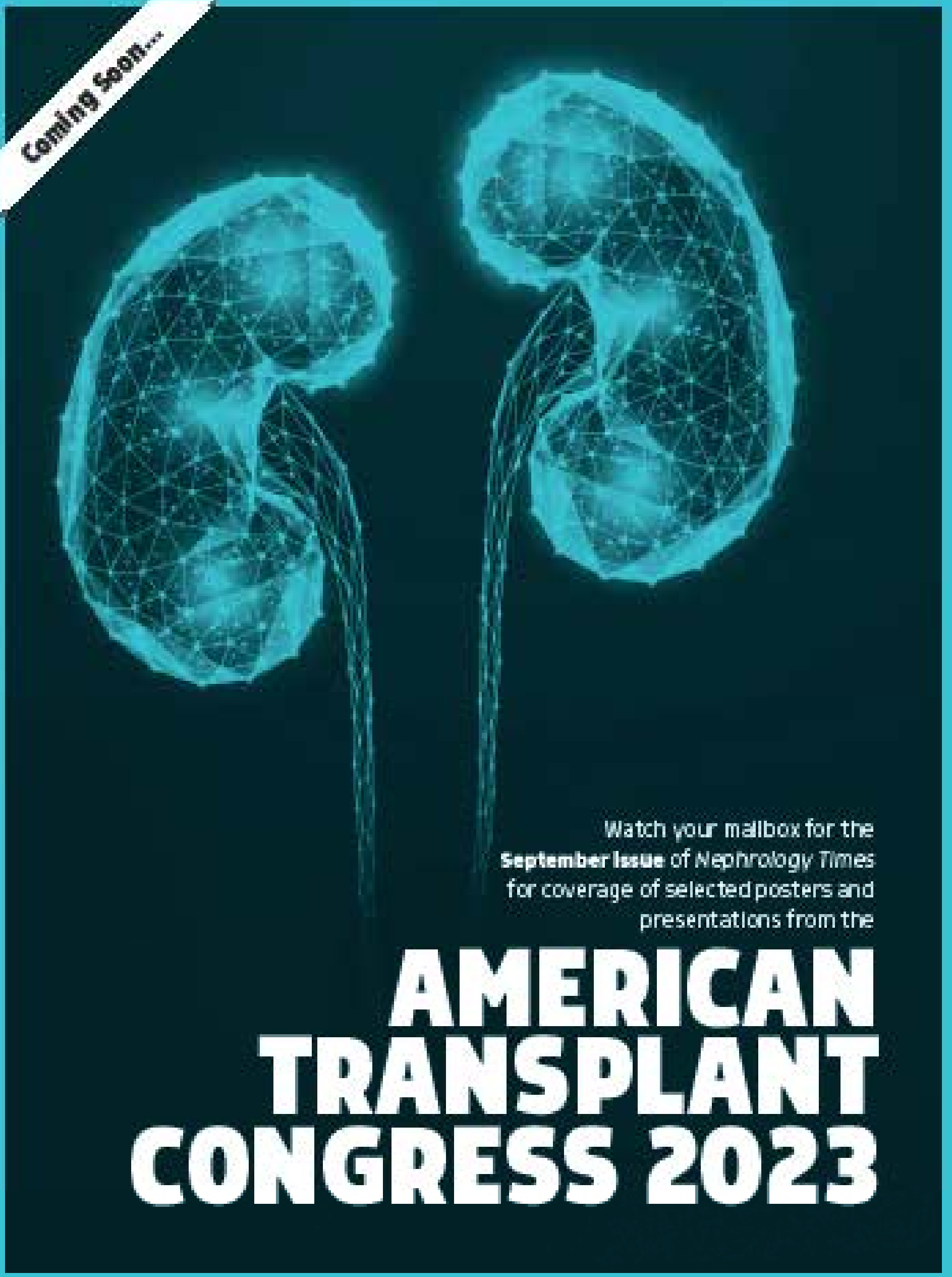
There is a continuing increase in the prevalence of pediatric chronic kidney disease (CKD) in the United States and worldwide. Due in part to systematic complications associated with CKD, developmental outcomes and quality of life remain suboptimal, even in an era of improved survival in children with CKD, including those with kidney failure.

Despite the availability of recombinant growth hormone (rHG) therapy, growth impairment is common in this patient population. Compared with children with CKD of normal height, those with CKD and short stature have worse quality of life and higher rates of morbidity and mortality. Impairment in children with CKD of nonglomerular origin, the most common etiology of pediatric CKD, is greater than that in children with glomerular CKD.

According to **Oleh Akchurin, MD, PhD,** and colleagues, there are few data available on the role of anemia in statural growth impairment in children with CKD. To date, no longitudinal studies have shown a relationship between anemia and statural growth over time in children with mild-to-moderate CKD of nonglomerular origin, and results of cross-sectional studies examining the association between anemia and statural growth have had conflicting results.

The researchers conducted an analysis to quantify the relationship between hemoglobin and statural growth in children with mild-to-moderate CKD of

continued on page 4




Watch your mailbox for the
**September Issue** of Nephrology Times
for coverage of selected posters and
presentations from the

# AMERICAN TRANSPLANT CONGRESS 2023

*Care for Children With CKD*

continued from page 1

on children with CKD. The workshop was supported by Horizon Pharma and Leadiant Biosciences.

The workshop was designed to develop clinical recommendations for the clinical care of pediatric patients with CKD specific to five topics: (1) addressing the needs of patients and parents/caregivers; (2) modifying the progression of CKD; (3) clinical management of CKD-mineral and bone disorder (CKD-MBD) and growth retardation; (4) clinical management of anemia, hypertension, and cardiovascular disease; and (5) transition and transfer of pediatric patients to adult nephrology care.

In a report in the *American Journal of Kidney Diseases* [2023;81(4):466-474], **Bradley A. Warady, MD,** and colleagues describe the key clinical recommendations generated from the workshop. The report also highlighted the recommendations deemed most feasible for implementation by the workshop attendees.

### ADDRESSING THE NEEDS OF PATIENTS AND CAREGIVERS

Addressing the needs and preferences of families during all stages of the disease is key, and may require training the health care team in strategies designed to optimize communications between the clinician and the family. The workshop participants stressed the need to build rapport and trust between the clinician and the family to best facilitate communication between the two groups.

Access to multidisciplinary care and patient navigators to help families with the complexities of the health care system were also recommended. Parents universally shared a desire for information to be presented in an understandable format on all aspects of their child's disease, including both diagnosis and treatment. They also expressed the need for additional resources for their children, such as referrals to a dietician and social worker. Access to peer support groups and mentoring programs for families was also requested, as well as programs addressing the mental health of families.

### MODIFYING CKD PROGRESSION

The workshop attendees stressed the need for identification of patients at risk for CKD progression and effective management of those patients, including screening for modifiable risk factors. Treatment and monitoring of increased blood pressure and proteinuria were also deemed important due to their association with CKD progression. Early recognition of the nephrotoxic potential of medications prescribed for children with CKD, avoidance of those medications when possible, and minimization of the duration of use were also recommended.

Aggressive treatment of dehydration and possible temporary discontinuation of renin-angiotensin-aldosterone system (RAAS)- blocking medications were recommended to prevent or decrease the risk of acute kidney injury in pediatric CKD. Other recommendations related to CKD progression included providing information regarding the possibile need for initiation of kidney replacement therapy for patients with CKD stage 3B or higher to avoid the need for urgent dialysis.

Attendees also emphasized the importance of identification of hypertension and aggressive treatment in children with CKD. Because masked hypertension may contribute to cardiovascular disease in children, attendees recommended the use of ambulatory blood pressure monitoring to identify and monitor high blood pressure in children with CKD, as well as blood pressure screening at every office visit and targeting office-measured blood pressure to less than the 90th percentile in healthy children.

RAAS blockers were identified as preferred antihypertensive agents for pediatric patients with CKD and hypertension. Workshop attendees recommended that RAAS blockers be prescribed as tolerated in patients with no hyperkalemia, syncope, or marked increase in serum creatinine levels. Other recommendations called for implementation of lifestyle and dietary interventions to aid in blood pressure management.

Attendees also emphasized the importance of identification of hypertension and aggressive treatment in children with CKD.

### CLINICAL MANAGEMENT OF CKD-MBD

Abnormalities in the regulation of bone and mineral metabolism in the setting of pediatric CKD can lead to growth inhibition. Workshop attendees recommended making clinical management decisions based on trends in blood testing, rather than values at single time points.

Updated Kidney Disease: Improving Global Outcomes clinical practice guidelines for the treatment of CKD-MBD highlight the importance of diagnosing bone abnormalities, stabilizing serum phosphate and calcium levels, and initiating treatment to correct increased parathyroid hormone levels. Workshop attendees recommended that the daily intake of calcium and the serum calcium levels be based on normative values for age, and that 25-hydroxyvitamin D levels should meet current published recommendations.

Other recommendations included correction of metabolic acidosis in pediatric patients with CKD; consultation with a renal dietitian to support appropriate mineral, calcium, and protein intake; and targeting normal age-related serum phosphate levels and the use of phosphate binders. The administration of recombinant human growth hormones after addressing other modifiable factors to treat short stature and the importance of exercise were also included in the recommendations.

### MANAGEMENT OF COMORBIDITIES

Despite the availability and efficacy of erythropoiesis-stimulating agents, pediatric patients with moderate to severe CKD commonly experience anemia. Because anemia in children is associated with adverse outcomes, the workshop attendees stressed the need to maintain hemoglobin levels at the normal level for the age and sex of the patient.

### TRANSITION TO ADULT CARE

Recommendations included initiation of the transfer process in early adolescence for patients with CKD stage 3 or higher and/or progressive CKD, and that parents/caregivers be included in the process. The transition process should be guided by a transition curriculum, and joint pediatric and adult nephrology transition clinics should be held to enhance the transition process. Because pediatric patients with CKD are commonly treated by multidisciplinary health care teams, staggering transfer between various providers was recommended to facilitate continuity of care.

### CONCLUSIONS

The authors summarized the recommendations, saying, "This compilation of recommendations was designed to improve the clinical care of children with CKD. The recommendations incorporate the experience and opinions of a diverse group of pediatric CKD health care providers in addition to considerations from the perspectives of the patients and their parents/caregivers for whom the recommendation are made. Ideally, this information will be incorporated by clinicians into pediatric nephrology practices and will not only further stimulate shared decision-making, but also enhance recognition of the education, advocacy, and other actions necessary to facilitate improved care for children with CKD." ■

### TAKEAWAY POINTS

- The National Kidney Foundation hosted a workshop with a multidisciplinary group of physicians, patients, and parents/caregivers of children with chronic kidney disease (CKD) to develop recommendations for the management of pediatric CKD.
- The workshop addressed five broad topics: addressing the needs of patients and parents/caregivers; modifying CKD progression; clinical management of CKD-mineral bone disorder; clinical management of anemia, hypertension, and cardiovascualr disease; and transfer to adult nephrology care.
- The recommendations were designed to increase recognition of the education and advocacy needed to improve care for children with CKD.

*Anemia and Growth Impairment*

continued from page 1

nonglomerular origin followed longitudinally in the Chronic Disease in Children (CKiD) cohort study. Results were reported in the *American Journal of Kidney Diseases* [2023;81(4):457-465].

The exposure of interest was hemoglobin z scores, calculated using the Centers for Disease Control and Prevention (CDC) age-, sex-, and race-specific mean and standard deviation. The outcome of interest was age- and sex-specific height z scores, also determined using CDC scores. Height was measured at each annual visit, and the average of two measurements was used in determining a final z score. Eligible patients were CKiD participants younger than 22 years of age with nonglomerular CKD who had not reached final adult height.

Multivariable repeated measures paired person-visit analysis and multivariable repeated measures linear mixed model analysis were used to quantify the relationship between hemoglobin and height. Both models were adjusted for age, sex, body mass index (BMI), estimated glomerular filtration rate (eGFR), acidosis, and medication use.

The analysis cohort included 510 CKiD participants. At baseline, median eGFR was 53 mL/min/1.73 $m^2$, mean age was 8.7 years, 67.8% were male (n=346), 19.6% were Black (n=95), 12.4% were Hispanic (n=63), BMI z score was 0.3, and height z score was –0.5. A total of 65 participants (12.7%) had anemia at baseline.

There were associations between lower average hemoglobin z scores and older age, lower eGFR, and a greater prevalence of use of erythropoiesis-stimulating agents (ESA) and iron therapy. During the follow-up period that included 1763 person-visits, 67% of the cohort had declining hemoglobin z-score trajectories. The average hemoglobin level was within the anemic range of 17% of person-visit pairs based on the definitions of anemia in the 2012 Kidney Disease: Improving Global Outcomes (KDIGO) clinical practice guideline on anemia in CKD.

The reference group was 10-year-old female participants with values for all covariates (average hemoglobin z score ≥0; eGFR, 50 mL/min/1.73 $m^2$; urinary protein-creatinine ratio, 0.5 mg/mg; serum bicarbonate, 25 mmol/L, and BMI z score of 0). After adjusting for covariates, the subgroups with average hemoglobin z scores of less than –2.0, –2.0 to less than –1.0, –1.0 to less than –0.5, and –0.5 to less than 0 had relative mean height z scores that were lower than the reference group (hemoglobin z score >0) by 0.35 (95% CI, –0.62 to –0.07), 0.24 (95% CI, –0.45 to –0.02), 0.16 (95% CI, –0.37 to 0.06), and 0.18 (95% CI, –0.36 to 0.01), respectively.

Even in children with average hemoglobin levels exceeding the KDIGO-defined threshold for anemia there was an association between the average hemoglobin z score and a lower height z score. Among

person-visit pairs where the average hemoglobin z scores were less than –1.0, 49.9% were considered not anemic per the KDIGO guideline.

When stratified by age, in both unadjusted and adjusted models, there was a positive relationship between the hemoglobin z score and the mean height z score among person-visits between the ages of 6 and 14 years. In the adjusted model, the association was statistically significant for ages 8, 9, and 14 years. The strongest association in the 6 to 14 years age group was for participants 9 years of age, where a 1-standard deviation increase in average hemoglobin was associated with a 0.22-standard deviation increase in height at the subsequent visit (95% CI, 0.08-0.37).

In linear mixed-effects analyses, there was an association between a change in hemoglobin z score and a concurrent change in height z score (under within-person change from baseline) in the unadjusted model in participants with an initial hemoglobin z score of less than –1.0. Following adjustment for covariates in this group, inferences remained nearly identical. Consistent with the paired person-visit analysis, there was no significant association between a decrease in hemoglobin and a concurrent change in height among participants with an initial hemoglobin z score of –1.0 or greater.

There were some limitations to the study cited by the authors, including the observational nature of CKiD that limited the ability to define hemoglobin thresholds that could be used as treatment targets based on growth outcomes; the inability to examine potential interactions of the associations between hemoglobin and growth with inflammation, iron homeostasis, rGH therapy, ESAs, and iron therapy; and the possibility that the findings were subject to unmeasured confounding.

