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HHS Funding Cuts and Layoffs Raise Concern in the Kidney Community

By Bridget M. Kuehn

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Dinushika Mohottige, MD, MPH, and her colleagues were surprised to receive a notice that their funding had been frozen for review just weeks after the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) awarded the team's 2025 funding. The team had been working on a study since June 2024, looking for potential environmental and structural factors, such as air pollution, water quality, healthy food access, and over-the-counter medications, that accelerate kidney diseases in a diverse population of US individuals with the apolipoprotein 1 (*APOL1*) genetic variant. The *APOL1* genetic variant is more common among people of African ancestry but occurs across races and ethnicities.

"These are all factors that seem in accordance with the Make America Healthy Again initiatives," said Mohottige, who is an assistant professor at the Institute for Health Equity Research at the Icahn School of Medicine at Mount Sinai in New York City and a staff nephrologist at the James J. Peters Department of Veterans Affairs Medical Center in the Bronx, but who spoke as a private individual and not on behalf of her institutions. "We are focusing on curbing chronic disease, [we are] focusing on things in the environment that are making people more ill, and we are focusing on biological truths by identifying people who have genetic variants that put them, in many cases, at higher risk for accelerated kidney [diseases]."

Ultimately, NIDDK terminated the grant in response to President Donald J. Trump's Executive Order, "Ending Radical and Wasteful Government DEI [Diversity, Equity, and Inclusion] Programs and Preferencing" (1). The grant termination is part of ongoing funding cancellations and layoffs that are reshaping the US Department of Health and Human Services (HHS) and sending ripple effects through kidney disease research and care. President Trump's Executive Order, "Implementing the President's 'Department of Government Efficiency' Workforce Optimization Initiative," includes a "dramatic

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New ADPKD Guideline Stresses Lifestyle Management, Shared Decision-Making

By Karen Blum

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When Vicente Torres, MD, PhD, was training in nephrology over 40 years ago, he was told that polycystic kidney disease (PKD) was something that a person was born with, and nothing could be done about it. Fortunately, knowledge of the disease has improved. Torres, former director of the Mayo Clinic Robert M. and Billie Kelley Pirnie Translational Polycystic Kidney Disease Center in Rochester, MN, recently cochaired the first guideline for autosomal dominant PKD (ADPKD) for Kidney Disease: Improving Global Outcomes (KDIGO).

The guideline (1) and an executive summary (2) were published in *Kidney International* and are freely available. The guideline, the first from KDIGO on a rare kidney disease, provides information for physicians and affected individuals to improve diagnosis, care, and treatment and addresses the challenges of managing this complex, inherited kidney disorder.

The time is right to issue a guideline for ADPKD, which affects up to 12 million people worldwide, Torres said, as the nephrology community has learned much more about the disease since a KDIGO conference about ADPKD in 2014. For one, genetic understanding of the disease has improved. A decade ago, experts were aware of only a couple of genes causing PKD. Now,

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INDICATION

XPHOZAH (tenapanor) 30 mg BID is indicated to reduce serum phosphorus in adults with chronic kidney disease (CKD) on dialysis as add-on therapy in patients who have an inadequate response to phosphate binders or who are intolerant of any dose of phosphate binder therapy.

IMPORTANT SAFETY INFORMATION

CONTRAINDICATIONS

XPHOZAH is contraindicated in:

- Pediatric patients under 6 years of age
- Patients with known or suspected mechanical gastrointestinal obstruction

WARNINGS AND PRECAUTIONS

Diarrhea

Patients may experience severe diarrhea. Treatment with XPHOZAH should be discontinued in patients who develop severe diarrhea.

MOST COMMON ADVERSE REACTIONS

Diarrhea, which occurred in 43-53% of patients, was the only adverse reaction reported in at least 5% of XPHOZAH-treated patients with CKD on dialysis across trials. The majority of diarrhea events in XPHOZAH-treated patients were reported to be mild-to-moderate in severity and resolved over time, or with dose reduction. Diarrhea was typically reported soon after initiation but could occur at any time during treatment with XPHOZAH. Severe diarrhea was reported in 5% of XPHOZAH-treated patients in these trials.

Please see Brief Summary of full Prescribing Information on the following page.

Reference: XPHOZAH® (tenapanor) full Prescribing Information. Waltham, MA: Ardelyx, Inc.; 2023.

ardelyx®

XPHOZAH (tenapanor) tablets, for oral use
Brief Summary of Prescribing Information

1 INDICATIONS AND USAGE

XPHOZAH is indicated to reduce serum phosphorus in adults with chronic kidney disease (CKD) on dialysis as add-on therapy in patients who have an inadequate response to phosphate binders or who are intolerant of any dose of phosphate binder therapy.

4 CONTRAINDICATIONS

XPHOZAH is contraindicated in patients under 6 years of age because of the risk of diarrhea and serious dehydration *[see Warnings and Precautions (5.1), Use in Specific Populations (8.5)]*.

XPHOZAH is contraindicated in patients with known or suspected mechanical gastrointestinal obstruction.

5 WARNINGS AND PRECAUTIONS

5.1 Diarrhea

Diarrhea was the most common adverse reaction in XPHOZAH-treated patients with CKD on dialysis *[see Dosage and Administration (2) in the full Prescribing Information, Contraindications (4) and Adverse Reactions (6.1)]*. In clinical trials, diarrhea was reported in up to 53% of patients, reported as severe in 5%, and associated with dehydration and hyponatremia in less than 1% of patients. Treatment with XPHOZAH should be discontinued in patients who develop severe diarrhea.

6 ADVERSE REACTIONS

6.1 Clinical Trial Experience

Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared with rates in the clinical trials of another drug and may not reflect the rates observed in practice.

The safety data described below reflect data from 754 adults with CKD on dialysis taking XPHOZAH in clinical trials as monotherapy and in combination with phosphate binders. Among the 754 patients, 258 patients were exposed to tenapanor for at least 26 weeks and 75 were exposed to tenapanor for at least one year. *[see Clinical Studies (14) in the full Prescribing Information]*.

Most Common Adverse Reaction

Diarrhea, which occurred in 43-53% of patients, was the only adverse reaction reported in at least 5% of XPHOZAH-treated patients with CKD on dialysis across trials. The majority of diarrhea events in the XPHOZAH-treated patients were reported to be mild-to-moderate in severity and resolved over time, or with dose reduction. Diarrhea was typically reported soon after initiation but could occur at any time during treatment with XPHOZAH. Severe diarrhea was reported in 5% of XPHOZAH-treated patients in these trials *[see Warnings and Precautions (5.1)]*.

7 DRUG INTERACTIONS

7.1 OATP2B1 Substrates

Tenapanor is an inhibitor of intestinal uptake transporter, OATP2B1 *[see Clinical Pharmacology (12.3) in the full Prescribing Information]*. Drugs which are substrates of OATP2B1 may have reduced exposures when concomitantly taken with XPHOZAH. Monitor for signs related to loss of efficacy and adjust the dose of concomitantly administered drug as needed.