In conclusion, the researchers said, “Hemoglobin decline is associated with statural growth impairment in children with mild-to-moderate CKD of nonglomerular origin. Hemoglobin z scores of less than –1.0 in these children should trigger an evaluation of anemia. Development of hemoglobin targets for anemia treatment in children with CKD should consider the association between hemoglobin and growth, which may result in higher hemoglobin targets than those that have been set for adults with CKD. Finally, growth outcomes should be measured in future interventional studies testing novel approaches for the treatment of anemia in pediatric CKD, especially in the preadolescent and early adolescent age groups.” ■



**TAKEAWAY POINTS**

- Researchers reported results of an analysis quantifying the relationship between hemoglobin and statural growth in children with mild-to-moderate chronic kidney disease (CKD) of nonglomerular origin.
- The analysis utilized data on 510 participants in the CKD in Children (CKID) study; of those, 67% had declining hemoglobin z score-trajectories over the follow-up period that included 1763 person-visits.
- Compared with average hemoglobin z scores of ≥0, there was an independent association between average hemoglobin z scores of less than -1.0 and significant growth impairment at the subsequent study visit.

*Somatic Growth Patterns In Infants*
continued from page 1

not receiving dialysis in the first 30 days of life. Results were reported in the *Journal of Renal Nutrition* [2023;33(2):236-242].

The review utilized the Fetal Care Center database to identify infants diagnosed prenatally with fetal kidney dysfunction and evaluated during pregnancy between January 1, 2014, and December 31, 2108. Fetal kidney dysfunction was defined as the presence of maternal amniotic fluid volume and kidney abnormalities as visualized on fetal imaging. Infants admitted to the neonatal intensive care unit were eligible for inclusion in the analysis. Exclusion criteria were bilateral renal agenesis or death prior to 30 days of life.

Somatic growth measurements of weight, length, and head circumference were obtained during routine clinical care at birth, 2-week, 1-month, 2-month, 3-month, 4-month, 6-month, 9-month, and 12-month chronological age as available. Feeding patterns for patients receiving dialysis were recorded, with an emphasis on four patterns of interest: (1) total prescribed daily fluid allowance (mL/kg/day); (2) percentage of infants receiving primarily enteral nutrition (more than half the total fluid received); (3) primary route of enteral feeds—oral, gastric, or postpyloric; and (4) type of enteral feedings (mother's own milk, pasteurized donor milk, or commercial formula).

A total of 114 pregnancies referred for concerns of fetal kidney dysfunction over 4 years following use of a policy of resuscitation for this patient population were included in the analysis. Of those, 68 received subsequent care elsewhere, six were excluded for a diagnosis of bilateral renal agenesis, two experienced an intrauterine fetal demise, and 34 died prior to 30 days of life. Of the 26 remaining infants, 17 received dialysis.

The majority of the 17 infants were White (64.7%) and male (58.8%). Fifteen (88.2%) had undergone fetal interventions, including vesicoamniotic shunt placement (23.5%, n=4), fetal cystoscopy (5.9%, n=1), or serial amnioinfusions (76.5%, n=13). Median birth gestational age was 35 weeks and median birth weight was 2340 grams. All 17 received dialysis access in the first month of life (median, 4 days) and began dialysis of any form at a median 6 days of life.

Ten infants were anuric and four were oliguric following delivery. Ten were born after practice changes and received extracorporeal dialysis after birth by prolonged intermittent kidney replacement therapy for 23 days prior to initiation of peritoneal dialysis. The remaining seven infants were able to be medically managed prior to initiation of peritoneal dialysis for a minimum of 14 days after peritoneal dialysis catheter placement.

Three infants died during the study period before hospital discharge and one died after the study period prior to kidney transplantation. Median corrected age at discharge was 3 months. All infants who survived to hospital discharge were receiving chronic dialysis at discharge. Nine were followed at Cincinnati Children's Hospital Medical Center, six transferred to an outside institution prior to discharge from the neonatal intensive care unit, and one subsequently returned to Cincinnati Children's Hospital Medical Center prior to 1 year of age.

During the initial hospitalization, the prevalence of comorbidities was high: respiratory disease (100%), pulmonary hypertension (65%), and sepsis (47%). Eleven infants had hypotension that required vasopressors (65%).

## TRENDS IN SOMATIC GROWTH

In this cohort of infants requiring dialysis, there was a substantial lag in growth trends in all parameters at 1-month and 2-month chronological age, particularly in length and head circumference. Catch-up growth appeared in weight, followed by head circumference and length. Length was not normalized by 1 year of life.

The researchers plotted somatic z-score measurement of the infants who did not receive dialysis. Of the nine infants with severe kidney disease who were managed medically without dialysis, peak serum creatinine in the first 14 days of life was 2.06 mg/dL. Six of the nine were followed by nephrology after hospital discharge. Seven had growth parameters recorded to 4 months of age and four had complete growth records to 1 year. The growth trends in this cohort were similar to those among infants who received dialysis, with the exception of a lack of catch-up growth in all parameters.

Of the infants followed at the center for chronic dialysis care, four received growth hormone therapy between 6 and 10 months of age for growth failure, defined as a height standard deviation score (SDS) less than –1.88 or a height velocity SDS less than –2 once metabolic and nutritional factors affecting growth were addressed. Of the infants who qualified from z score alone but did not receive treatment, parathyroid hormone concentrations were often elevated. One infant in the nondialysis cohort received growth hormone therapy at 8 months of life.

The authors cited the retrospective observational design of the study as a limitation to the findings and a contributor to the inability of the researchers to determine a causal relationship between growth, nutrition, and dialysis. The small sample size was also cited as a limitation.

In summary, the researchers said, "Infants with ESKD are at high risk for growth failure, most profound in the first 2 months of life. This may be due to the high degree of systemic illness in this population during the neonatal period but delays in initiation of enteral nutrition are likely contributory. Implications and associations related to this deficit on long-term outcomes are greatly needed as overall survival continues to improve. Interventions to improve growth and early nutrition with greater human milk provision, aggressive parenteral nutrition, and optimized fluid status with early dialysis are all attractive targets for further study and may improve outcomes of neurodevelopment and mortality." ■

**TAKEAWAY POINTS**

- Researchers reported results of a study of growth patterns in infants with severe congenital anomalies of the kidney and urinary tract (CAKUT) who required dialysis in the first 30 days of life.
- The single-center, observational retrospective review was conducted at the Cincinnati Children's Hospital Medical Center using data on infants with severe CAKUT from 2014 to 2018.
- Compared with infants with CAKUT who did not receive dialysis in the first 30 days of life, those in the dialysis cohort had improved somatic growth trends. Linear growth did not normalize by 1 year of age in either cohort.

Nephrology Times
Practical News, Trends, and Analysis

**PUBLISHER**
AMC Media Group

**NEPHROLOGY TIMES STAFF**

**EDITORIAL**

**MANAGING EDITOR**
Victoria Socha

**DIGITAL PROJECTS MANAGER**
Chris Gedikli

**ART DIRECTOR**
Ari Mihos

**ASSISTANT ART DIRECTOR**
John Salesi

**ADVERTISING**

**ACCOUNT MANAGER**
Jen Callow
jcallow@amcmediagroup.com

**Recruitment advertising orders can be sent to:**

**DIRECTOR, RECRUITMENT CLASSIFIEDS**
Lauren Morgan
lmorgan@amcmediagroup.com

Visit us at www.nephtimes.com

AMC MEDIAGROUP
630 Madison Avenue
Manalapan, NJ 07726

***Nephrology Times*** (ISSN 1940-5960) is published monthly by AMC Media Group, at 630 Madison Avenue, Manalapan, NJ 07726. Printed in the U.S.A.


Subscription information and orders: Physicians who are listed with AMA/AOA as having a primary or secondary specialty related to nephrology within the US are eligible for a free subscription. If you are not currently receiving the publication, send an email with your name, address, and specialty to Victoria Socha at: tsocha@amcmediagroup.com.

For customer service on your free subscription, please call 732.490.5530. Annual subscription rates: US: $99 individual, $200 institution.

**Postmaster:** Send address change to:
***Nephrology Times***
630 Madison Avenue
2nd Floor
Manalapan, NJ 07726.



**Conference Coverage**

*Austin, Texas | April 11-15, 2023*

# NATIONAL KIDNEY FOUNDATION

## SPRING CLINICAL MEETINGS 2023

**Nephrologists, fellows and residents with a special interest in kidney disease, general internists, pharmacists, physician assistants, nurse practitioners, nurses and technicians, social workers, and renal and clinical dietitians all attended the NKF Spring Clinical Meetings 2023 in Austin, Texas, to learn about developments in all areas of nephrology practice, and network with colleagues.**

**Presenters reported the latest insights into chronic kidney disease care, and participants were informed about new and evolving concepts related to kidney disease.**

# Conference Coverage

*Austin, Texas | April 11-15, 2023*

## Cost of Care Reduced With Utilization of Home Hemodialysis

**According to** the United States Renal Data System, use of home dialysis has increased since 2017. Across all payer types, the greatest growth has been seen in home hemodialysis. The Advancing American Kidney Health (AAKH) executive order set a goal of initiating home dialysis or preemptive kidney transplant for 80% of patients with incident end-stage renal disease (ESRD).

While new payment models from the Centers for Medicare & Medicaid Services (CMS) reward payers for achievement of higher rates of home dialysis, use of home hemodialysis is lowest among patients with Medicare Advantage health insurance coverage: 1.3% versus 3.0% among patients with original Medicare fee-for-service (FFS) coverage without Medicaid.

During a poster session at the NKF Spring Clinical Meetings 2023, **Stephan Dunning, MBA,** and colleagues at Outset Medical, Inc., San Jose, California, reported estimates of the per-member per-month (PMPM) costs for a Medicare Advantage health plan and 5-year savings generated by incentivizing home dialysis aligned with the AAKH goal. The poster was titled *Home Hemodialysis Can Help Reduce Total Cost of Care Among Medicare Advantage Members With ESRD.*

The researchers modeled a Medicare Advantage health plan with 500 members on dialysis. They included inputs from the CMS 2023 dialysis-only per capita cost of $9332.69 and dialysis member cost components (inpatient, outpatient, dialysis, physician, and so on) using the CMS bid pricing tool. To reflect the respective negotiating power for larger versus smaller dialysis programs with private payers, dialysis reimbursement was estimated at $337.27 per treatment (27% above the 2023 FFS base rate) for in-center hemodialysis and $302.75 (14% above the base rate) for regional home dialysis providers.

Inflationary factors were used for capitation and costs. Literature and the Tablo® Hemodialysis System investigational device exemption trials were used to draw other model assumptions for new dialysis starts, mortality, transplant, modality choice, retention, and relative event rates.

At the end of the 5 modeled years, an estimated 172 members would be on Tablo home hemodialysis (30%). The 5-year average PMPM for members on home hemodialysis ($9277) was roughly equal to that of patients on peritoneal dialysis ($9319). PMPM costs for in-center hemodialysis would be $9963, resulting in $686 PMPM savings with home hemodialysis versus in-center hemodialysis. Over the 5 modeled years, the total savings would be $4.2 million.

"Medicare Advantage plans have been slow to join CMS in incentivizing home dialysis for either providers or members," the researchers said. "This modeled analysis demonstrates substantial cost savings by Medicare Advantage health plans through home hemodialysis expansion with innovative home dialysis technologies like the Tablo Hemodialysis System."

**Source:** Dunning S, Aragon MD, Alessandri-Silva A. Home hemodialysis can help reduce total cost of care among Medicare Advantage members with ESRD. Poster #358. Abstract of a poster presented at the National Kidney Foundation Spring Clinical Meetings 2023; April 11-15, 2023; Austin, Texas.

## A Process Model for Referral to Kidney Transplant Evaluation

**While the** preferred modality for kidney failure treatment is kidney transplant, most patients initiate dialysis prior to receiving a transplant. Referral to a transplant center is a key early component of receipt of a transplant; however, according to **Adam Wilk, PhD,** and colleagues at Emory University, Atlanta, Georgia, only 34% of patients are referred to a transplant center within 1 year of dialysis initiation. The absence of a process model to characterize how dialysis clinics approach the decision of whether to refer patients for transplant impedes efforts to mitigate provider- and clinic-level barriers to early referral.

The researchers conducted 39 interviews during June to August 2022 with dialysis clinic providers in Georgia, North Carolina, and South Carolina to identify processes leading up to referral or nonreferral to a transplant center. Results were reported during a poster session at the NKF Spring Clinical Meetings 2023 in a poster titled *How Dialysis Providers Assess and Refer Patients for Kidney Transplant Evaluation: A Process Model.*

Interviews were conducted with dialysis social workers, nurse managers, nephrologists, and administrators. Recruitment was facilitated using purposive sampling to ensure diversity by participants' role, years of experience, and county median household income level. The semistructured interviews were conducted via telephone and were recorded and transcribed. Key constructs, including discrete steps and decisions, were identified using a phenomenological approach. Multiple coders developed the codebook and interpreted the data.

Most participants described a four-step process preceding any transplant referral: (1) assessment of whether the patient has a nonmodifiable contraindication to transplant, in which case the referral does not proceed; (2) parallel dialogues with the patient, including education on transplant, and within the care team, leading to inquiring about the patient's interest in transplant (step 2 is repeated if the patient does not express interest in transplant); (3) once the patient indicates interest in transplant, the lead provider (nephrologist) or the collective care team judges whether to make the referral at that time or to wait and intervene with the patient to improve chances of waitlisting; and (4) carry out the referral on the specified timeline.

"Qualitative interviews with dialysis providers revealed a four-step process for approaching transplant referral decisions," the researchers said. "This model can be used to inform interventions on dialysis clinics' assessment and referral processes."

**Source:** Wilk A, McDonnell J, Urbanski M, et al. How dialysis providers assess and refer patients for kidney transplant evaluation: a process model. Poster #466. Abstract of a poster presented at the National Kidney Foundation Spring Clinical Meetings 2023; April 11-15, 2023; Austin, Texas.

## Outcomes in Patients With COVID-19-Related AKI

**While COVID-19** is recognized as a typical syndrome of acute respiratory illness, it can also affect multiple organ systems. Acute kidney injury (AKI) has been associated with both direct and indirect responses to infection with COVID-19; available evidence suggests that AKI related to COVID-19 is seen in more than 20% of hospitalized patients and more than half of patients admitted to the intensive care unit.

**Neha Jain, MD,** and colleagues at Highland Hospital, Alameda Health System, Oakland, California, performed a retrospective chart review to examine the incidence of AKI, risk factors, and outcomes in patients with COVID-19 at their center. Results were reported during a poster session at the NKF Spring Clinical Meetings 2023 in a poster titled *COVID-19-Related Acute Kidney Injury: Incidence, Risk Factors, and Outcomes in a County Hospital Cohort.*

The review included charts for all patients older than 18 years of age who were admitted to the center with a positive COVID-19 test between April 2020 and March 2021. Relevant clinical data were collected from electronic health records and then statistically analyzed. AKI was defined as an increase in serum creatinine ≥0.3 mg/dL from baseline during the hospitalization. The primary outcome measures were in-hospital mortality, transfer to a tertiary center, or patient discharge.

A total of 445 patients were included in the chart review. Of those, 62.7% were men, 35.7% (n=159) had diabetes mellitus, 43.6% (n=194) had hypertension, and 50.3% (n=220) had obesity. Chronic kidney disease (CKD), defined as glomerular filtration rate <60 mL/min/1.73 $m^2$, was present in 19.6% (n=86) and 5.2% (n=23) had end-stage kidney disease.

AKI developed in 38.5% (n=171) of patients. Of those, 7.2% (n=32) required renal replacement therapy. One patient underwent kidney biopsy that showed collapsing focal segmental glomerulosclerosis. Oxygen support was required in 74.4% (n=331) and 13% (n=58) required ventilatory support. Patients who recovered were discharged (86.1%; n=383) or transferred to a tertiary center (2.2%; n=10). Fifty-two patients died (11.7%).

Risk factors significantly associated with development of AKI were male sex, diabetes mellitus, hypertension, and CKD at baseline ($P<.05$). There was no significant correlation between AKI and outcomes ($P<.05$).

"Hospitalized patients with COVID-19 infection are at elevated risk of developing AKI. Male sex, diabetes mellitus, hypertension, and CKD are factors associated with a higher risk of developing AKI. In contrast to many other studies, our study did not find a significant correlation between AKI and mortality," the researchers said.

**Source:** Jain N, Manjunath V, Luo J. COVID-19-related acute kidney injury: incidence, risk factors, and outcomes in a county hospital cohort. Poster #11. Abstract of a poster presented at the National Kidney Foundation Spring Clinical Meetings 2023; April 11-15, 2023; Austin, Texas.

## ADPKD in Young Adults: Burden and Progression

**Health-related** quality of life (HRQoL) is adversely affected in patients with autosomal dominant polycystic kidney disease (ADPKD) as the disease progresses. **Eric Davenport, MEcon, MStat,** and colleagues conducted an analysis to describe disease burden and progression of ADPKD in young adults.

Results were reported during a poster session at the NKF Spring Clinical Meetings 2023. The poster was titled *Disease Burden and Disease Progression of Young Adult Patients With Autosomal Dominant Polycystic Kidney Disease.*

The analysis included data from the OVERTURE (NCT01430494) study. OVERTURE was an observational, longitudinal study of patients with ADPKD that assessed total kidney volume (TKV), estimated glomerular filtration rate (eGFR), and other disease outcomes, as well as patient-reported measures of HRQoL. Measures of HRQoL were obtained using the 12-item Short Form Health Survey (SF-12v2) Mental and Physical Component Summaries (MCS and PCS) and the Brief Pain Inventory (BPI) and ADPKD-specific questionnaires (ADPKD Impact Scale [ADPKD-IS] and ADPKD Urinary Impact Scale [ADPKD-UIS]). The data were summarized by age group, sex, and number of visits.

The analysis cohort included 93 eligible patients 18 to <22 years of age and 132 patients 22 to <26 years of age at baseline. In each group, approximately 60% were female. Kidney function was normal for most patients in both groups (mean eGFR, 115.2 and 107.4 mL/min/1.73 $m^2$); TKV was enlarged (mean, 814.7 and 980.9 mL). Close to half of the patients (48.8% and 50.4%) were in Mayo class 1D to 1E.

At month 12, mean decline in eGFR from baseline was 2.3 mL/min/1.73 $m^2$ in the 18 to <22 group (female, 0.9; male, 4.3) and 1.7 mL/min/1.73 $m^2$ in the 22 to <26 group (female, 1.8; male, 1.6). Mean TKV grew 5.2% in the 18 to <22 group (female, 3.2%; male, 8.2%) and 6.5% in the 22 to <26 group (female, 5.7%; male, 7.6%) from baseline.

At baseline, mean scores on the SF-12v2 MCS (47.6 and 48.4) and PCS (53.1 and 54.2) were close to normal. On average, participants reported no-to-very-mild pain (mean composite pain severity of BPI, 0.9 and 0.8). On average, participants reported no-to-little impact on average for ADPKD-IS and ADPKD-UIS. Results were similar for male and female patients and retained at month 12.

In conclusion, the authors said, "These data improve understanding of disease burden and natural history of ADPKD in young adults. Patients with ADPKD ages 18 to <26 experience early enlarged TKV and eGFR decline. While there is no obvious impact on HRQoL, they may benefit from treatments that reduce the growth rate and eGFR decline."

**Source:** Davenport E, Zhou X, Wang J, et al. Disease burden and disease progression of young adult patients with autosomal dominant polycystic kidney disease. Poster #351. Abstract of a poster presented at the National Kidney Foundation Spring Clinical Meetings; April 11-15, 2023; Austin, Texas.

## AKI-D in Patients With CKD Hospitalized for Pneumonia

**Patients admitted** to the hospital for pneumonia commonly develop acute kidney injury (AKI). Those who progress to AKI requiring dialysis (AKI-D) face increased risk for adverse outcomes. However, according to **Sae X. Morita, MD,** and colleagues, there are few data available on the risk factors for AKI-D in patients admitted with pneumonia and chronic kidney disease (CKD).

The researchers conducted an analysis of data from the National Inpatient Sample for 2019 to examine the incidence of AKI-D among patients with CKD hospitalized for pneumonia. Results were reported during a poster session at the NKF Spring Clinical Meetings 2023 in a poster titled *Risk Factors for Acute Kidney Injury (AKI) Requiring Dialysis in Patients With and Without Chronic Kidney Disease (CKD) During an Admission for Pneumonia Using a Nationally Representative Sample.*

The outcome of interest was AKI-D. Transplant recipients and those receiving maintenance dialysis were excluded. The analysis compared baseline characteristics in the CKD and non-CKD groups. Risk factors for AKI-D were determined using multiple logistic regression in separate models.

The database identified 1,459,854 admissions with a primary diagnosis of pneumonia. Of those, 20% were in patients with CKD. Patients with CKD were older (75.9 vs 63.6 years; $P<.01$), and less likely to be female (45% vs 50%; $P<.01$), compared with the non-CKD group. AKI-D was more common in patients with CKD (2.5% vs 0.03%; $P<.01$). Overall, mortality was 4.8%, and it was higher in the CKD group than in the non-CKD group (6.4% vs 4.4%; $P<.01$).

In the CKD group, the multivariable model demonstrated an association between younger age, male sex, and Black, Hispanic, and Asian race and higher odds of AKI-D. In addition, admission to a large, urban, teaching, privately owned hospital was associated with higher odds of AKI-D.

In conclusion, the researchers said, "The incidence of AKI-D was 10 times higher in the CKD group than in the non-CKD population. Male, Black, Hispanic, and Asian patients and hospital settings such as region and teaching status were risk factors for AKI-D in both groups. Further studies are needed to evaluate whether differences in clinical practice underlie some of these risks."

**Source:** Morita SX, Deda X, Melamde M. Risk factors for acute kidney injury (AKI) requiring dialysis in patients with and without chronic kidney disease (CKD) during an admission for pneumonia using a nationally representative sample. Poster #19. Abstract of a poster presented at the National Kidney Foundation Spring Clinical Meetings 2023; April 11-15, 2023; Austin, Texas.

## Advanced CKD, Heart Failure, and Risk of Dementia

**Researchers, led by Amara Sarwal, MD,** conducted a study to determine whether chronic kidney disease (CKD) and heart failure are independent risk factors for Alzheimer disease/related dementias (ADRD) in a cohort of US veterans with type 2 diabetes. Results were reported during a poster session at the NKF Spring Clinical Meetings 2023 in a poster titled *Cardiorenal Syndrome: CKD, Heart Failure, and Risk for Dementia.*

The cohort included US veterans ≥65 years of age with type 2 diabetes and two outpatient measurements of serum creatinine at least 60 days apart from January 1, 2008, to December 31, 2010. The date of the second creatinine measurement was considered the index date. The CKD Epidemiology Collaboration equation was used to define estimated glomerular filtration rate. *International Classification of Diseases, Tenth Revision (ICD 9/10)* codes from January 1, 2000, to the index date were used to define the presence of heart failure and other comorbidities.

Veterans with ADRD at baseline were excluded. Occurrences of ADRD subsequent to baseline were identified by *ICD-9/10* codes from the index date to December 31, 2021.

The cohort included 362,598 US veterans. Of those, 14.6% had heart failure at baseline, 34.8% had stage 3 CKD, and 3.3% had stage 4/5 CKD. During the study period, there were 46,156 ADRD events (12.7%), 248,609 deaths (68.6%), and 258,530 composite ADRD/death events (71.3%).

In multivariable logistic regression model analysis adjusted for demographics, comorbidities, and medications, there was no association between CKD and increased risk of ADRD. There were associations between CKD and death and a composite of ADRD/death. There were associations between heart failure and increased risk of ADRD, death, and a composite of ADRD/death.


"Advanced CKD was not associated with ADRD, likely due to the competing risk of death," the researchers said. "ADRD is a more advanced stage of cognitive function decline. Whether earlier stages of cognitive decline, which may affect quality of life, are more common in advanced CKD needs further study."

**Source:** Sarwal A, Ye X, Boucher R, et al. Cardiorenal syndrome: CKD, heart failure, and risk for dementia. Poster #190. Abstract of a poster presented at the National Kidney Foundation Spring Clinical Meetings 2023; April 11-15, 2023; Austin, Texas.

## Changes in eGFR in Patients With Gout During Treatment With Pegloticase

**Patients with** advanced chronic kidney disease (CKD) commonly experience gout, a condition associated with CKD progression. In patients with CKD and uncontrolled gout, pegloticase lowers serum urate. Results of the MIRROR randomized, controlled trial demonstrated a higher response rate with methotrexate (MTX) versus placebo cotherapy (71.09% vs 38.5%). However, according to **Abdul Abdellatif, MD,** and colleagues, use of MTX had been limited due to the potential risk for an adverse impact on estimated glomerular filtration rate (eGFR) in patients with CKD.

During a poster session at the NKF Spring Clinical Meetings 2023, Dr. Abdellatif et al reported 12-month changes in eGFR among patients in the MIRROR trial. The poster was titled *eGFR Changes During Pegloticase Treatment With and Without Methotrexate Cotherapy: 12-Month Findings of MIRROR RCT.*

Uncontrolled gout was defined as serum urate ≥7 mg/dL, urate-lowering therapy failure/intolerance, and one or more gout symptoms. Patients with uncontrolled gout were randomized 2:1 to receive oral MTX (15 mg/week) or placebo as cotherapy to pegloticase (8 mg biweekly, 52 weeks). Patients with eGFR <40 mL/min/1.73 $m^2$ were excluded.

Following a 2-week MTX tolerance test and 4-week blinded MTX/placebo run-in period, patients began treatment with pegloticase plus MTX or pegloticase plus placebo. The first dose of pegloticase was Day 1. Measurement of eGFR occurred prior to MTX use, at baseline, and during therapy. Mean change in eGFR from baseline was analyzed by group and by patients with baseline eGFR <60 mL/min/1.73 $m^2$ and patients with baseline eGFR <60 mL/min/1.73 $m^2$ and ≥60 mL/min/1.73 $m^2$ (intention-to-treat, all randomized patients).

The groups were similar in baseline characteristics: MTX group, n=100; mean age, 56 years; 91% men; baseline eGFR, 68 mL/min/1.73 $m^2$ and placebo group, n=52; mean age, 53 years; 85% men; baseline eGFR, 71 mL/min/1.73 $m^2$. Both groups were stable in eGFR during the run-in and treatment periods.

At week 52, the change in eGFR from baseline in the MTX group was +4.6 mL/min/1.73 $m^2$ versus +1.7mL/min/1.73 $m^2$ in the placebo group. Among patients with baseline eGFR <60 mL/min/1.73 $m^2$, the change from baseline at week 52 was +3.2 mL/min/1.73 $m^2$ in the MTX group and +0.9 mL/min/1.73 $m^2$ in the placebo group.

In conclusion, the researchers said, "eGFR remained stable in most pegloticase-treated patients with or without MTX cotherapy. This also held true for patients with stage 3 CKD at baseline (all eGFR >40). These data suggest renal function was not negatively impacted by treatment with pegloticase plus MTX during the MIRROR RCT."

**Source:** Abdellatif A, Botson J, Obermeyer K, Padnick-Silver L, Marder B. eGFR changes during pegloticase treatment with and without methotrexate cotherapy: 12-month findings of MIRROR RCT. Poster #232. Abstract of a poster presented during the National Kidney Foundation Spring Clinical Meetings; April 11-15, 2023; Austin, Texas. Funding for the study was provided by Horizon Therapeutics plc.

## Neurocognitive Evaluation and Time to Transplant Waitlist

**Up to 38%** of patients with end-stage renal disease experience cognitive impairment. The risk for developing neurocognitive impairment is increased in patients on maintenance hemodialysis and is associated with increases in disease progression and recovery time. Patients who are referred to evaluation for placement on the kidney transplant waitlist may or may not be referred to neurocognitive evaluation (NCE).

**Barcenia Morgan, MD,** and colleagues at the University of Texas Medical Branch, Galveston, Texas, conducted a retrospective cohort study to examine the discrepancies between referred and nonreferred patients in waitlist placement rates, transition time from initial evaluation to waitlist, and selection for transplant surgery. The researchers reported results of the study during a poster session at the NKF Spring Clinical Meetings 2023 in a poster titled *Renal Transplant Transition Rates After Neurocognitive Evaluation in ESRD.*

The study cohort included 1719 patients evaluated for kidney transplant from January 2015 to December 2019 at a single center. The cohort was divided into two groups: (1) 155 patients who were referred for NCE prior to consideration for renal transplant and (2) 1564 patients who were not referred for NCE.

The researchers compared outcomes between the two groups, including waitlist rates, time from evaluation to waitlist assignment, and rates of transplant surgery. *P* values were calculated to compare referred and nonreferred patients for each of the three outcomes. Patient demographics, medications, and comorbidities were also reviewed.

Of the patients included in the overall cohort, approximately 9.0% were referred for NCE prior to consideration for renal transplant. Of the overall cohort, 48.4% were female, 25.2% were non-Hispanic White, 37.4% were non-Hispanic Black, and 34.8% were Hispanic. Among the patients referred for NCE, 32.9% had depression, 29.2% had anxiety, and 16.8% had a previous cerebral vascular accident.

Among the group referred for NCE, 36.8% were placed on the waitlist, compared with 49.6% of those not referred for NCE ($P$=.002). The time of transition from evaluation to waitlist placement was 7.5 months among patients in the NCE group compared with 4.6 months among patients in the nonreferred group ($P$=.003). Rates of kidney transplant were 15.5% in the group referred for NCE and 18.2% in the group not referred for NCE ($P$=.444).