Enalapril is a substrate of OATP2B1. When enalapril was coadministered with XPHOZAH (30 mg twice daily for five days), the peak exposure (Cmax) of enalapril and its active metabolite, enalaprilat, decreased by approximately 70% and total systemic exposures (AUC) decreased by 50 to 65% compared to when enalapril was administered alone *[see Clinical Pharmacology (12.3) in the full Prescribing Information]*. However, the decrease in enalaprilat's exposure with XPHOZAH may be offset by the inherently higher exposures observed in patients with CKD on dialysis due to its reduced renal clearance. Therefore, a lower starting dose of enalapril, which is otherwise recommended in patients with CKD on dialysis is not required when enalapril is coadministered with XPHOZAH.

7.2 Sodium Polystyrene Sulfonate

Separate administration XPHOZAH and sodium polystyrene sulfonate (SPS) by at least 3 hours. SPS binds to many commonly prescribed oral medicines.

8 USE IN SPECIFIC POPULATIONS

8.1 Pregnancy

Risk Summary

Tenapanor is essentially non-absorbed systemically, with plasma concentrations below the limit of quantification (less than 0.5 ng/mL) following oral administration *[see Clinical Pharmacology (12.3) in the full Prescribing Information]*. Therefore, maternal use is not expected to result in fetal exposure to the drug.

The available data on XPHOZAH exposure from a small number of pregnant women have not identified any drug associated risk for major birth defects, miscarriage, or adverse maternal or fetal outcomes. In reproduction studies with tenapanor in pregnant rats and rabbits, no adverse fetal effects were observed in rats at 0.2 times the maximum recommended human dose and in rabbits at doses up to 15 times the maximum recommended human dose (based on body surface area) *[see Nonclinical Toxicology (13.1) in the full Prescribing Information]*.

The estimated background risk of major birth defects and miscarriage for women with CKD on dialysis with hyperphosphatemia is unknown. All pregnancies have a background risk of birth defect, loss, or other adverse outcomes. In the United States general population, the estimated background risk of major birth defects and miscarriage in clinically recognized pregnancies is 2% to 4% and 15% to 20%, respectively.

Animal Data

In an embryofetal development study in rats, tenapanor was administered orally to pregnant rats during the period of organogenesis at dose levels of 1, 10 and 30 mg/kg/day. Tenapanor doses of 10 and 30 mg/kg/day were not tolerated by the pregnant rats and was associated with mortality and moribundity with body weight loss. The 10 and 30 mg/kg dose group animals were sacrificed early, and the fetuses were not examined for intrauterine parameters and fetal morphology. No adverse fetal effects were observed in rats at 1 mg/kg/day (approximately 0.2 times the maximum recommended human dose) and in rabbits at doses up to 45 mg/kg/day (approximately 15 times the maximum recommended human dose, based on body surface area). In a pre- and post-natal developmental study in mice, tenapanor at doses up to 200 mg/kg/day (approximately 16.5 times the maximum recommended human dose, based on body surface area) had no effect on pre- and post-natal development.

8.2 Lactation

Risk Summary

There are no data available on the presence of tenapanor in either human or animal milk, its effects on milk production or its effects on the breastfed infant. Tenapanor is essentially non-absorbed systemically, with plasma concentrations below the limit of quantification (less than 0.5 ng/mL) following oral administration *[see Clinical Pharmacology (12.3) in the full Prescribing Information]*. The minimal systemic absorption of tenapanor will not result in a clinically relevant exposure to breastfed infants. The developmental and health benefits of breastfeeding should be considered along with the mother's clinical need for XPHOZAH and any potential adverse effects on the breastfed infant from XPHOZAH or from the underlying maternal condition.

8.4 Pediatric Use

Risk Summary

XPHOZAH is contraindicated in patients less than 6 years of age. In nonclinical studies, deaths occurred in young juvenile rats (less than 1-week old rats; approximate human age-equivalent of less than 2 years of age) and in older juvenile rats (approximate human age-equivalent of 2 years of age) following oral administration of tenapanor, as described below in Juvenile Animal Toxicity Data.

The safety and effectiveness of XPHOZAH in pediatric patients have not been established.

Juvenile Animal Toxicity Data

In a 21-day oral dose range finding toxicity study in juvenile rats, tenapanor was administered to neonatal rats (post-natal day (PND) 5) at doses of 5 and 10 mg/kg/day. Tenapanor was not tolerated in male and female pups and the study was terminated on PND 16 due to mortalities and decreased body weight (24% to 29% reduction in females at the respective dose groups and 33% reduction in males in the 10 mg/kg/day group, compared to control).

In a second dose range finding study, tenapanor doses of 0.1, 0.5, 2.5, or 5 mg/kg/day were administered to neonatal rats from PND 5 through PND 24. Treatment-related mortalities were observed at 0.5, 2.5, and 5 mg/kg/day doses. These premature deaths were observed as early as PND 8, with majority of deaths occurring between PND 15 and 25. In the 5 mg/kg/day group, mean body weights were 47% lower for males on PND 23 and 35% lower for females on PND 22 when compared to the controls. Slightly lower mean tibial lengths (5% to 11%) were noted in males and females in the 0.5, 2.5, and 5 mg/kg/day dose groups on PND 25 and correlated with the decrements in body weight noted in these groups. Lower spleen, thymus, and/or ovarian weights were noted at the 0.5, 2.5, and 5 mg/kg/day doses. Tenapanor-related gastrointestinal distension and microscopic bone findings of increased osteoclasts, eroded bone, and/or decreased bone in sternum and/or femorotibial joint were noted in males and females in the 0.5, 2.5, and 5 mg/kg/day dose groups.

In juvenile rats administered tenapanor at 0.03, 0.1, or 0.3 mg/kg/day on PND 5 through PND 61, treatment-related mortalities were observed at 0.3 mg/kg/day. Lower mean body weight gains were noted in the 0.3 mg/kg/day group males and females compared to the control group primarily during PND 12–24 but continuing sporadically during the remainder of the dosing period; corresponding lower mean food consumption was noted in this group during PND 21–33. As a result, mean body weights were up to 15.8% and 16.8% lower in males and females, respectively, compared to the control group; the greatest difference was on PND 24 for males and PND 21 for females. Mean body weight in the 0.3 mg/kg/day group males was only 3.9% lower than the control group on PND 61. There were no tenapanor-related effects on mean body weights, body weight gains, or food consumption in the 0.03 and 0.1 mg/kg/day group males and females. A dosage level of 0.1 mg/kg/day was considered to be the no-observed-adverse-effect level (NOAEL) for juvenile toxicity of tenapanor *[see Contraindications (4), Warnings and Precautions (5.1)]*.

In a 21-day oral dose range finding study in older (weaned) juvenile rats administered tenapanor at 0.1, 1, or 5 mg/kg/day on PND 21 through PND 41 (approximate human age-equivalent of 2 to 12 years of age), treatment-related mortalities or moribundities were observed during the first two days of the study in the 1 mg/kg/day males and the 5 mg/kg/day males and females. Watery feces, decreased food consumption, and lower mean body weight were also observed in the 1 and 5 mg/kg/day groups.