In conclusion, the authors said, "Candidates without NCE referral were placed on the kidney transplant waitlist significantly faster and had a higher rate of placement overall. Nonreferred patients had an insignificantly higher rate of transplant surgery. Thus, in eligible [end-stage renal disease] ESRD patients, NCE referral may be corelated with longer time-to-waitlist, lower waitlist attainment rates, and lower transplant surgery attainment rates."

**Source:** Morgan B, McCoy M, Thomas D, Garate D, Kueht M, Samper-Ternent R. Renal transplant rates after neurocognitive evaluation in ESRD. Poster #433. Abstract of a poster presented at the National Kidney Foundation Spring Clinical Meetings 2023; April 11-15, 2023; Austin, Texas.

## Outcomes Among Critically Ill Patients on Peritoneal Dialysis

**The majority** of patients receiving peritoneal dialysis have end-stage kidney disease (ESKD). However, according to **Nicholas Seidler, MD,** and colleagues, current data on peritoneal dialysis in patients with critical illness focus on utilization of the modality in patients with acute kidney injury. The researchers conducted a study designed to examine the mortality and temporal trends for patients receiving peritoneal dialysis in the setting of critical illness.

Results of the retrospective cohort study were reported during a poster session at the NKF Spring Clinical Meetings 2023. The poster was titled *Outcomes in Critical Care Admissions in Peritoneal Dialysis Patients.*

The study cohort included adult patients with ESKD receiving peritoneal dialysis who were admitted to an intensive care unit (ICU) at Rhode Island Hospital, Providence, and Miriam Hospital, Providence, between January 1, 2015, and January 1, 2022. Data on dialysis modalities used in the ICU, admission outcomes, and 1-year outcomes were collected.

The analysis included 67 critical care admissions among 45 patients. Fifty-two percent were female, and mean age was 54 years. During the ICU admission, 64% received peritoneal dialysis, 6% received hemodialysis, 9% received peritoneal dialysis and hemodialysis, and 16% received peritoneal dialysis, hemodialysis, and continuous renal replacement therapy.

Of those patients receiving peritoneal dialysis at discharge, 48% remained on peritoneal dialysis at 1 year postdischarge, 21% had transitioned to hemodialysis, and 21% had died. Of those discharged on hemodialysis, 90% remained on hemodialysis at 1 year, none had transitioned back to peritoneal dialysis, and 10% had died.

In summary, the researchers said, "Most patients received peritoneal dialysis while in the ICU, and the second largest group began with peritoneal dialysis but was transitioned to hemodialysis. Of those discharged on peritoneal dialysis, less than half remained on peritoneal dialysis after 1 year. Of those discharged on hemodialysis, none transitioned back to peritoneal dialysis after 1 year."

**Source:** Seidler N, Chatragadda B, Raker C, Hu S, Shah A. Outcomes in critical care admissions in peritoneal dialysis patients. Poster #367. Abstract of a poster presented at the National Kidney Foundation Spring Clinical Meetings 2023; April 11-15, 2023; Austin, Texas.

## Hypertension in Living Kidney Donors by Race/Ethnicity

**Complications associated** with living kidney donation include hypertension. However, according to **Ekamol Tantisattamo, MD,** and colleagues, there are few data available on the level of risk for hypertension among living donors of different races.

The researchers conducted a retrospective cohort study using data from the Scientific Registry of Transplant Recipients (SRTR). Results were reported during a poster session at the NKF Spring Clinical Meetings 2023 in a poster titled *Racial Disparity and Hypertension in Living Kidney Donors*.

The SRTR includes living donors undergoing donation between June 1972 and September 2022. Multiple Cox proportional hazard regression analyses were used to examine time-to-event for developing postdonation systolic hypertension (SHTN). SHTN was defined as systolic blood pressure >130 mmHg.

Of the 174,359 living kidney donors, mean age was 41 years and 60% were female. Seventy percent were White, 11% were Black, 13% were Hispanic, 3% were Asian, 0.52% were American Indian/Alaska Native, 0.49% were multiracial, and 0.43% were Hawaiian/other Pacific Islander.

Up to 3.5% of the overall cohort had a history of hypertension prior to donation. The incidence rate of SHTN was 0.2 person-months. Compared with White donors, only Black donors had a significantly higher risk of developing SHTN (hazard ratio [HR], 1.05; 95% CI, 1.01-1.09). Other races/ethnicities had significantly lower risk; the Hawaiian/other Pacific Islander group had a nonsignificantly lower risk.

Following adjustment for age, sex, predonation obesity status, systolic blood pressure, diastolic blood pressure, pre- and postoperative serum creatinine, history of hypertension, and the interaction term between race/ethnicity and obesity status, the risk for developing SHTN remained increased in Black donors ($HR_{Black}$, 1.17; 95% CI, 1.06-1.28); Asian donors were at significantly lower risk ($HR_{Asian}$, 0.85; 95% CI, 0.76-0.96). There were no significant differences in risk in other races/ethnic groups.

Obesity status was an effect modifier, with an attenuated risk for developing SHTN seen in Black donors with obesity (*P* for interaction, <.003).

In summary, the authors said, "Black [patients have] a persistently higher risk for developing postdonation hypertension compared to White [patients] independent of pre- and postdonation factors, while this outcome varies in other races/ethnicity. Preventive strategies for hypertension in living kidney donors should be implemented for pre- through postdonation periods."

**Source:** Tantisattamo E, Hasjim B, Naunsilp P, Puchongmart C, Wattanachayakul P. Racial disparity and hypertension in living kidney donors. Poster #444. Abstract of a poster presented at the National Kidney Foundation Spring Clinical Meetings 2023; April 11-15, 2023; Austin, Texas.

## Symptom Burden and Quality of Life in AKI-D

**According to Y. Diana Kwong, MD,** and colleagues, there are few data available on the symptom burden and quality of life among patients with acute kidney injury treated with intermittent hemodialysis (AKI-D). The researchers conducted a prospective cohort study within a clinical trial (NCT04218370) comparing different hemodialysis schedules in patients with AKI-D.

Results were reported during a poster session at the NKF Spring Clinical Meetings 2023. The poster was titled *Understanding Symptoms and Quality of Life of Patients With AKI-D*.

Participants in the trial were from two large university health systems. They were asked to complete the dialysis symptom index (DSI) and to rate their overall health and quality of life in the past week on a scale of 1 (very poor) to 7 (excellent) at three time points.

The cohort included 95 participants; of those, 64 completed the survey at study entry point. Six of the 95 declined to participate and 24 had altered mental status, leading to incompletion of the survey. Twenty-eight of the 64 initial study participants were followed to day 90. Loss to follow-up was related most commonly to an inability to contact the patient (n=10) and death (n=6).

Of 30 symptoms included in the DSI, participants reported a median of 13, 11, and eight on day 0, 28, and 90, respectively. On day 0, the most commonly reported symptoms were fatigue (82%), dry mouth (73%), feeling anxious (66%), worrying (65%), and trouble falling asleep (63%). Median health rating score was 3 and median quality of life rating was 3.5.

On day 28, the most commonly reported symptoms were fatigue (63%), dry skin (63%), trouble staying asleep (53%), trouble falling asleep (53%), and nausea (50%). Median health rating was 4 and median quality of life rating was 5.

On day 90, the most commonly reported symptoms were fatigue (57%), itching (52%), trouble staying asleep (52%), dry skin (48%), and feeling anxious (37%). Median health rating was 5 and median quality of life rating was 5.

In summary, the researchers said, "Patients with AKI-D have significant burden of physical and emotional symptoms that continue up to day 90. Overall health and quality-of-life ratings improved over time. Assessment of patient-reported outcomes in this population is often limited by missing data given the patients' severity of illness."

**Source:** Kwong YD, Hsu C-Y, Siew E, et al. Understanding symptoms and quality of life of patients with AKI-D. Poster #14. Abstract of a poster presented at the National Kidney Foundation Spring Clinical Meetings 2023; April 11-15, 2023; Austin, Texas.

## Patient Financial Stress and Medication Nonadherence

**According to Dua Abedeen, MPH,** and colleagues at SUNY Downstate Health Sciences University, Brooklyn, New York, undue financial stress may force patients to choose between medication and other living expenses, resulting in inferior rates of medication adherence. Unless directly asked, patients may not disclose issues with finances to their provider.

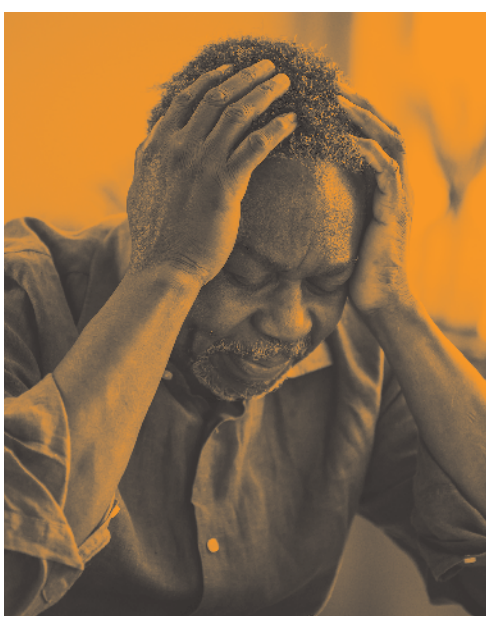
Using a Likert scale survey, the researchers interviewed a random convenience sample of 24 patients receiving dialysis and 16 kidney transplant recipients in an inner-city area. Results of the interviews were reported during a poster session at the NKF Spring Clinical Meetings 2023 in a poster titled *Association of Financial Stressors With Medication Nonadherence in Inner-City Patients With ESKD*.

Mean age of the interviewed patients was 59 years, 77% (n=30) identified as Black, 70% (n=26) were men, 57% (n=20) had less than a college education, and 65% (n=13) made less than $40,000 per year. Mean dialysis vintage was 5.2 years, and mean time since transplant was 4.0 years. All of the patients had insurance.

More than half of the cohort (52%, n=19) said that finances affected their ability to control their medical condition, 42% (n=15) said they had difficulty meeting monthly bills, and 40% (n=14) reported difficulty in affording housing. Seventeen patients reported forgetting to take medication, five reported intentionally missing a dose, and six reported attempting to make their medication last as long as possible, including skipping a dose.

Patients who reported attempting to make medications last as long as possible had more difficulty in meeting monthly expenses ($r$=0.365; $P$=.044) and affording housing ($r$=0.360; $P$=.047). Those who reported more difficulty in meeting monthly household payments were more worried about the financial costs associated with their medications ($r$=0.453; $P$=.007), as were those who reported more difficulty in affording housing ($r$=.0456; $P$=.006).

In summary, the researchers said, "In our inner-city population: 1. Almost half [of patients] had forgotten to take medication and 14% had been intentionally nonadherent. 2. The majority [of patients] believed finances affected their ability to manage their kidney disease. 3. Almost half [of patients] had difficulty with monthly bills and paying for housing. 4. The greater the financial hardship, the more likely patients would skip doses to make medication last longer and [the more likely they were] to feel that they could not control their disease. 5. Housing and other financial difficulties in low-income [end-stage kidney disease (ESKD)] populations may contribute to nonadherence and feelings of helplessness and should be questioned about in order to identify patients at risk so that interventions can be planned."



**Source:** Abedeen D, Williams B, Gomez J, Markell M. Association of financial stress with medication nonadherence in inner-city patients with ESKD. Poster #195. Abstract of a poster presented at the National Kidney Foundation Spring Clinical Meetings 2023; April 11-15, 2023; Austin, Texas.

# Low Food Access and Risk of

Chronic kidney disease (CKD), hypertension, and diabetes are leading contributors to excess health care costs, morbidity, and premature mortality in the United States. Previous research has examined biological and sociocontextual factors contributing to those diseases and the clinical outcomes associated with them. Disease development is linked with factors such as nutrition and dietary patterns and connected with social factors that include income, education, neighborhood racial composition, and neighborhood economic investment.

Explorations of the connections between diet and chronic disease include efforts to understand the effects of the built environment on access to healthy, nutritious food. Low food access urban areas are defined by the US Department of Agriculture as census tracts in which at least 500 people or 33% of the population live more than one-half mile from a supermarket, super center, or large grocery store. Communities with low food access tend to have lower levels of income and education, higher proportions of Black and Latino/Hispanic residents, and greater access to independent grocery stores and convenience stores than to chain and nonchain supermarkets.

According to **Gaurang Garg, MD,** and colleagues, there are few data available on the association between access to nutritional food and incident chronic illness. Using electronic health record (EHR) data from health care institutions across Chicago, Illinois, merged with zip code-level grid mapping of supermarket access, the researchers conducted a retrospective cohort study to examine associations between neighborhood food environments and the risk of incident hypertension, diabetes, and CKD.

The study was also designed to test the hypothesis that zip codes with larger average distances to the nearest supermarket would have higher incidence of those diseases compared with zip codes with shorter average distances to the nearest supermarket. Results were reported in the *American Journal of Kidney Diseases* [2023;81(2):168-178].

The outcome of interest was the incidence of hypertension, diabetes, and CKD based on codes from the *International Classification of Diseases, Ninth Revision,* and/or blood pressure ≥140.90 mm Hg, hemoglobin A1c ≥6.5%, and estimated glomerular filtration rate <60 mL/min/1.73 $m^2$. The cohort included 777,994 individuals without hypertension, diabetes, or CKD at baseline within the HealthLNK Data Repository that includes EHRs from seven health care institutions in Chicago. Study participants resided in one of 56 Chicago zip codes.

Using the average distance to a supermarket in each zip code, the zip codes were stratified into tertiles. Tertile 1 had the shortest distance; zip codes in tertiles 2 and 3 had average supermarket distances of 0.73 miles and 1.23 miles, respectively. Areas with the lowest access, in some cases nearly 2 miles to the nearest supermarket, were located primarily in southern and western neighborhoods.

Compared with those in zip code tertile 1, those in tertiles 2 and 3 were more likely to be female and have Medicare or Medicaid as insurance. The distribution of participants who were Hispanic was generally equal across tertiles. Most of those in the highest tertiles were Black, and the majority of participants in tertile 1 were White. Access to vehicles was relatively equal across tertiles.

Of the 777,944 participants, 408,608 developed hypertension, 51,380 developed diabetes, and 56,365 developed CKD during 2007-2012. In unadjusted analysis, compared with tertile 1, the zip codes in tertiles 2 and 3, respectively, were associated with higher incidence of hypertension (odds ratios [ORs], 1.22; 95% CI, 1.20-

# Hypertension, Diabetes, and CKD

1.23 and 1.49; 95% CI, 1.47-1.50); prediabetes (ORs, 2.27; 95% CI, 2.03-2.52 and 3.14; 95% CI, 2.83-3.48); and diabetes (ORs, 1.94; 95% CI, 1.89-1.99 and 2.55; 95% CI, 2.49-2.61).