In weaned juvenile rats administered tenapanor at 0.1, 0.3, and 0.7 (males) or 1 (females) mg/kg/day on PND 21 through PND 80, no mortalities were observed. Significant decreases in mean body weights were observed in the 0.3 and 0.7 mg/kg/day males throughout the dosing period (up to 20.3% lower than control) and in the 1 mg/kg/day females between PND 23 to 35 (up to 16.7% lower than control), with food consumption notably decreased on PND 21 to 29. There were also reductions in tibia length between PND 76 and 80 in the 0.3 and 0.7 mg/kg/day males, and between PND 36 and 64 in the 0.7 mg/kg/day males, which were not observed during the 14-day recovery period. The NOAEL was considered to be 0.1 mg/kg/day for juvenile toxicity of tenapanor.

8.5 Geriatric Use

Of 1010 adult patients with CKD on dialysis randomized and treated in two randomized, double-blind, placebo-controlled randomized withdrawal clinical trials for XPHOZAH (TEN-02-201 and TEN-02-301) as well as a third randomized, double-blind, placebo-controlled trial (TEN-02-202) for XPHOZAH in combination with phosphate binders, 282 (28%) were 65 years of age and older. Clinical studies of XPHOZAH did not include sufficient numbers of patients aged 65 and older to determine whether they respond differently than younger patients.

10 OVERDOSAGE

No data are available regarding overdosage of XPHOZAH in patients. Based on nonclinical data, overdose of XPHOZAH may result in gastrointestinal adverse effects such as diarrhea, as a result of exaggerated pharmacology with a risk for dehydration if diarrhea is severe or prolonged *[see Warnings and Precautions (5.1)]*.

17 PATIENT COUNSELING INFORMATION

Advise Patients:

Diarrhea

Instruct patients to contact their healthcare provider if they experience severe diarrhea *[see Warnings and Precautions (5.1)]*.

- Instruct patients not to use stool softeners or laxatives with XPHOZAH.

Administration and Handling Instructions

Instruct Patients:

- To take XPHOZAH just prior to the first and last meals of the day *[see Dosage and Administration (2.2) in the full Prescribing Information]*.
- Patients should be counseled not to take XPHOZAH right before a hemodialysis session, and to take XPHOZAH right before the next meal, as some patients may experience diarrhea after taking XPHOZAH.
- If a dose is missed, take the dose just before the next meal. Do not take 2 doses at the same time *[see Dosage and Administration (2.2) in the full Prescribing Information]*.
- To keep XPHOZAH in a dry place. Protect from moisture. Keep in the original bottle. Do not remove desiccant from the bottle. Keep bottles tightly closed *[see How Supplied/Storage and Handling (16) in the full Prescribing Information]*.

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HHS Funding Cuts and Layoffs

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restructuring" of the HHS, including the consolidation of its 28 divisions to 15 and a reduction of the department's workforce by one quarter, from 82,000 full-time employees to 62,000, according to an HHS press release (2). In addition to saving money, HHS Secretary Robert F. Kennedy, Jr., said in the press release that the cuts would help achieve the administration's goal to Make America Healthy Again. "We aren't just reducing bureaucratic sprawl. We are realigning the organization with its core mission and our new priorities in reversing the chronic disease epidemic," Kennedy said. "This department will do more—a lot more—at a lower cost to the taxpayer."

While advocates for people with kidney diseases and nephrologists expressed support for the administration's stated goals to increase government efficiency and improve chronic disease prevention and care, many also expressed concern about the impact of the layoffs at HHS and funding cuts and cancellations on patient research and on the future of kidney disease research.

"While it is certainly appropriate to try to identify inefficiencies in government, the...terminations across HHS will negatively affect the lives of [people with kidney diseases] in the United States. NKF [National Kidney Foundation] is deeply concerned about these actions, which appear to be haphazard and indiscriminate," said Jesse Roach, MD, senior vice president of government relations at NKF, in a statement (3).

Kidney disease impact

Roach noted in his statement that some of the HHS cuts have affected critical kidney health programs. He said that many employees, who were working to modernize the transplant system, were cut from the Health Resources and Services Administration's Division of Transplantation. "Mass layoffs stand in direct opposition to the goals of transplant system reform to improve efficiency, transparency, and the ability of government to respond to the needs of people who rely on the system," Roach said. "Chaotic terminations of the employees charged with implementing reforms will ensure the status quo persists."

Other staff cuts that Roach described as alarming were:

- The Centers for Medicare & Medicaid Services staff who are responsible for organ procurement, transplant, and dialysis safety, as well as for improving patient care and transplant access
- The National Institutes of Health (NIH) researchers who are developing new kidney disease therapies that may help prevent progression to kidney failure
- The Centers for Disease Control and Prevention staff who are working to prevent dialysis-related infections, track and prevent infectious diseases that may harm patients who are immunocompromised, and monitor overall US health
- The US Food and Drug Administration staff who ensure access to safe food, medications, and devices that are vital to people with kidney diseases

"It is unclear if any prior thought was given to the effects [that] these mass terminations will have on the ability of these agencies to function or the effects [that] these cuts will have on everyday Americans," Roach said. He continued, "Right now, the journey to recovery just became harder for those waiting on a transplant, for patients who rely on dialysis to be safe, and for those hoping for a cure or treatment for their chronic illnesses. There will also be an incalculable loss of talent, expertise, and experience that will be difficult, if not impossible, to ever replace."

HHS also plans to cut contracts with outside organizations by 35% (4). One outside contract researcher for HHS, who was fired abruptly in January under the anti-DEI initiative, was studying racial and ethnic disparities in kidney care using federal data. The investigator, who wished to remain anonymous, said that they were given just 15 minutes' notice before the contracting organization shut off their access to their work or ability to inform collaborators and community-based partners. The researcher worries that the kidney community will lose progress on inequities and rebuilding trust with underserved communities. "We know the health inequities in kidney care have persisted for decades," the contract investigator said. "In the past decade, we saw some progress in [the] closing of these gaps. By terminating these health equity-related projects, we are reversing that progress and could go back and widen inequities."

Mohottige and the former HHS contractor expressed concern about the impact of the department-wide cuts at NIH. The former HHS contract researcher noted that cuts to infectious disease outbreak prevention and surveillance, vaccine access and development, and defunding of state health departments will all have impacts on vulnerable populations like people living with kidney diseases.

Patients have also expressed concern: "As someone living with the consequences of kidney disease, I've learned that hope is often our greatest medicine," said Robert Pito Sanchez, MPS, senior clinical interviewer nephrology at the Albert Einstein College of Medicine in New York. "We look to the future because that's where the healing is supposed to come from—where scientists, we believe, are working day and night to better understand what's happening in our bodies, and how to stop it. The termination of the *APOL1* gene study didn't just cut funding—it cut into that hope. It sent a message that the pursuit of answers for people like me, for communities like mine, isn't worth the cost or the time." Pito Sanchez is on the community-based advisory board for the *APOL1* study.

ASN President Prabir Roy-Chaudhury, MD, PhD, FASN, wrote a letter to the new director of NIH, Jayanta Bhattacharya, MA, MD, PhD, congratulating him on his position and emphasizing the importance of working together to improve kidney disease diagnosis, prevention, and care to meet the administration's goals of curbing chronic disease and its devastating impact on Americans. Roy-Chaudhury emphasized that President Trump recognized the importance of improving kidney care during his first term in his Executive Order on Advancing American Kidney Health (5). The Executive Order supports kidney disease research, and Roy-Chaudhury noted that it helped lead to significant steps by legislators and the Executive Branch to improve kidney care. Preventing and slowing kidney diseases also have the potential to substantially reduce Medicare's $150 billion in annual costs for kidney disease care, he noted in the letter. Yet, the recent cuts may jeopardize these efforts, he said.

Roy-Chaudhury stated that "...recent NIH funding cuts threaten to undermine these efforts and contradict the goals articulated by HHS Secretary Kennedy and yourself to address chronic diseases and improve health outcomes." He noted the disproportionate impact of the termination of the coordinating centers for critical networks on nephrology and geriatric nephrology researchers working to improve outcomes for people with kidney diseases. "These programs provide vital research infrastructure and support training and career development for early-stage investigators committed to strengthening the medical workforce," Roy-Chaudhury said. "Reducing investments in kidney research jeopardizes progress in tackling chronic diseases and runs counter to the administration's stated mission of improving kidney health for all Americans."

Uncertainty and delays

The cuts are already causing disruption in ongoing kidney disease research, impacting patients, and threatening to derail the next generation of researchers. Mariya Sweetwyne, PhD, an assistant professor at University of Washington Medicine in Seattle, was in the process of applying for her first NIH grant to fund her research on how mitochondria affect cellular aging and injury response in the kidney when NIH abruptly canceled the request for proposal. "We are trying to understand how aging overlaps with kidney diseases, making older kidneys more susceptible to disease," Sweetwyne said. "Understanding that and the cell types involved [are] key for developing targeted therapies and therapies with fewer side effects."

The grant for which she was applying was designed to fund researchers who also mentor and support students from under-represented backgrounds as part of NIH's efforts to increase diversity in science. NIH also canceled funding for numerous ongoing studies in the anti-DEI push, including a study on how long-term arsenic and uranium in drinking water contribute to cardiovascular and kidney diseases and a study on the role of mitochondria in sex differences in acute kidney injury (6).

Sweetwyne, who launched her laboratory 4 years ago, can reapply for other grants. She is optimistic about her prospects because reviewers scored her application well. She is also an NIH reviewer. However, having to restart the process will delay much-needed funding for her nascent laboratory until at least spring 2026. Sweetwyne is unsure what will happen next. She has start-up funds from her university to help support her salary for now. However, she will be unable to hire graduate students, and she will need to fully support her salary, her laboratory's operating and equipment expenses, and the wages of the people working in her laboratory with grants once her start-up funds run out.

But she is more concerned about the impact on kidney research and people living with kidney diseases. "Are people going to feel like they can talk about what problems they see in kidney research practices and how that affects our ability to come up with solutions for kidney diseases?" she asked.

Freezing prospects

The seemingly arbitrary cancellations also make it harder for researchers, especially those just starting, to pursue or sustain a research career. Sweetwyne noted that some top-ranked graduate programs have rescinded all of their offers to prospective trainees because the programs are uncertain about whether they can support the trainees for 5 years. Many universities have also frozen hiring, she said.

"We are rapidly losing pathways for people to start new projects," Sweetwyne said. That is particularly frustrating for kidney disease research, she shared, since the field has enjoyed recent "game-changing" breakthroughs with sodium-glucose cotransporter-2 inhibitors and glucagon-like peptide-1 receptor agonists, as well as promising approaches using big data, gene editing, and RNA therapies. "We are right on the cusp of being able to do something incredible, and we are shutting it down," she said.

Mohottige shared that concern, especially given the limited number of nephrologists and nephrology researchers. She noted that many young investigators are being advised to avoid equity-related work. She also worried about the impact on scientific innovation and global competition. "I am concerned about the impact on a whole generation and maybe multiple generations of investigators," she expressed.

Mohottige has been working with her community advisory board, colleagues, and institution to appeal the grant cancellation. In April, she and advisory board members met with the Senate Health, Education, Labor and Pensions Committee members' staff to discuss the importance of the study in helping prevent kidney diseases and kidney disease progression to kidney failure, which is costly to both taxpayers and people with kidney diseases who often experience a reduced quality of life and financial instability. Mohottige noted that the study may help patients with other chronic diseases by identifying environmental contributors and how to mitigate them to preserve health.

"We urge the administration and Congress to reconsider and roll back these actions immediately so potential cuts can be made in a thoughtful and safer manner," Roach concurred. "To do otherwise may result in absolute tragedy for the American people" (3). ■

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HHS Funding Cuts and Layoffs

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New ADPKD Guideline Stresses Lifestyle Management, Shared Decision-Making

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"many more genes have been added to the list," he said, contributing to more targeted treatments depending on a person's genetic makeup.

In addition, the natural course of the disease has been better defined, so it is possible to determine a person's prognosis. Lifestyle and dietary changes and blood pressure control are known to impact the course of disease. Imaging tools have improved and can help diagnosis and prognosis. Furthermore, there is an appreciation that, because the disease starts in childhood, lifestyle management should start early. "I am of the opinion that taking good care of the patient [through] early diagnosis, trying to maintain an ideal body weight and dietary interventions, can have an impact on the outcome of the disease," Torres said. "It's very important for people to know that."

The guideline includes 10 chapters that address the full scope of ADPKD diagnosis and management. Treatment approaches and recommendations were based on a systematic review of relevant studies and appraisal of the certainty of evidence and strength of recommendations.

The first chapter introduces a new disease nomenclature and covers related genes, prevalence, diagnosis, and prognosis. It recommends abdominal imaging by ultrasound to screen adults at risk, as well as genetic testing in many cases. Additional chapters cover kidney manifestations of the disease; chronic kidney disease management, kidney failure, and kidney replacement therapy; polycystic liver disease; intracranial aneurysms and other extrarenal manifestations; and pregnancy and reproductive issues.

One chapter is dedicated to therapies to delay the progression of ADPKD, including tolvaptan and other pharmacologic interventions. Another chapter covers lifestyle and psychosocial aspects of the disease, overall recommending that individuals be encouraged to follow a healthy diet and engage in moderate physical activity for at least 150 minutes per week. The ninth chapter is dedicated to pediatric issues.

Throughout the guideline, authors stress the importance of shared decision-making as an important cornerstone of patient-centered management. The last chapter discusses approaches to the management of people with ADPKD. "People who have polycystic kidney disease should be well-educated on their disease," Torres said. "The physician should not dictate the treatment but should make the patient understand why it's important."

The guideline "is a major step forward in the ADPKD landscape, because ADPKD is the most common genetic kidney disorder and the fourth-leading cause of kidney failure in the United States," said Pranav Garimella, MD, MPH, an associate professor of clinical medicine and director of the PKD Center of Excellence at the University of California, San Diego. "Until now, there's been really no cohesive guideline or recommendation from any kidney body, internationally or in the United States, on how to assess and manage ADPKD."

The authors covered everything from a framework on how to identify patients to the manifestations and management, not just of kidney issues but also the downstream effects on blood vessels, cardiac valves, reproductive health, and mental health issues experienced by some patients because of their pain, symptoms, and concerns about passing on the disease to their children, explained Garimella. "It's almost a one-stop shop for people to learn everything about ADPKD today."