There was an association between zip codes in tertile 2 and a lower incidence of CKD (OR, 0.95; 95% CI, 0.93-0.97). There was no association between zip codes in tertile 3 and CKD incidence (OR, 1.00; 95% CI, 0.98-1.02).

Following adjustment for neighborhood factors (zip code-level median household income, racial and ethnic composition, and vehicle access), there were significant associations between supermarket distance tertile and incidence of hypertension (tertile 2: OR, 1.03; 95% CI, 1.02-1.05; tertile 3: OR, 1.04; 95% CI, 1.02-1.06), prediabetes (tertile 2: OR, 1.51; 95% CI, 1.33-1.71; tertile 3: OR, 1.78; 95% CI, 1.55-2.05), diabetes (tertile 2: OR, 1.27; 95% CI, 1.23-1.30; tertile 3: OR, 1.38; 95% CI, 1.33-1.43), and CKD (tertile 2: OR, 1.18; 95% CI, 1.15-1.21; tertile 3: OR, 1.33; 95% CI, 1.29-1.73). When distance to the nearest supermarket was included as a continuous variable, results were similar.

In models adjusted solely for individual factors (age, sex, race, ethnicity, and health insurance) there were significant associations with tertiles 2 and 3 and greater odds of prediabetes and diabetes, but lower odds of hypertension and CKD (prediabetes: ORs, 1.33; 95% CI, 1.18-1.50 and 1.37, 95% CI, 1.21-1.55); (diabetes: ORs, 1.29; 95% CI, 1.26-1.33 and 1.35; 95% CI, 1.31-1.39); (hypertension: ORs, 0.95; 95% CI, 0.94-0.97 and 0.91; 95% CI, 0.89-0.92); and (CKD: ORs, 0.80; 95% CI, 0.78-0.82 and 0.73; 95% CI, 0.72-0.76).

Following adjustment for both neighborhood- and individual-level covariates, tertiles 2 and 3 of supermarket distance were associated with a higher incidence of diabetes (ORs, 1.05; 95% CI, 1.02-1.09 and 1.09; 95% CI, 1.05-1.13). Conversely, zip codes in the second or third tertiles of supermarket distance were associated with a lower incidence of hypertension (ORs, 0.93; 95% CI, 0.92-0.95 and 0.87; 95% CI, 0.86-0.89). For tertiles 2 and 3, there was no significant association with incidence of CKD (ORs, 0.98; 95% CI, 0.96-1.01 and 1.00; 95% CI, 0.97-1.04). There was a statistically significant association of incident hypertension (OR, 4.05; 95% CI, 3.94-4.16; $P<.001$) and incident diabetes (OR, 3.13; 95% CI, 3.05-3.21; $P<.001$) with incident CKD.

There were some limitations to the study findings, including the inability to capture neighborhood and social factors such as poverty, social cohesion, housing, education, gentrification, and discriminatory public policies that may affect health outcomes, and limited individual-level information.

In conclusion, the researchers said, "We observed notable disparities in rates of hypertension, diabetes, and CKD across Chicago zip codes. Except for diabetes, the association of supermarket proximity with hypertension and CKD was largely explained by individual- and neighborhood-level factors. Additional studies using neighborhood deprivation indexes and hierarchical models may further elucidate the respective individual- and neighborhood-level contribution to disease outcomes." ■

**TAKEAWAY POINTS**

- Researchers reported results of a study examining the association of household distance to the nearest supermarket with the incidence of hypertension, diabetes, and chronic kidney disease (CKD) in an urban area in the United States.
- Of 777,994 participants, 408,608 developed hypertension, 51,380 developed diabetes, and 56,355 developed CKD.
- There were significant disparities in supermarket proximity and incidence of hypertension, diabetes, and CKD.

# Adherence to DASH Among Black Adults With CKD

The burden of hypertension, chronic kidney disease (CKD), and cardiovascular disease is disproportionately higher in Black Americans. Adherence to the DASH (Dietary Approaches to Stop Hypertension) eating plan is associated with improvements in hypertension and positive outcomes in CKD and cardiovascular disease. However, according to **Crystal C. Tyson, MD, MHS,** and colleagues, adherence to DASH is low among Americans. Diet counseling has been shown to enhance DASH adherence in Black men and women, resulting in a reduction in racial disparities in rates of hypertension control. Nevertheless, adherence to DASH is suboptimal, and racial disparities in adherence remain.

There are few data available on the factors contributing to low adherence to DASH in Black Americans. Previous studies have identified possible barriers to adherence, including high costs of healthy food, lack of available and/or accessible healthy food, overaccessibility and convenience of unhealthy food, and discordant cultural influences on food preferences and diet norms. Individuals with CKD may face additional barriers related to the need to restrict some foods that are emphasized in DASH (fruits, vegetables, whole grains, and legumes).

Dr. Tyson et al conducted a qualitative study to examine perceptions about DASH, its cultural compatibility, and barriers and facilitators to adherence to DASH in a cohort of Black adults with CKD. Results were reported in the *Journal of Renal Nutrition* [2023;33(1):59-68].

The study included focus groups and semistructured individual interviews with 22 Black men and women with CKD from outpatient clinics at a US academic medical center. Thematic analysis was used to examine the transcripts of the audio-recorded interviews. Eligible participants were ≥21 years of age, had CKD stages 3 or 4 (defined as estimated glomerular filtration rate of 30 to 59 mL/min/1.73 $m^2$ or 20 to 30 mL/min/1.73 $m^2$, respectively), and completed an outpatient primary care or nephrology clinic visit between November 2019 and March 2021.

Focus group discussions were held from December 2019 to January 2020 in a private conference room. The discussions lasted approximately 90 minutes and were led by an experienced qualitative moderator. Due to the implementation of COVID-19 restrictions in March 2020, the interviews with participants with CKD stage 4 were conducted via telephone. The telephone interviews lasted approximately 60 minutes and were performed by one of two race-concordant qualitative moderators using the same interview guide that was used during the initial focus group discussions.

All participants were asked semistructured, open-ended questions. They were asked to react to this statement: *DASH is not an African American diet because it doesn't take into account cultural traditions or food preferences.* The lack of a definition for African American diet was deliberate.

The final sample size was 22 individuals. Of those, 13 patients with stage 3 CKD attended one focus group discussion involving eight participants or one focus group discussion involving five participants, and nine with CKD stage 4 completed one telephone interview. Of the overall cohort, 13 participants were female, median age was 61 years, and the most commonly reported comorbid condition was hypertension.

A total of 21 participants completed the study questionnaire. Of those, 15 reported having little or no money left to purchase "special things" after paying their monthly bills, and 11 reported only rarely or never having enough money left over to purchase healthy food in a typical month.

Participants' familiarity with DASH varied from having no prior knowledge about the diet to having heard of it but not in detail. After learning about DASH, the participants generally agreed that it was a healthy diet.

The majority of participants felt that DASH was appropriate for patients with CKD; however, three participants, all with stage 4 CKD, mentioned potential conflicts. One felt DASH included too much protein, and another said DASH contained too much potassium, based on receiving advice to restrict those nutrients. The third participant said that his poor appetite, related to his CKD, would make it challenging to consume the amount of food recommended by DASH.

Responses related to the cultural compatibility of DASH were mixed. A few participants felt that DASH did not account for cultural traditions, but indicated that that would not hinder their ability to adhere to the diet. However, most felt DASH to be culturally compatible for reasons that included the possibility to modify traditional recipes into healthful, DASH-friendly versions. The final reaction to the cultural compatibility of DASH was that cultural traditions were irrelevant in areas of health; health needs to take precedence over tradition.

### BARRIERS AND FACILITATORS TO FOLLOWING DASH

Most participants agreed that they had accessibility of healthy foods, but they felt that healthy foods would cost more than their typical dietary pattern. Some felt that because DASH calls for fresh produce, they might face extra trips to the grocery store to replace spoiled food. Participants on fixed incomes or with time constraints indicated those things might make adherence to DASH challenging. However, most participants agreed that the higher costs and extra grocery store trips would be worth the tradeoff of improvements in their health.

Some participants had concerns regarding food preparation and cooking, including worries about cooking ability, not owning proper tools to measure foods, and the inconvenience of having to weigh foods. Strategies to overcome those barriers were having access to simple, easy-to-follow DASH recipes and learning how to accurately determine serving sizes.

Another perceived barrier to adherence to DASH involved participants' household responsibilities regarding food. Living with household members with conflicting food preferences and needs was seen as a barrier. Some participants thought living alone would make it easier to adhere to DASH, while some felt living with others would facilitate adherence if the household members were supportive and encouraged efforts to eat healthy foods.

The researchers cited some limitations to the study, including the small sample size restricted to an urban area of a southern state, and the need to conduct individual phone interviews with some participants rather than focus group discussions.

In conclusion, the authors said, "Black adults with CKD viewed DASH as a healthy, culturally compatible diet. Recognizing that diet in Black adults is not uniform, interventions should emphasize person-centered rather than stereotypically culture-centered approaches to DASH adherence." ■

### TAKEAWAY POINTS

- Researchers conducted a study to examine perceptions about the DASH (Dietary Approaches to Stop Hypertension) eating plan among Black adults with chronic kidney disease (CKD) stages 3 to 4.
- The study included 22 Black adults with CKD who received information about DASH and then offered their perceptions of barriers and facilitators to adherence to the diet plan.
- Overall, the participants viewed DASH as a healthy, culturally compatible diet, and indicated willingness to work to overcome barriers to adherence.

# Rates of Cardiovascular Events in Patients With Glomerular Disease

Patients with all-cause chronic kidney disease (CKD) are at high risk for cardiovascular events. As estimated glomerular filtration rate (eGFR) decreases below 60 mL/min/1.73 $m^2$, the risk of cardiovascular disease increases exponentially. There is an association between levels of proteinuria <150 mg/d and a doubling of cardiovascular risk.

According to **Mark Canney, MD, PhD,** and colleagues, there are few data available on the risk of cardiovascular disease in patients with various primary glomerular diseases. The absolute risk of cardiovascular disease from the time of diagnosis in patients with each type of primary glomerular disease is unknown, limiting the clinical implementation of cardiovascular prevention strategies in patients who may be younger and retain kidney function and may not be recognized as being at high cardiovascular risk.

The researchers conducted an observational cohort study in a population-level cohort of adults with primary glomerular disease to describe the risk of cardiovascular disease compared with the general population and the impact of traditional and kidney-related risk factors on cardiovascular risk. Results were reported in the *American Journal of Kidney Diseases* [2022;80(6):740-750].

Study exposures were traditional cardiovascular disease risk factors (diabetes, age, sex, dyslipidemia, hypertension, smoking, prior cardiovascualr disease) and kidney-related risk factors (type of glomerular disease, eGFR, proteinuria). The primary outcome of interest was the occurrence of any major adverse cardiovascular event or any revascularization procedure after biopsy. The composite outcome included coronary artery, cerebrovascular, and peripheral vascular events, and death due to myocardial infarction or stroke.

Subdistribution hazards models were used to evaluate the outcome risk with noncardiovascular disease death treated as a competing event. Standardized incidence rates (SIRs) were calculated based on the age- and sex-matched general population.

The cohort included 1912 adults in British Columbia, Canada, with biopsy-proven membranous nephropathy (n=387), minimal change disease (MCD) (n=226), IgA nephropathy (IgAN; n=759), or focal segmental glomerulosclerosis (FSGS; n=540). Eligible participants were diagnosed between January 1, 2000, and December 31, 2012. Mean age of the total cohort was 50.6 years, 59.5% (n=1127) were male, and median duration of follow-up was 6.8 years.

During the median 6.8 years of follow-up, 11.1% (n=212) patients experienced the primary cardiovascular disease outcome: 6.0% (n=115) with a coronary artery event; 2.4% (n=46) with a cerebrovascular event; and 2.7% (n=51) with a peripheral vascular event (individual cardiovascular events were mutually exclusive).

In the overall cohort, the 10-year risk of experiencing a cardiovascular event was high: 14.7%; (95% CI, 12.8%-16.8%). There were significant differences in risk across types of glomerular disease. The risk was highest in patients with FSGS and membranous nephropathy and lower in those with IgAN and MCD (Gray test $P<.001$). Nonetheless, the absolute 10-year risk was high in each type of glomerular disease: 7.4% (95% CI, 5.2%-10.0%) in IgAN; 12.1% (95% CI, 7.0%-18.8%) in MCD; 17.6% (95% CI, 13.1%-22.7%) in membranous nephropathy; and 23.7% (95% CI, 19.3%-28.3%) in FSGS.

Using the Kidney Disease Improving Global Outcomes guideline recommendations that consider a crude incidence of 10 cardiovascular events per 1000 person-years as a threshold beyond which cardiovascular risk is high, the incidence of cardiovascular events was high for the overall cohort (24.7 per 1000 person-years; 95% CI, 22.2-27.4), as well as for each individual type of glomerular disease. Patients with FSGS and membranous nephropathy had higher incidence of cardiovascular events compared with those with IgAN. In the total cohort, the incidence was similar during each year of follow-up following biopsy.

The incidence of cardiovascular events was age- and sex-specific standardized to the general adult population in British Columbia. For the overall cohort, the SIR was 2.46 (95% CI, 2.12-2.82), indicating that the rate of cardiovascular events was 2.5 times that of the general population. There was also greater risk compared with the general population for each individual type of glomerular disease: for FSGS, 3.98 (95% CI, 3.19-4.91); for membranous nephropathy, 3.03 (95% CI, 2.23-4.03); for MCD, 1.76 (95% CI, 1.03-2.82); and for IgAN, 1.38 (95% CI, 1.01-1.85).

There were individual associations between the traditional cardiovascular risk factors (age, male sex, hypertension, diabetes, dyslipidemia, smoking, and prior cardiovascular event) and a higher risk of cardiovascular events. In unadjusted analyses, there was an association of each doubling of proteinuria at biopsy and a 30% greater cardiovascular risk (subdistribution hazard ratio [SHR], 1.3; 95% CI, 1.2-1.5; $P<.001$). There was an association between lower eGFR at biopsy and greater risk; the association was seen even in those with eGFR between 60 and 90 mL/min/1.73 $m^2$ (SHR, 1.9; 95% CI, 1.1-3.3; $P=.03$).

Compared with patients with IgAN, the risk of cardiovascular events was significantly higher in those with FSGS (SHR, 3.4; 95% CI, 2.4-4.8; $P<.001$) and membranous nephropathy (SHR, 2.4; 95% CI, 1.6-3.6; $P<.001$). There was no significant increase in risk among those with MCD (SHR, 1.3; 95% CI, 0.8-2.3; $P=.3$).

The researchers cited some limitations to the study findings, including the potential for misclassification of glomerular disease, the possibility of unmeasured confounding, utilizing hospital data for the primary outcome, and using administrative definitions of comorbid conditions.