The guideline provides information about how to diagnose ADPKD and the importance of using imaging to guide the diagnosis based on the number of cysts and the patient's age, Garimella said. It also discussed genetic testing. "Genetic testing is very important in ADPKD," he said. "Historically, we haven't done it because we haven't had treatments, but now we know that there's a spectrum of genetic mutations that cause ADPKD, and understanding which gene is affected may eventually determine treatment, as there are now treatments being developed for specific gene mutations."

Garimella added: "This is definitely the first step, but I hope to see future iterations of the guidelines as therapeutic options for PKD expand with many ongoing clinical trials for PKD right now. It is an exciting time." ■

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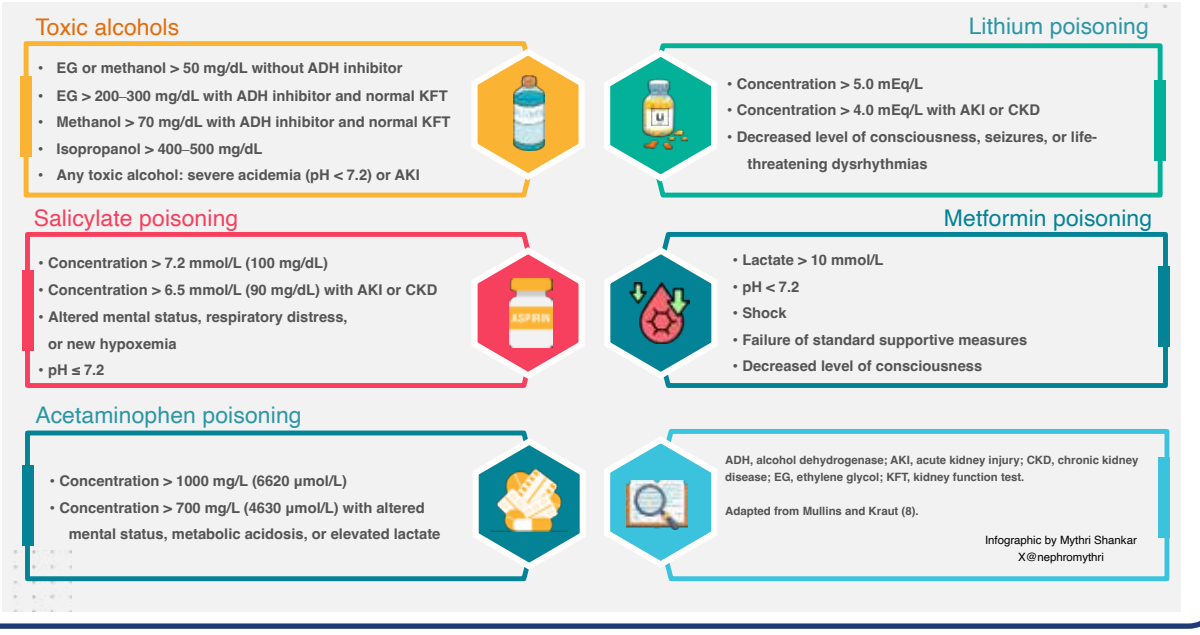
Correction

Correction to "Approach to a Poisoned Patient: Fundamentals Nephrologists Need to Know" (August 2024)

https://doi.org/10.62716/kn.000732025

The article "Approach to a Poisoned Patient: Fundamentals Nephrologists Need to Know" by Mythri Shankar, MBBS, MD, DNB, published in the August 2024 issue of *Kidney News* contained an incorrect expansion in the Figure for ADH (alcohol dehydrogenase) due to an editing error. The Figure has been corrected. ■

Figure. Indications for hemodialysis in poisoning



ASN President's Update

Why Nephrology Is Special Even Though I Chose It for the Wrong Reasons

By Prabir Roy-Chaudhury

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During my nearly 30 years in nephrology, I have often been asked why I chose this specialty. A question that I wish was asked more often is, "What makes nephrology such a great specialty?" In answering both of these questions, I will share my personal story and describe the core strengths of nephrology that I believe will drive its bright future. But first, let me tell you how I chose nephrology for all the wrong reasons, and how despite that reality, it embraced me and made me fall in love with aspects I never expected.

Initially, I chose nephrology for three main reasons. First, I loved performing procedures, especially central lines. At the time of my training at the University of Aberdeen, Scotland, the renal registrars (equivalent to renal fellows) placed all the dialysis lines. Second, I was drawn to a specialty that was rooted in aggressive fluid resuscitation and of course fluid removal—often through dialysis—as needed. Third, nephrology was the only subspecialty that allowed registrars from the 2-year general medical registrar rotation in Aberdeen to spend a full year as a dedicated specialist renal registrar.

The last reason was perhaps the most important. I was certain I wanted to avoid the complexities of chronic internal medicine issues. Imagine my shock when, just weeks into my role as a renal registrar, I realized that nephrology was full of the very same complex medical issues that I had hoped to avoid, only now with a kidney twist. But then two wonderful things happened. I discovered how kidney transplantation could completely transform a person's life, and most unexpectedly, I grew to appreciate how treating the internal medicine complexities often seen across the kidney care continuum supports holistic and patient-centered care.

In the three decades since my first exposure to nephrology, I have a better list of reasons why choosing this specialty was the right decision and what makes it such a great field. My list now includes that nephrology offers something for everyone; engages a global community; has become a magnet for new therapies; and continues to focus on patient-centered, holistic care. While my first few weeks in nephrology were worrisome, there is no doubt today that I made the right career decision, even if it was for the wrong reasons! Particularly gratifying and important, each of the attributes that make nephrology special to me personally could also drive meaningful changes within the field. These drivers are central to demonstrating the significant value that nephrology and nephrologists bring to health care systems, hospitals, insurers, payors, and most importantly, to the millions of people living with kidney diseases.

Something for everyone

Nephrology truly has something for everyone. For example, immunology plays a role in glomerulonephritis and transplantation, chemistry is vital to every nephrology diagnosis and treatment, and devices are key to dialysis and interventional nephrology. The diversity of kidney diseases also allows for immense variety in the duration of care that nephrologists provide, the severity of the disease process, the site of care, and the type of person nephrologists care for. Thus, nephrologists could be the primary caregiver for decades for people living with chronic kidney disease, on dialysis, or with a functioning allograft. Alternatively, we may see a patient only once on a consult service for volume depletion and acute kidney injury.

Nephrologists treat patients in the hospital who are among the most seriously ill—from those with end stage liver disease on continuous renal replacement therapy while awaiting a liver transplant to those who, after a successful living donor kidney transplant, have a nearly normal creatinine level. Our role spans every imaginable setting: dedicated kidney services, various internal medicine settings, intensive care units from medical to burns to neurosurgery, and nonmedicine services such as orthopedics and obstetrics.

Perhaps more than any other specialty, we also have a unique opportunity to care for patients across a wide range of socioeconomic backgrounds, often serving some of the most vulnerable members of our communities. For all of these reasons, nephrologists are truly the "Renaissance people" within medicine. By bridging and connecting different parts of the system, nephrologists provide immense value to the entire health care field.

A global community

More than 50% of US nephrologists have graduated from international medical schools, over 35% of ASN Kidney Week participants travel to the United States from abroad, and the majority of submissions to ASN's peer-reviewed journals come from outside the United States. Together, these data points make the case that kidney care, research, and education in the United States have a truly global footprint.

As an international medical graduate who navigated the uncertainties of the transition from J-1 visa to H-1 visa to green card to US citizen, I know first-hand that nephrology practices across the country are enriched by people from different backgrounds and experiences bound together by a common specialty. These life experiences have made nephrologists more empathetic toward the unique populations that we serve.

In addition, the global perspectives of ASN members have strengthened the society's position as a global leader in kidney health by forging connections with kidney organizations worldwide. The significant representation of South Asian and East Asian origin nephrologists in the United States, for example, has led to formal partnerships between ASN and the Japanese Society of Nephrology and the Indian Society of Nephrology, as well as the American Nephrologists of Indian Origin. This international outlook is an asset as health care undergoes rapid globalization driven by advances in artificial intelligence and digital technologies.

A magnet for new therapies

The last 5 years have been, by far, the most exciting in my career. With increased attention on early detection and early intervention, there has been an influx of new therapies for both rare and common kidney diseases. These latter therapies—such as sodium-glucose cotransporter-2 inhibitors, nonsteroidal mineralocorticoid receptor antagonists, and glucagon-like peptide-1 receptor agonists—will benefit the more than 850 million people living with kidney diseases around the world, by reducing the rate of progression of kidney diseases and the burden of cardiovascular morbidity and mortality.

These innovative treatments also provide the potential to help us reimagine nephrology itself. They could serve as the conduit for nephrology and nephrologists to break out of our small, somewhat dialysis-dominated bubble and engage on a broader playing field—which would focus on linking innovation to early intervention and equitable access to care. This shift would bring us closer to achieving ASN's vision of a world without kidney diseases.

Successfully treating kidney diseases and reducing the burden of cardiovascular disease in these patients would also lower the number of individuals requiring dialysis or kidney transplants, as well as reduce hospitalizations. In doing so, nephrology and its practitioners would further demonstrate their value to heath care systems nationwide. This transformation is a priority for ASN for all of these reasons and also because this future would result in nephrology becoming a much more attractive subspecialty.

Patient-centered, holistic care

Being ASN president has given me the opportunity to interact with and learn from many individuals from other subspecialties of medicine. One of the observations that stands out is that nephrologists, more than many other specialties, have a patient-centered approach to care that is holistic and involves taking care of the whole patient.

While such an approach may not have been an advantage in a fee-for-service payment model, our emphasis on caring for the whole patient is an advantage within the newly emerging value-based care models that focus on holistic patient care within a global payment system. The lessons that we have learned over the last 30 years by caring for patients undergoing dialysis and transplant now need to be translated into the burgeoning field of cardiovascular-kidney-metabolic health, for example, which could result in increased value to health care systems, insurers, and payors.

For me, nephrology is and always will be special because of these four core strengths. My nearly 30 years in nephrology have deepened my belief in the passion, dedication, and wisdom of nephrologists around the world, who bring an incredible breadth of expertise and experience to our field. After decades of maintaining the status quo, we are now at an inflection point in nephrology. To seize this moment and drive change within our specialty, we must leverage all of the strengths within the field, within ASN, and most importantly, within our membership.

Above all, our patients cannot afford another long period of therapeutic stagnation. I invite you to join ASN and me in working toward our shared vision of a world without kidney diseases.

Prabir Roy-Chaudhury, MD, PhD, FASN, is the Drs. Ronald and Katherine Falk Eminent Professor in Nephrology, codirector of the University of North Carolina Kidney Center at Chapel Hill, and ASN president.

To comment on Dr. Roy-Chaudhury's editorial, please contact email@asn-online.org.

A Reflection on Advocacy: Lessons Learned From Capitol Hill

By Annie Liu and Anna Zemke

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Walking through the US Capitol, it is hard not to be struck by the beauty and centuries of history embedded in its walls. Here we were—two third-year clinical and research nephrology fellows in Washington, DC, for Capitol Hill Day—joining the ASN Policy and Advocacy Committee to discuss key policy issues with members of Congress. Like many of our peers, we have felt the weight of uncertainty—navigating funding gaps, questioning future stability, and witnessing broader national and global shifts that affect our patients, loved ones, and careers. But standing before the Capitol building reminded us that, as physicians and researchers, we must be the voice helping members of Congress understand the current health care climate.

On March 19th, we started the day with a brisk morning walk to the Capitol, which unfolded into a series of meetings with staff from both the House of Representatives and Senate offices. We advocated for three key policies, seeking bipartisan support: 1) Honor Our Living Donors Act (HR 628/S 957)—to allow provisions of support to living donors based on their own income, rather than the recipient's; 2) invest $67 million for the Health Resources and Services Administration's Organ Transplantation program in the fiscal year 2026 (FY26) appropriations—to modernize data and information technology infrastructure in transplantation; and 3) support $25 million for Kidney Innovation Accelerator (KidneyX) in the FY26 appropriations—to maintain innovation and the development of new therapies for people with kidney failure.

The following are a few lessons we took away from our experience on the Hill, which we hope will resonate with physicians considering advocacy:

- **Find your voice**. At the heart of our legislative system is representation. Your elected officials cannot represent your voice if they do not know what matters to you. As physicians—trusted community leaders and frontline witnesses to the gaps in the health care system—we must speak up. Physicians need to stand up and lean in. Our communities look to us for leadership.
- **Give your representative an action item**. Think about both your state-level and national representatives (Table). As a congressional staffer shared, the issues that gain traction are often those that constituents directly bring to the table. Share your personal stories—whether about health equity, access to care, research funding, or patient-centered policy—and offer specific, actionable requests (e.g., "Please support/oppose this particular bill."), as this will make it easier for your representative to help take action. Whether by email, telephone calls, or in-person meetings, our representatives are there to listen. Even if you do not meet with them directly, their offices are open to you.
- **Build your policy knowledge**. Advocacy can feel intimidating at first, but build your repertoire. Do not rely on a single source of information. Explore diverse perspectives and news outlets. As Daniel E. Weiner, MD, MS, FASN, the Policy and Advocacy Committee's council liaison, says, "Stay out of the echo chamber." Just as we have trained to synthesize clinical data, we should approach civic engagement with the same curiosity and rigor.
- **Find mentors and allies.** Seek out faculty or senior colleagues in the community who are engaged in advocacy work. Their experience and networks can be invaluable as you chart your own path. Advocacy does not have to be a solo endeavor. In fact, the collective voice is what democracy is built on.

Our day on Capitol Hill reminded us that advocacy is not separate from our roles as clinicians and researchers. Instead, it is an extension of them. We left feeling energized, knowing that even brief conversations can shape the future of policy in kidney care. It is a reminder that our voices and the voices of our patients carry weight. Let's make sure they are heard. ■

Table. Resources to advocate for legislative action

Resource	Link
Find your US House representative.	https://www.house.gov/representatives/find-your-representative
Find your US senator.	https://www.senate.gov/senators/senators-contact.htm
Find your city- and state-level elected officials.	https://www.usa.gov/elected-officials
ASN's Legislative Action Center	https://www.asn-online.org/policy/lac.aspx

Annie Liu, DO, MS, MPH, is a third-year clinical and research fellow in the Nephrology Division at Massachusetts General Hospital and Brigham and Women's Hospital, Boston, MA. Anna Zemke, MD, MS, is a third-year clinical and research fellow in the Nephrology Division at the University of Washington, Seattle. Dr. Liu and Dr. Zemke are interns with the ASN Policy and Advocacy Committee.