In conclusion, the authors said, "Our findings provide convincing evidence that individuals with biopsy-proven IgAN, membranous nephropathy, MCD, and FSGS have a high risk of experiencing cardiovascular events that is approximately 2.5 times that of the general population. This risk differs by type of glomerular disease and is present both before and after the onset of kidney failure. Cardiovascular risk stratification may be improved by considering glomerular disease-specific risk factors in addition to traditional cardiovascular risk factors. Further research is warranted to better understand the mechanisms underlying this heightened risk of cardiovascular disease so that we can potentially intervene early and improve cardiovascular outcomes for patients with glomerular disease." ■

**TAKEAWAY POINTS**

- Researchers reported results of an observational cohort study designed to examine the risk of cardiovascular disease in adults with glomerular disease compared with the general population.
- For the overall cohort, the incidence rate of cardiovascular events was high at 24.7 per 1000 person-years and for each disease type (range, 1.22-46.1 per 1000 person-years).
- The incidence rate of cardiovascular events was higher among the patients with glomerular disease than among the general population of British Columbia, Canada.

# Outcomes in Recipients of Deceased-Donor AKI Kidneys

Some kidneys from deceased donors have been affected by acute kidney injury (AKI) related to the circumstances of death or to complications of treatment. Approximately one-third of kidneys from decreased donors with AKI are discarded, a rate that is higher than that in donors without AKI.

There are few data available on the risk of immunological complications associated with transplanting AKI kidneys. Tissue inflammation in AKI is related to multiple pathways. **Peter P. Reese, MD, PhD,** hypothesized that recipients of AKI kidneys would experience increased rates of acute rejection, both cellular and antibody, and formation of de novo donor-specific antibody (DSA).

To test the hypothesis, the researchers conducted a multicenter, prospective cohort study that included testing deceased-donor urine for injury biomarkers and detailed chart review of recipient outcomes, including biopsies. Detailed immunological data in the Deceased Donor Study were utilized to assess whether donor kidney injury and inflammation were associated with allograft failure and rejection. Results were reported in the *American Journal of Kidney Diseases* [2023;81(20):222-231].

AKI was identified using conventional serological definitions that rely on changes in serum creatinine concentration in addition to characterizing injury using urinary biomarkers, including interleukin-18 (IL-18), kidney injury molecule 1 (KIM-1), and neutrophil gelatinase-associated lipocalin (NGAL). Using a subset of centers that had clinical protocols for routine posttransplant assessment of DSA, the researchers developed a study protocol to "harmonize adjudication of a composite outcome that included de novo DSA within 1 year after transplant."

The primary outcome of interest was a composite of graft failure not due to death or biopsy-proven acute rejection (BPAR) in the first year following transplant. A secondary outcome was a composite of graft failure, rejection, or de novo DSA within the first year. Analyses utilized multivariable Fine-Gray models with death as a competing risk. The researchers measured concentrations of IL-18, KIM-1, and NGAL in deceased donor urine, and donor clinical AKI was assessed using Acute Kidney Injury Network (AKIN) criteria.

The primary cohort included 1137 deceased-donor kidney transplant recipients at 13 centers. Mean recipient age was 53.7 years, 61% were male, 14% had received a previous kidney transplant, and 15% had estimated panel reactive antibody (PRA) >80%. Eighty-two percent of the cohort received rabbit antihymocyte globulin induction therapy, 15% received basiliximab, and 3% received alemtuzumab.

Compared with recipients who did not experience the primary composite outcome of rejection or allograft failure, those who did were more likely to be Black (57% vs 45%; *P*=.003), to have prior transplants (19% vs 13%; *P*=.04), and to have calculated PRA titers >80% (21% vs 14%; *P*=.05) for the association with all four levels of PRA. They were less likely to be discharged from the transplant hospital on tacrolimus (89% vs 97%; *P*<.001) or mycophenolate (93% vs 97%; *P*=.02). Thirty-seven percent of recipients experienced delayed graft function (DGF); those who experienced the primary outcome were more likely to have DGF than those without the primary outcome (54% vs 35%; *P*<.001).

Mean terminal serum creatinine was 1.21 for the deceased kidney donors, and 19% were DCD (donation after cardiovascular determination of death). Using AKIN stages of CKD, 73% of the kidneys were from donors with no AKI, 16% from donors with stage 1 AKI, 6% from donors with stage 2 AKI, and 5% from donors with stage 3 AKI.

During the first year following transplantation, 14% of kidney transplant recipients (n=159) experienced the primary outcome of graft failure or BPAR (107 met the primary outcome due to BPAR). Seventy-seven of the BPAR episodes were acute cellular rejection only, eight were antibody-mediated rejection only, 12 were both acute cellular rejection and antibody-mediated rejection, and 10 could not be definitively classified.

In multivariable analyses, there were no significant associations between urinary injury biomarkers and the primary outcome. In fully adjusted models comparing highest- versus lowest-tertile biomarker concentrations, the subdistribution hazard ratios (HRs)were 0.76 (95% CI, 0.45-1.28) for IL-18, 1.20 (95% CI, 0.69-2.07) for KIM-1, and 1.14 (95% CI, 0.71-1.84) for NGAL.

The subcohort with DSA screening included 422 recipients at five centers. Of those, 13% (n=54) had pretransplant DSA. By year 1, 20% (n=85) experienced the composite outcome of graft failure, acute rejection, and/or de novo DSA. Thirty-eight experienced the rejection outcome, 35 the de novo DSA outcome, and 12 the graft failure outcome. Twelve recipients died by year 1.

There was no significant association between urinary biomarkers and the secondary composite outcome. In fully adjusted models comparing the highest-tertile versus the lowest-tertile biomarker concentrations, the subdistribution HRs were 0.81 (95% CI, 0.42-1.56) for IL-18, 0.9 (95% CI, 0.43-1.87) for KIM-1, and 0.66 (95% CI, 0.34-1.29) for NGAL.

The association of urinary NGAL with rejection or allograft failure was modified by DCD status. There were no significant associations between donor urinary biomarkers and the outcome of BPAR, graft failure, or death. There was no association between donor AKI defined with the AKIN scale with the primary or secondary outcomes or with the outcomes of the exploratory analyses.

Limitations to the study cited by the authors included the possibility that an association between AKI and subclinical rejection was undetected due to limited power or because surveillance biopsies were not part of center protocols, and the possibility that centers accepted only AKI kidneys with otherwise favorable characteristics.

In conclusion, the researchers said, "In the multicenter study with close follow-up of recipients, donor injury biomarkers were associated with neither the primary outcome of graft failure and rejection nor a secondary outcome that included de novo DSA. These results should be confirmed in other cohorts. For transplant centers trying to develop greater experience with transplanting donor AKI kidneys, these findings provide initial evidence that accepting deceased-donor kidneys with AKI will not substantially increase risks of acute rejection under a regimen of robust immunosuppression." ■

**TAKEAWAY POINTS**

- To test the hypothesis that recipients of AKI kidneys would experience increased rates of acute rejection, both cellular and antibody, and formation of de novo donor-specific antibody (DSA), researchers conducted a multicenter, prospective cohort study that included testing deceased-donor urine for injury biomarkers.
- There were no significant associations between donor urinary injury biomarkers and the primary outcome of a composite of biopsy-proven acute rejection (BPAR) and graft failure.
- There was also no association between the donor urinary injury biomarkers and the secondary outcome of a composite of BPAR, graft failure, and/or de novo donor-specific antibody.

# Posttransplant Parathyroidectomy and Cinacalcet Use

For most patients with kidney failure, the optimum treatment is kidney transplantation; preemptive or early kidney transplantation is associated with superior outcomes. Due to the scarcity of kidney donors resulting in prolonged wait times, many patients with kidney failure spend years on dialysis before receiving a kidney transplant. Consequently, recipients of kidney transplant commonly have advanced secondary or tertiary hyperparathyroidism at the time of the transplant.

In patients with advanced chronic kidney disease (CKD) and kidney failure, factors including phosphate retention, nutritional vitamin D deficiency, diminished production of 1,25-dihydrocyvitamin D, and hypocalcemia all contribute to an increase in parathyroid hormone (PTH) secretion and parathyroid gland hyperplasia (secondary hyperparathyroidism). Over time, PTH synthesis and secretion may no longer respond to negative feedback stimuli, leading to autonomous or tertiary hyperparathyroidism.

Posttransplant hyperparathyroidism is common and, according to **Aileen X. Wang, MD,** and colleagues, treatment practices are poorly characterized. The researchers conducted a retrospective, observational cohort study to examine the incidence, associations, and outcomes of posttransplant parathyroidectomy and calcimimetic use in a cohort of kidney transplant recipients in the United States insured with Medicare. Results were reported in the *American Journal of Kidney Diseases* [2023;81(3):270-280].

The study participants were identified using the US Renal Data System data to extract demographic, clinical, and prescription data from Medicare Parts A, B, and D-insured patients who received their first kidney transplant from 2007 to 2013. Patients with pretransplant parathyroidectomy were excluded. There were two study subcohorts: the parathyroidectomy subcohort (patients who underwent posttransplant parathyroidectomy) and the cinacalcet subcohort (patients who used cinacalcet after transplant).

The outcomes of interest were the incidence of and secular trends in parathyroidectomy and cinacalcet use in the 3 years following transplant and 90-day outcomes after posttransplant parathyroidectomy and initiation of cinacalcet. Posttransplant parathyroidectomy was identified by current procedural terminology codes 60500 and 60505. Cinacalcet use was identified using Medicare Part D prescription claims. Posttransplant cinacalcet use was defined as any posttransplant prescription for cinacalcet in the 6 months prior to transplant. The two outcomes were assessed independently of one another. Proportional hazards models were used to assess temporal trends and multivariable Poisson regression was used to examine pretransplant correlates of parathyroidectomy and cinacalcet use.

Study inclusion criteria were uninterrupted Medicare Parts A, B, and D coverage for at least 6 months prior to undergoing kidney transplantation and evidence of at least one Medicare claim in the 2 years prior to transplantation. A total of 30,127 kidney transplant recipients met the inclusion criteria. Of those, 10,707 had filled a prescription for cinacalcet before transplant. Pretransplant cinacalcet users were younger and more likely to be female, Black, and of longer dialysis vintage than nonusers.

Over 70,883 patient-years of follow-up, there were 551 parathyroidectomies (unadjusted incidence rate [IR], 78 [95% CI, 72-84] parathyroidectomies per 10,000 patient-years). Median time from transplant to parathyroidectomy was 13.9 months. Of the 551 parathyroidectomies (1.8% of the entire cohort), 319 were performed as inpatient procedures and 232 were performed as outpatient procedures.

Over 58,326 patient-years of follow-up, 5413 patients filled at least one prescription for cinacalcet (unadjusted IR, 928 [95% CI, 904-953] posttransplant cinacalcet users per 10,000 patient-years). Median time from transplant to first cinacalcet posttransplant prescription fill was 6.8 weeks. When posttransplant use was defined as two or more posttransplant cinacalcet prescription fills, the study identified 4458 patients over 60,807 person-years of follow-up (unadjusted IR, 733 [95% CI, 712-755] posttransplant cinacalcet users per 10,000 patient years).

There was no significant change between 2007 and 2013 in the incidence of parathyroidectomy in the 3 years after kidney transplant (trend $P \geq .1$ for all models). There was a significant increase in the use of cinacalcet (trend $P \leq .002$ for all models). The unadjusted and model 4 hazard ratios for cinacalcet use in patients who underwent transplant in 2013 (vs 2007) were 1.4 (95% CI, 1.3-1.5) and 1.2 (95% CI, 1.1-1.3), respectively.

Longer pretransplant dialysis vintage and pretransplant cinacalcet use were strongly associated with both receipt of posttransplant parathyroidectomy and cinacalcet use. The risk of parathyroidectomy and cinacalcet use was approximately 2.9- and 3.7-fold higher in patients on dialysis for 5 or more years (vs <2 years).

Of the 551 patients who underwent parathyroidectomy, 25% were hospitalized within 90 days of the procedure (IR, 12 [95% CI, 10-15] events per 10 person-years. Mean time from parathyroidectomy to hospitalization was 27 days. The most common complication was hypocalcemia-related diagnoses.

Of the 5413 patients who initiated cinacalcet, 27.7% were hospitalized within 90 days of their first posttransplant prescription fill (IR, 14 [95% CI, 13-15] events per 10 person-years). Mean time from the first posttransplant prescription fill to hospitalization was 31 days. Acute kidney injury occurred in 20.4% (IR, 9 [95% CI, 8-10] events per 10 person-years).

Key limitations cited by the authors were restricting the sample to Medicare beneficiaries; the inability to classify the type of parathyroidectomy performed; lack of laboratory data on levels of PTH, serum calcium, and serum phosphate; and the inability to compare the outcomes of patients treated with cinacalcet versus parathyroidectomy.

In summary, the researchers said, "We examined early posttransplant parathyroidectomy and cinacalcet prescription practices in a large and diverse cohort of US kidney transplant recipients. Almost 20% of our study cohort received a cinacalcet prescription (18%) or underwent parathyroidectomy (1.8%) in the first 3 years after their transplant. With ever-lengthening wait times for kidney transplantation, the frequency and severity of posttransplant hyperparathyroidism have steadily increased. Unfortunately, current management is based on rather sparce data. Prospective studies are urgently needed." ■

**TAKEAWAY POINTS**

- Researchers reported results of a study examining the incidence, associations, and outcomes of posttransplant parathyroidectomy and use of cinacalcet in US Medicare beneficiaries.
- There was no significant increase in the rate of posttransplant parathyroidectomy during the study period (2007-2013).
- There was a significant increase in the posttransplant use of cinacalcet during the study period.

## NKF Urges Inclusion of Kidney Patients in Trials of COVID-19 Therapies

Following a decision by the US FDA to revoke Evusheld's authorization regarding emergency use due to lack of efficacy against dominant COVID-19 variants, **Ken Longino,** CEO of the National Kidney Foundation (NKF), issued a statement that read in part:

"While we support the FDA's decision to revoke Evusheld's authorization for emergency use considering its lack of efficacy on newer Omicron subvariants, it is more important than ever that kidney patients have access to vaccines and therapies that meet rigorous safety and efficacy against burgeoning subvariants. We strongly encourage the FDA and other biotechnology stakeholders to increase investments in innovative research and expediated access to therapeutics that protect kidney patients against COVID-19.

"The vulnerability of ALL kidney patients remains heightened as the COVID-19 pandemic continues and places these patients at a higher risk for infection and mortality at alarming rates, particularly in-center and home dialysis patients, transplant recipients, and immunosuppressed chronic kidney disease patients (eg, patients with glomerular disease, autoimmune disorders, etc.). For the first in 50 years since the enactment of the Medicare End Stage Renal Disease benefit, the greatest decline in the total number of patients on dialysis within a single year occurred in 2021 due to COVID-19-related deaths...We would like to emphasize important considerations regarding low seroconversion and increased risk of vaccine-immunosuppressive drug interactions for select members of this patient population.