The authors report no conflicts of interest.

DEI Values Continue to Play an Important Role in Advancing Kidney Health

By Rakhi Khanna, Hector M. Madariaga, Dinushika Mohottige, Mariya T. Sweetwyne, Jason Cobb, and Anonymous Authors

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Growing attacks on diversity, equity, and inclusion (DEI) programs in the United States threaten the well-being, advancement, and health of all Americans. Despite the decades-long evidence of benefits from programs that enhance equity for all, individuals and organizations hoping to counteract attacks on DEI through democratic processes, such as free speech and open discourse, are currently facing significant and substantiated fears about retaliation and other adverse consequences. As authors of this commentary, we also hold such concerns for ourselves. Some contributing authors here have chosen to remain anonymous in fear of retaliation to their careers and for their families' safety. Despite these valid fears, however, we are more concerned about the consequences to the field of nephrology and to people living with kidney diseases if we continue to say nothing.

What does it mean for us as a kidney health community if nephrologists and other medical professionals, researchers, and policymakers are afraid to truthfully advocate for the needs of our extensive and diverse patient population? The burden of kidney diseases is immense, and choosing to exclude segments of our medical and scientific workforce from the freedom to meaningfully participate in kidney cures will serve no one. We cannot distance ourselves from the concepts of DEI if we intend to improve kidney health in the United States and around the world.

Nor can we remain silent, as the acronym is levied as a slur against valued members of our nephrology workforce. *Diversity* describes a way for us to learn about and leverage our differences to optimize and accelerate the way we think, conduct scientific studies, and deliver care. *Equity* means ensuring that the opportunities and resources to realize fairness and just processes are made available to all members of our society. *Inclusion* allows us to cultivate and support a sense of belonging and community so that all members of a society can feel valued and safe, contributing to a collective purpose. These are core principles that are important for any society to thrive and ones that are stated as core values of the ASN community: "ASN is committed to promoting diversity, inclusiveness, and equity to enhance the nephrology profession and the lives of people with kidney diseases" (1).

High-quality health care is a practice of DEI. Nephrology requires determining the equitable treatment for diverse patients based on their unique disease etiology, health history, lifestyle, and resources. As societies like ASN demonstrate, successful and compassionate chronic kidney disease care requires the inclusion of medical staff, dedicated researchers, and people living with kidney diseases and their families. Finding ways to help unique patient populations is imperative to reducing the burden of kidney diseases for everyone (2). This includes having a diverse and inclusive workforce that previous studies have shown makes problem-solving approaches better through diverse perspectives and is consistent with patient values. Furthermore, this is highlighted in two of ASN's stated core values (1):

- Health equity: Working strategically to eliminate disparities in the diagnosis, treatment, and prevention of kidney diseases
- Patient advocacy: Promoting universal access to quality care for all people living with kidney diseases

All physicians take the Hippocratic oath, vowing to treat everyone with compassion and a fundamental focus on reducing harm and suffering. Reducing harm includes our collective mission to move beyond merely describing long-standing, staggering inequalities in kidney health but to identify and implement strategies to repair these harms. Yet, we know that patients from resource-limited backgrounds often experience limited access to care and poor health outcomes, including in kidney care. As humans, we unknowingly associate certain qualities with a person because of their race, ethnicity, and/or socioeconomic position. These biases inhibit us from being curious and learning about another person and furthermore, can exacerbate disparities in medical treatment. Medicine and research, focused on health disparities, are charged with finding solutions to these problems, regardless of the complexity or discomfort that arises when confronting bias and inequity.

As nephrologists and kidney researchers, we witness and are motivated to act because of the inequalities that exist among patient populations. Although Black Americans make up 13% of the US population, they account for over one-third of the population undergoing dialysis. Despite equity-enhancing policies, such as the 2014 revision of the transplant allocation system, patients who are Black and Latino remain less likely to receive a preemptive kidney transplant versus their White counterparts (3). A study conducted in the southeast United States found that women were less likely than men to be referred for transplant and that this inequality was most severe for older, Black, non-Hispanic, and White women, relative to other groups (4). A study among people with advanced chronic kidney disease living in Baltimore, MD, demonstrated that individuals who were Black and female and had a median household income of less than $20,000 were more likely, relative to other groups, to have discussed dialysis instead of transplant for kidney replacement. The causes of these disparities are multifactorial, often stemming from unequal social structures and opportunities, system- and clinician-level biases, as well as factors such as gene–environment interactions.

Nephrology requires determining the equitable treatment for diverse patients based on their unique disease etiology, health history, lifestyle, and resources.

There is no person living with kidney disease who does not urgently deserve a better health outcome. As physicians, scientists, and researchers, our aims are to study patient populations, their outcomes, and how best to help them. A focus on diverse populations is warranted so that we can serve each person better, but this does not mean serving another population less. In fact, the myth of the "zero-sum game" has long hindered our efforts to advance health justice and effective coalition building (5, 6). Nor does it serve our common goal of curing kidney diseases to consider only biological etiologies of kidney diseases, while denying the validity and impact of social and environmental drivers of health (7).

Funding for projects that are studying treatment options or identifying the source of health disparities for any patient population, no matter how specific, qualifies as what should be considered an ethical and moral duty of our society. Despite this, funding cuts targeting kidney research intended to address health disparities have already occurred and are likely to grow. These funding losses target specific patient groups and researcher demographics, further entrenching health disparities. The repercussions of this could last for decades and further erode trust in the medical research enterprise.

As large companies and professional organizations roll back their efforts on resources for DEI, and the pendulum swings yet another time, the medical and biomedical research communities must remain steady and stand their ground on serving the needs of all people. We should not be shortsighted and let the ever-changing political structure dictate clinical care, kidney research, and the future of nephrology. ■

This editorial was written by Rakhi Khanna, DO, FASN, Rush University Medical Center, Chicago, IL; Hector M. Madariaga, MD, FASN, Tufts Medical Center, Boston, MA; Dinushika Mohottige, MD, MPH, Institute for Health Equity Research, Icahn School of Medicine at Mount Sinai, New York, NY; Mariya T. Sweetwyne, PhD, University of Washington Medicine, Seattle; Jason Cobb, MD, Emory University School of Medicine, Atlanta, GA, and ASN DEI Committee chair; and two authors who wish to remain anonymous.

The views of these authors do not represent those of their affiliated organizations or employers.

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New ASN Project Focuses on Saving Kidneys, Hearts, and Lives With Early Intervention, New Therapies, and Multidisciplinary Care

By Bridget M. Kuehn

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Patient advocate Andrew Storfer, PhD, does not mince words when discussing what would happen if his successful kidney allograft ever failed. He says he would refuse dialysis and fade away rather than return to what he refers to as a last resort.