"As the FDA continues to research the next generation of prophylactic and therapeutic monoclonals and we enter an endemic phase of the COVID-19 virus, we recommend the inclusion of high-risk patients, specifically kidney patients, including those on dialysis or after transplantation, into clinical trials as it is important to ensure that innovative therapies are safe and effective for this population. Furthermore, to protect immunocompromised patients from future COVID-19 variants, we urge the development of accelerated paths for approval and authorization of new monoclonals currently in the clinical trial phase. We believe that utilization of this approach can assure safety while also making a timely and exponential impact on millions of lives. We welcome the possibility to partner with the FDA as a thought leader on future initiatives regarding this matter."

## NKF Launches Patient-Education Series on Hyperkalemia

In a recent press release, the National Kidney Foundation (NKF) announced the launch of a new animated video series on the heightened risk for complications of hyperkalemia (elevated potassium) in individuals with advanced chronic kidney disease. The two videos are available in both English and Spanish. The series is supported by AstraZeneca.

**Joseph Vassalotti, MD,** chief medical officer at NKF, said, "Potassium is an essential nutrient that helps the body to function properly, but too much potassium in the blood can be a serious medical condition for patients with CKD, diabetes, and/or heart failure, called hyperkalemia. If hyperkalemia is severe, it can sometimes cause heart rhythm irregularities and even sudden death. A simple blood test can determine the level of potassium in a person's blood. It is important to encourage patients to see a doctor for their overall health benefit and to work on a proper treatment plan together."

## AOPO Highlights Progress Toward 2026 Transplant Goal

The Association of Organ Procurement Organizations (AOPO) released a report outlining progress toward the association's goal of 50,000 annual organ transplants in 2026. The goal was set in 2021 to advance the work of organ procurement organizations (OPOs), the federally designated nonprofit groups responsible for facilitating the organ donation process.

In a recent press release, **Barry Massa,** president of AOPO and executive director of LifeCenter Organ Donor Network, said, "AOPO and its OPO community are dedicated and steadfast in our mission to save more lives through organ donation and transplantation year after year. We have witnessed continued growth since the start of this comprehensive initiative to increase donation and transplantation rates across the nation."

The goal of 50,000 complements and exceeds a goal set by the Centers for Medicare & Medicaid Services (CMS) in 2020 to reach 41,000 annual transplants by the end of 2026. AOPO's members reached 39,860 annual organs transplanted in 2022, nearly achieving the CMS goal 5 years early. Current projections indicate that OPOs are on a path to recover and successfully transplant 50,000 organs annually in 2026.

## Survey Results Highlight Need for Earlier Testing for CKD

Bayer released results of a recent survey designed to yield an understanding to the attitudes and challenges faces by health care professionals in diagnosing, managing, and treating patients with chronic kidney disease (CKD). The survey was executed by Bayer and fielded in partnership with MedSurvey.

The survey was distributed to 1000 respondents, including nephrologists, primary care physicians, nurse practitioners, and physician assistants. Survey responses highlighted the need for improvements in care, with an emphasis on the need for earlier and more frequent testing for CKD among patients with type 2 diabetes.

In a press release, **German Guerrero, MD,** executive medical director, Cardiorenal, at Bayer, said, "Research has shown that comanagement between a primary care physician and a nephrologist is associated with improved quality of care, delayed dialysis, and more frequent testing, but we wanted to more deeply understand some of the challenges the treatment team faced in an effort to incite conversations about how we can improve them. At Bayer, we are working to ensure people with chronic kidney disease associated with type 2 diabetes receive optimal care that ultimately leads to earlier diagnosis and treatment and better outcomes.

"These findings reinforce the importance of our commitment to identifying resources and programs aimed at better understanding the real-world management of chronic kidney disease and expanding screening and

### UPCOMING NEPHROLOGY MEETING

**American Society of Nephrology**

**Kidney Week 2023**

November 2-5, 2023
*Philadelphia, Pennsylvania*
www.asn-online.org/education/kidneyweek

early care management. Together—with health care professionals and the broader kidney community—we have an opportunity to improve the diagnosis and management of chronic kidney disease to truly advance care."

## AKF 2023 Class of Corporate Members

In a recent press release, the American Kidney Fund (AKF) announced its 2023 Class of Corporate Members, strategic partners in the Fund's Corporate Membership Program. Corporate Members provide support to AKF as the Fund continues its work to combat kidney disease on all fronts, ranging from prevention to posttransplant living.

**LaVarne A. Burton,** AKF president and CEO, said, "AKF's Corporate Members help make it possible for us to develop, build on, and sustain the wide range of programs and resources we offer for the kidney community. We are grateful for our 2023 Class of Corporate Members for the continued support that helps us to positively impact the lives of those affected by kidney disease, including those at risk for the disease, family members, caregivers, transplant recipients, and living organ donors. We look forward to working with all of our partners, both new and returning, throughout the year."

As of March, the 2023 Class of Corporate Partners included Amgen Inc.; GSK plc; Novartis Pharmaceuticals Corporation; Travere Therapeutics; and Vertex Pharmaceuticals, Inc. (Champion Level); Akebia Therapeutics, Inc.; Alexion Pharmaceuticals, Inc.; Alnylam Pharmaceuticals, Inc.; Ardelyx, Inc.; AstraZeneca plc; Calliditas Therapeutics AB; CSL Vifor; Horizon Therapeutics plc; Janssen Pharmaceuticals, Inc.; Otsuka American Pharmaceutical, Inc.; and PhRMA (Patron Level); and Apellis Pharmaceuticals; Ascelia Pharma AB; Aurinia Pharmaceuticals, Inc.; Biotechnology Innovation Organization; Chinook Therapeutics, Inc; Exelixis, Inc.; Hansa BioPharma AB; Novo Nordisk A/S; and Spherix Global Insights (Advocate Level).

## Fresenius Kidney Care Provides Funding for FIMC

Fresenius Kidney Care has donated $150,000 to the Food Is Medicine Coalition (FIMC) to expand access to medically tailored meals through the FIMC Accelerator Program and to support the development of an accreditation program to ensure fidelity to the quality standards of the FIMC medically tailored meal model.

In a recent press release, **Dennis Kogod,** president of Fresenius Kidney Care, said, "For people living with chronic kidney disease, a healthy diet and exercise is the key to maintaining kidney function and preventing progression to kidney failure, but limited access to healthy foods or knowledge of how to manage a complex diagnosis can prevent indi-

continued on page 20

Print-only Content

continued from page 19

viduals from pursuing a nutritious diet. We're committed to helping patients living with chronic kidney disese approach their care holistically, and providing medically tailored meals can help improve their outcomes."

FIMC agencies provide patients living with complex diseases such as kidney failure and those managing dialysis treatment the opportunity to work with a registered dietitian nutritionist to create a meal plan specifically designed to meet their health needs. With referral from a medical professional or health care plan, patients can have premade meals delivered to their home.

The donation from Fresenius continues its ongoing partnership with FIMC and will help fund a fourth cohort of nonprofit food providers who will be trained to become providers through the FIMC Accelerator Program.

**Alissa Wassung,** executive director of FIMC, said, "We know that high-quality, nutrient-dense food is vital to the treatment and management of diseases. This funding is critical to accelerating our work in communities to refine, replicate, and broadly scale the medically tailored meal model to ensure that people living with kidney disease and other chronic illnesses have access to medically tailored meals, regardless of where they reside. Accrediting medically tailored meal providers throughout the US will help expand this work with a systematic and research-based approach."

Print-only Content

## Easy Water for Everyone Wins Global Prize

Dialyze Direct, a provider of onsite dialysis in skilled nursing facilities, has announced that its nonprofit partner, Easy Water for Everyone, has won second prize in the small innovative projects category of the Mohammed bin Rashid Al Maktoum Global Water Award. Easy Water for Everyone was recognized for its work in providing pure and safe drinking water to underserved communities in West Africa using repurposed dialysis membranes.

Since its establishment in 2015, the organization has brought clean water to 16,000 people across 35 villages in Ghana, Uganda, and Senegal. The technology they utilize operates independently of any electrical grid and is capable of producing more than 50,000 liters of pure water daily.

**Henry Kauftheil,** CEO of Dialyze Direct, said, "We are proud to support Easy Water for Everyone and its leadership, **Linda Donald** and **Dr. Nathan Levin,** in this monumental achievement of repurposing life-saving dialysis membranes to save lives through water treatment. This award is a testament to the importance of their work in providing pure water solutions to communities in Africa that are often overlooked."

Dr. Levin, cofounder of Easy Water for Everyone, said, "Our organization's mission is to provide pure and safe drinking water to those in underserved rural communities, and this award helps bring attention to this important issue. I am grateful for Dialyze Direct's support and collaboration in making this mission a reality." ■

COVID-19

## AKI in COVID-19, Influenza, and Respiratory Syncytial Virus

*Journal of Nephrology.* doi.org/10.1007/s40620-023-01591-2

A large percentage of patients with COVID-19 develop acute kidney injury (AKI). According to Eden Shusterman and colleagues at Sourasky Medical Centre, Tel Aviv, Israel, likely mechanisms include direct viral penetration of renal cells through the angiotensin converting enzyme 2 receptor and indirect damage by the aberrant inflammatory response characteristic of COVID-19.

Noting that other respiratory viruses such as influenza and respiratory syncytial virus (RSV) are also associated with AKI, the researchers conducted a retrospective study comparing the incidence, risk factors, and outcomes of AKI among patients admitted to a tertiary hospital due to infection with COVID-19, influenza (A + B), or RSV.

The study utilized data on 2593 patients hospitalized with COVID-19, 2041 patients hospitalized with influenza, and 429 patients hospitalized with RSV. Patients with RSV were older, had more comorbidities, and presented with higher rates of AKI at admission and within 7 days (11.7% vs 13.3% vs 18% for COVID-19, influenza, and RSV, respectively; $P$=.001). Rates of the need for mechanical ventilation were higher among patients with COVID-19 compared with those among patients with influenza or RSV (12.4% vs 6.5%, vs 8.2%, respectively; $P$=.002), as were rates of mortality (18% vs 8.6% vs 13.5%, respectively; $P$<.001).

In the COVID-19 group only, high ferritin levels and low oxygen starvation were independent risk factors for severe AKI. In all groups, AKI in the first 48 hours of admission and in the first 7 days of hospitalization were strong independent risk factors for adverse outcomes.

In conclusion, the researchers said, "Despite many reports of direct kidney injury by SARS-CoV-2, AKI was less in patients with COVID-19 compared with influenza and RSV patients. AKI was a prognostic marker for adverse outcome across all viruses."

## AKI Rates Lower With Patient-Triggered Ventilation in COVID-19

*Journal of Clinical Medicine.* doi.org/10.3390/jcm12051859

Patients with COVID-19 who experience acute respiratory distress syndrome (ARDS) commonly require mechanical ventilation. There are numerous studies examining optimal management of and treatment for COVID-19. However, there are few data available on specific ventilation strategies for ARDS.

According to **Mark E. Seubert, MD,** and **Marco Goeijenbier, PhD,** support mode during invasive mechanical ventilation is associated with potential benefits that include conserving of diaphragmatic motility, avoiding the negative consequences of the longer use of neuromuscular blockers, and limiting the occurrence of ventilator-induced lung injury. The researchers conducted a retrospective study of confirmed nonhyperdynamic patients with SARS-CoV-2 infection who required mechanical ventilation to examine the association between the occurrence of kidney injury and the decreased ratio of support to controlled ventilation.

The total incidence of AKI in this cohort was low (n=5/41). Sixteen of 41 patients underwent patient-triggered pressure support breathing at least 80% of the time. In that group, there was a lower percentage of AKI (0/16 vs 5/25), determined as a creatinine level above 177 µmol/L in the first 200 hours. There was a negative correlation between time spent on support ventilation and peak creatinine levels ($r$=–0.35). Disease severity scores were significantly higher in the group predominantly on control ventilation.

"Early patient-triggered ventilation in patients with COVID-19 may be associated with lower rates of acute kidney injury," the researchers said.

ADPKD

## Comparison of eGFR Equations in Pediatric Patients With ADPKD

*Pediatric Nephrology.* doi.org/10.1007/s00467-023-05926-w

Children and adolescents with autosomal dominant polycystic disease (ADPKD) represent a growing target population for the development of new treatment options. According to **Pieter Schellekens, MD,** and colleagues, the promising new interventional therapies require determination of a reliable equation for estimated glomerular filtration rate (eGFR) from early stages of ADPKD. The researchers conducted a prospective and longitudinal study comparing commonly used equations for eGFR for their relative performance in a cohort of 68 genotyped patients 0 to 23 years of age with ADPKD.

The revised Schwartz formula (Chronic Kidney Disease in Children [CKiD]) demonstrated a highly significant decline in eGFR with aging (–3.31 mL/min/1.73 m$^2$ per year; $P$<.0001). In the recently updated Schwartz equation (CKiDU25), there was a smaller but still significant decline in eGFR with aging ($P$=.001) as well as a significant difference by sex ($P$<.0001); differences not observed with the other equations.

There was no age and sex dependency with the full-age-spectrum (FAS) equations (serum creatinine-based FAS, the cystatin C-based FAS, and the combined FAS equations).

The prevalence of hyperfiltration was highly dependent on the formula used. The CKiD equation was associated with the highest prevalence of hyperfiltration (35%).

In summary, the authors said, "The most widely used methods to calculate eGFR in ADPKD children (CKID and CKiDU25 equations) were associated with unexpected age or sex differences. The FAS equations were age- and sex-independent in our cohort. Hence, the switch from the CKiD to [Chronic Kidney Disease-Epidemiology Collaboration] equation at the transition from pediatric to adult care causes implausible jumps in eGFR, which could be misinterpreted. Having reliable methods to calculate eGFR is indispensable for clinical follow-up and clinical trials."

CHRONIC KIDNEY DISEASE

## Assessment of Renal Impairment in Patients With AIDs

*AIDS.* 2023;37(3):447-454

Researchers in France, led by **Etienne Mondesert, MD,** conducted a study to compare estimated glomerular filtration rate (eGFR) using the creatinine equation ($eGFR_{creat}$) or the cystatin C equation ($eGFR_{cys}$) in a cohort of individuals with HIV being treated with antiviral drugs. The cohort included patients with $eGFR_{creat}$ approximately 60 mL/min/1.73 m$^2$ to evaluate agreement on stage 2 and 3 chronic kidney disease (CKD) classification.

A total of 262 consecutive patients with HIV-1 with a suppressed viral load (<200 copies/mL) treated with antiretroviral drugs and diagnosed with impaired renal function ($eGFR_{creat}$ 45-80 mL/min/1.73 m$^2$) were included in the study. The researchers determined $eGFR_{creat}$, $eGFR_{cys}$, and resulting CKD staging. Antiretroviral drug regimens were classified into eight groups: cobicistat (COBI)+elvitegravir (EVG); ritonavir (RTV)+protease inhibitor; dolutgravir (DTG); DTG+rilpivirine (RPV); RPV; raltegravir (RAL); bictegravir (BIC); and other antiretroviral drugs.

Mean $eGFR_{cys}$ was higher than mean $eGFR_{creat}$ (77.7 vs 67.9 mL/min/1.73 m$^2$, respectively; $P$<.0001). The differences were significant in five treatment groups with COBI/EVG; DTG; DTG+RPV; RAL. When using $eGFR_{cys}$ rather than $eGFR_{creat}$, CKD classification was modified for 51% of patients, with reclassification to less severe stages in 37% and worse stages in 14%.

In summary, the researchers said, "This study highlighted significant differences in eGFR depending on the renal marker used in persons with HIV, having a significant impact on CKD classification. $eGFR_{cys}$ should be an additive tool for patients have $eGFR_{creat}$ around 60 mL/min/1.73 m$^2$ for better identification of renal impairment."

continued on page 22

continued from page 21

DIABETES

## Finerenone in Patients With Stage 4 CKD and Type 2 Diabetes

*Clinical Journal of the American Society of Nephrology.* [doi:10.2215/CJN.0000000000000149]

There are limited treatment options to reduce persistent cardiovascular and renal risk in patients with type 2 diabetes and stage 4 chronic kidney disease (CKD). Results of FIDELITY, a prespecified pooled analysis of FIDELIO-DKD (Finerenone in Reducing Kidney Failure and Disease Progression in Diabetic Kidney Disease) and FIGARO-DKD (Finerenone in Reducing Cardiovascular Mortality and Morbidity in Diabetic Kidney Disease) demonstrated that heart-kidney outcomes were improved in participants with CKD and type 2 diabetes who were treated with finerenone.

**Pantelis Sarafidis, MD,** and colleagues conducted a FIDELITY subgroup analysis to examine the effects of finerenone among participants with stage 4 CKD (defined as estimated glomerular filtration rate [eGFR] <30 mL/min/1.73 $m^2$). Efficacy outcomes of interest were a cardiovascular composite (cardiovascular death, nonfatal myocardial infarction, nonfatal stroke, or hospitalization for heart failure) and a kidney composite (kidney failure, sustained ≥57% decrease in eGFR from baseline, or kidney disease death).

FIDELITY included 13,023 participants. Of those, 7% (n=890) had stage 4 CKD. The hazard ratio for risk of the cardiovascular composite outcome with finerenone versus placebo among participants with stage 4 CKD was 0.78 (95% CI, 0.57-1.07). The kidney composite outcome was not met for the overall study period; the protective effect with finerenone versus placebo was shown only up to 2 years. Following the 2-year mark, the direction of association was inconsistent and there was an observed loss of precision over time incurred on finerenone versus placebo risk differences. Albuminuria and rate of eGFR decline were consistently reduced with finerenone versus placebo.

The treatment arms were balanced in adverse events. The most common adverse event reported was hyperkalemia (stage 4 CKD: 26% and 13% for finerenone vs placebo, respectively). The incidence of hyperkalemia resulting in permanent discontinuation was low (stage 4 CKD: 3% and 2% for finerenone vs placebo, respectively).

In conclusion, the researchers said, "The cardiovascular benefits and safety profile of finerenone in participants with stage 4 CKD were consistent with the overall FIDELITY population; this was also the case for albuminuria and the rate of eGFR decline. The effects on the composite kidney outcome were not consistent over time."

DIALYSIS

## Symptom Burden of Older Adults Before and After Dialysis Initiation

*Clinical Journal of the American Society of Nephrology.* 2022;17(12):1719-1729

Among older patients with kidney failure, lowering the burden of symptoms may be more beneficial than prolonging life. Patients initiating dialysis are affected by kidney failure-related symptoms differently. According to **Esther N. M. de Rooji, MD,** and colleagues there are few data available on the change in symptoms prior to and following dialysis initiation.

The researchers conducted a study to examine the course of total and individual symptom number and burden before and after dialysis initiation in a cohort of older patients. The study utilized data from the European Quality (EQUAL) study, an ongoing, prospective, multicenter study in patients ≥65 years of age with an incident estimated glomerular filtration rate (eGFR) ≤20 mL/min/1.73 $m^2$.

Using the dialysis symptom index, 30 symptoms were assessed every 3 to 6 months between 2012 and 2021. Scores for symptom number ranged from 0 to 30 and for burden from 0 to 150 (higher scores indicate more severity). Mixed effects models were used to examine symptoms during the year prior to and the year following initiation of dialysis.

The cohort included 456 incident dialysis patients who completed at least one DSI during the year before and the year after dialysis initiation. At baseline (dialysis initiation) mean age was 76 years, 75% were men, mean eGFR was 8 mL/min/1.73 $m^2$, 44% had diabetes, and 46% had cardiovascular disease. In the year prior to dialysis initiation, symptom number increased +3.6 (95% CI, +2.5 to +4.6) and symptom burden increased +13.3 (95% CI, +9.5 to +17.0). Following initiation of dialysis, symptom number changed –0.9 (95% CI, –3.4 to +1.5) and burden decreased –5.9 (95% CI, –14.9 to –3.0).

"Symptom burden worsened considerably before and stabilized after dialysis initiation," the researchers said. "Fatigue, decreased interest in sex, and difficulty becoming sexually aroused were considered most burdensome, of which only fatigue somewhat improved after dialysis initiation."

GLOMERULAR DISEASE

## Skeletal Complications in Pediatric Patients

*Journal of the American Society of Nephrology.* 2022;33(12):223302246

There are unique risk factors for compromised bone health among children with glomerular disease. According to **Amy J. Goodwin Davies, PhD,** and colleagues, there are few data available on skeletal complications in that patient population.

The retrospective cohort study utilized data from PEDSnet, a national network of pediatric health systems with standardized health record data for more than 6.5 million patients from 2009 to 2021. Using Poisson regression analysis, the researchers compared incidence rates (per 10,000 person-years) of fracture, slipped capital femoral epiphysis (SCFE), and avascular necrosis/osteonecrosis (AVN) in 4598 children and young adults with glomerular disease with rates among 553,624 general pediatric patients.

The cohort with glomerular disease was identified using a published computable phenotype. Inclusion criteria for the general population cohort were two or more primary care visits >1 year apart, 1 to 21 years of age, one visit or more every 18 months if followed ≥3 years, and no chronic progressive conditions, defined by the Pediatric Medical Complexity Algorithm. SNOMED-CT diagnosis codes were used to identify fracture, SCFE, and AVN; fracture required an associated x-ray or splinting/casting procedure within 48 hours.

Compared with the general pediatric cohort, there was a higher risk of fracture for the glomerular disease cohort in girls only (incidence rate ratio [IRR], 1.6; 95% CI, 1.3-1.9). Risks of hip/femur and vertebral fracture were increased in the glomerular disease cohort (adjusted IRRs, 2.2; 95% CI, 1.3-3.7 and 5; 95% CI, 3.2-7.6, respectively). The adjusted IRR for SCFE was 33.4 (95% CI, 1.9-5.9) and 56.2 (95% CI, 40.7-77.5) for AVN.

In conclusion, the authors said, "Children and young adults with glomerular disease have significantly higher burden of skeletal complications than the general pediatric population." ■

Sarah Tolson

# Building Resilience in Nephrology Practices: Securing Your Practice's Future

During my time working for a third-party billing company, we have had many nephrologists come to us because their practice manager or biller had left and they did not have a plan in place for what they would do if their revenue cycle was missing a vital component. Resilience is vital for nephrology practices to withstand unforeseen challenges. This article explores strategies such as cross-training medical billing staff, software backup systems, password backups, and robust administrative processes and procedures to build a resilient practice.

## CROSS-TRAINING STAFF

Medical billing is a critical aspect of any nephrology practice. Ensuring accurate and timely billing is essential to maintain cash flow and avoid potential financial pitfalls. To promote resilience in this area, it's important to cross-train your medical billing staff, so they can competently manage different aspects of the billing process. For example, cross-training billing staff to understand both inpatient and outpatient billing for procedures such as hemodialysis, peritoneal dialysis, and kidney transplant evaluations can prevent delays in reimbursements due to staff shortages or absences. Additionally, training staff to handle billing for various insurance providers, including Medicare and Medicaid, can help maintain a consistent revenue stream.

In addition to cross-training staff members, documenting processes and procedures relevant to charge entry, claim submission, payment posting, and all other aspects of the billing process is a critical component of building resilience. Documentation should be detailed and clear enough that someone with no knowledge of the billing process could follow the documentation and successfully follow the billing process.

## SOFTWARE BACKUP SYSTEMS

The increasing reliance on electronic medical records and practice management software necessitates the implementation of comprehensive software backup systems. These systems should include both on-site and off-site backup solutions to protect against data loss due to hardware failure, natural disasters, or cyberattacks.

Nephrology practices can ensure resilience by regularly backing up patient records, billing information, and other crucial data. This can be achieved using cloud-based storage services or external hard drives. It is also vital to test your backup systems periodically to ensure that data can be restored quickly and accurately in case of an emergency. There are many third-party companies that offer options for storing and backing up data in preparation for unfortunate circumstances such as hardware failure or cyberattacks.

## PASSWORD BACKUPS AND SECURITY

With the rise of cyber threats in health care, protecting sensitive patient information and practice data is more important than ever. Implementing a password management system, such as a secure password manager, can help prevent unauthorized access to your practice's data. This system should be combined with strong, unique passwords and regular password updates.

To enhance security, consider implementing multifactor authentication (MFA) for your practice's software systems. MFA adds an additional layer of security by requiring users to verify their identity using a second factor, such as a fingerprint, a text message code, or a physical token. MFA can protect your practice even if passwords are compromised.

## ADMINISTRATIVE PROCESSES AND PROCEDURES

A resilient nephrology practice requires robust administrative processes and procedures to ensure smooth operations during times of crisis or unexpected changes. Some key areas to address include:

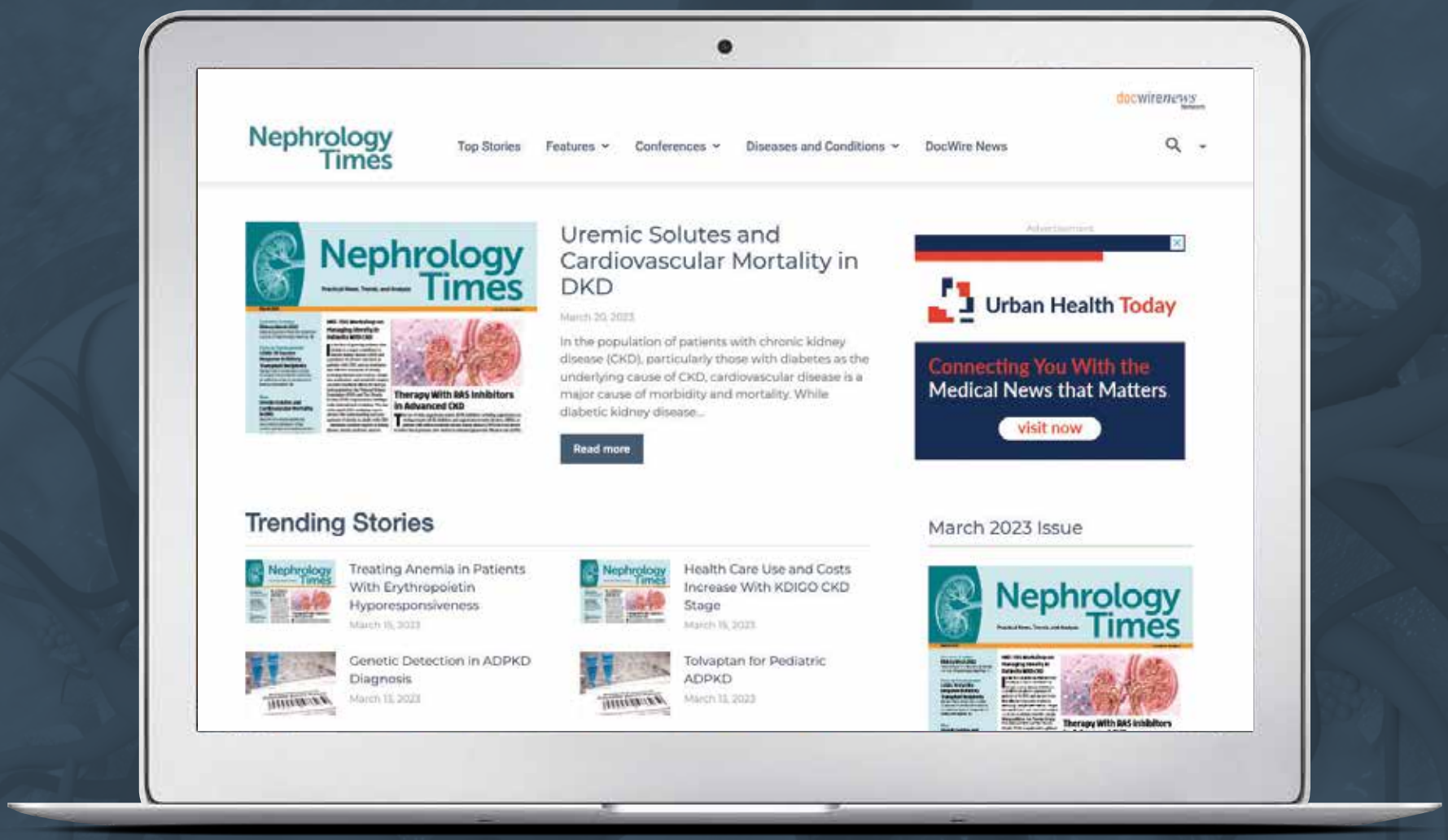
- Contingency planning: Establish plans to handle staffing shortages, equipment failures, or natural disasters. For example, develop relationships with nearby physicians or hospitals to provide care to your patients if your clinic is temporarily unavailable.

- Regular audits and assessments: Conduct periodic audits of your practice's billing and coding practices, as well as assessments of your cybersecurity measures. This can help identify areas of weakness and opportunities for improvement, bolstering your practice's resilience.

By investing in cross-training, implementing robust software backup systems, enhancing password security, and establishing strong administrative processes and procedures, nephrologists can create a resilient practice that is better prepared for the uncertainties of the future. These measures not only protect your practice from potential disruptions but also contribute to a more efficient, secure, and stable nephrology practice. ■

**Sarah Tolson** is the director of operations for Sceptre Management Solutions, Inc., a company specializing in billing for outpatient ESRD dialysis programs, nephrology practices, and interventional nephrology. Your questions are welcome, and she can be reached at stolson@sceptremanagement.com, 801.775.8010, or via Sceptre's website, www.sceptremanagement.com.

# *DocWire News*, your one-stop source for the latest medical industry news, now includes nephtimes.com.




## Check out the online-exclusive content and round out your nephrology news experience.

Nephrology Times

Practical News, Trends, and Analysis