He and other patient advocates at ASN's Nephrology in a New Era of Cardiovascular-Kidney-Metabolic Health: Saving Kidneys, Hearts, and Lives workshop in late March were all adamant about the need to redesign kidney care delivery to focus on empowering patients, providing patient-centered care, and preserving patient health and well-being. "While medical team-based CKD [chronic kidney disease] management and prevention may be somewhat costly on the front end," Storfer said, "it would save hundreds of thousands of dollars spent on stage 4 kidney disease and beyond."

It was a vision shared by nephrologists, primary care specialists, and other leaders who participated in the workshop: Shift the focus from kidney failure therapies like dialysis to preventing the need for them and preserving patients' health using a growing number of therapies that leverage the interconnected nature of cardiovascular, kidney, and metabolic health. At the meeting, clinicians and patient advocates worked side by side to identify barriers and develop a roadmap for transitioning from the current system of care to a more holistic model that yields dividends for patients, the health system, and the field of nephrology.

CKM syndrome

Workshop Cochair Katherine Tuttle, MD, FASN, said that mechanistic research has led to the recognition of cardiovascular-kidney-metabolic (CKM) syndrome. She explained that dysfunctional adiposity contributes to well-known risk factors for both heart and kidney diseases, such as hypertension, diabetes, and atherosclerosis, and creates a state of chronic inflammation that can exacerbate both heart and kidney diseases. "The kidney is very important in terms of accelerating multiple paths of cardiovascular disease," she said. "Cardiovascular disease also increases the risk of losing kidney function and having adverse kidney failure outcomes should you survive…. They are interconnected, have shared origins, and shared risk factors."

The American Heart Association's (AHA's) Cardiovascular-Kidney-Metabolic Health: A Presidential Advisory, published in October 2023, highlighted the situation's urgency (1). The advisory coined the term "CKM syndrome" and issued a rallying cry to break down specialty silos and foster interdisciplinary collaboration to boost prevention, diagnosis, and care for CKM syndrome. As many as 90% of US adults have CKM syndrome across stages 1 to 4. Notably, more than half of them are at stage 2 or higher, inclusive of chronic kidney disease from both metabolic and nonmetabolic causes (2).

"Complicating the burden of these interconnected conditions is fragmented patient care," said Janani Rangaswami, MD, cochair of the Scientific Advisory Group that wrote the AHA Cardiovascular-Kidney-Metabolic Health advisory. Individuals with lower levels of education, lower incomes, food insecurity, and public insurance are at greatest risk. "We know very well that not only are minoritized and underserved communities at higher risk for CKM interconnected conditions, but they are also less likely to be interfaced with appropriate guideline-directed therapies that can be life, heart, and kidney saving," said Rangaswami, who is also chief of nephrology at the Washington, DC, VA Medical Center and professor of medicine at The George Washington University.

Time as nephrons

Those delays and barriers to diagnosis and care can be costly for patients who progressively lose kidney function and face multiorgan complications including kidney failure. "Cardiologists think of time as myocytes," said workshop Cochair Adeera Levin, MD, FASN. "We don't think of time as nephrons. We wait [until the estimated glomerular filtration rate changes after a 50% loss of kidney function] to do something."

The workshop aimed to change that approach and develop a roadmap for kidney-preserving care through early identification, preventive care, and utilization of a growing arsenal of medications that prevent kidney and cardiovascular complications, as well as death. "The good news is, we now have treatments that work across CKM syndrome mechanisms," Tuttle said.

Clinicians have long used renin-angiotensin system inhibitors in the form of angiotensin-converting enzyme inhibitors and angiotensin II receptor blockers to lower kidney and cardiovascular risks. New classes of medications have emerged that when used with these renin-angiotensin system inhibitors, can preserve kidney and heart health:

- Sodium-glucose cotransporter-2 inhibitor trials have demonstrated that this class of drugs reduces relative risks of major kidney outcomes by nearly 40% with concurrent benefits on reducing risks of heart failure events by 23% and cardiovascular death by 14% (3).
- A nonsteroidal mineralocorticoid receptor antagonist, finerenone, also meaningfully reduced relative risks of major kidney and heart failure events by 15% to 23% (4).
- A glucagon-like peptide-1 receptor agonist, semaglutide, reduced relative risks of major kidney outcomes by 24%, along with reductions in major adverse cardiovascular events by 18% and all-cause death by 20% (5).

"The new therapies give us an opportunity to break out of the small, comfortable, often dialysis-dominated nephrology bubble," said ASN President Prabir Roy-Chaudhury, MD, PhD, FASN. "It gives us the opportunity to play in a much larger playing field—a playing field that prioritizes education and awareness, and early screening, diagnosis, and treatment; that focuses on cardiovascular health in people with CKD; and which aims to bring precision medicine into the kidney world, so that we can get the right kidney care to the right patients at the right time."

There is also growing evidence that combining these drugs may further improve patient outcomes and increase the potential for care personalization, Tuttle explained. However, challenges remain in translating these therapies into practice. "We now have the opportunity to save kidneys, hearts, and lives," Tuttle said. "Unfortunately, the majority of people with chronic kidney disease are unaware they even have the disease. How do we find and treat people who do not know they're about to go off a cliff?"

Nephrology 2.0

ASN's Saving Kidneys, Hearts, and Lives initiative is working to reboot the role of nephrologists in delivering holistic

care for people with CKM syndrome, identify and address systems-level barriers, and promote the implementation of new therapies. The initiative is working in concert with AHA's CKM initiative.

AHA's Cardiovascular-Kidney-Metabolic Health advisory laid out a multidisciplinary framework to overcome the challenges of identifying people with CKM and delivering more effective care at a population level. AHA is also developing 150 CKM Centers of Excellence in 15 regions across the United States to test some of the advisory's proposed care models. Many models emphasize bolstering the ability to proactively address CKM syndrome early in the primary care setting and facilitating more collaboration across specialties, including endocrinology, cardiology, and nephrology. "We truly have to move from siloed care to holistic care, and importantly, health achieved on the kidney side translates into health achieved on the cardiovascular side and the other way around," Rangaswami said. "It is truly a partnership, and it truly is multidisciplinary."

Among some of the key challenges to implementing more holistic care models identified at the ASN Saving Kidneys, Hearts, and Lives workshop were the limited nephrology workforce, the high cost of kidney- and life-saving medications, limitations in existing payment models, and the need to improve nutrition, physical activity levels, and the food system in the United States.

"The elephant in the room is payment," Levin said. "There are ways that we have been reimbursed for nephrology around the world that perhaps have made us a bit more complacent than we should be. What we want to do in this workshop is figure out nephrology as we want it to be academically, clinically, [and] from a policy perspective."

Roy-Chaudhury also highlighted the need to ensure that the rollout of new therapies does not exacerbate underlying disparities in access and outcomes. "The challenge is that we have to ensure that these new therapies reduce disparities in care as opposed to increasing them," Roy-Chaudhury said. "In order to do this, we have to deliver the benefits of integrated cardio-kidney-metabolic care to people from regions with a [resource]-poor socioeconomic status, in inner city zones, rural areas, and border areas. If done right, the maximum impact of these therapies could be felt in vulnerable populations in parts of the world where there is limited access to specialized heart and kidney care."

Participants also identified many opportunities to overcome barriers to CKM care. They emphasized the role of nephrologists in helping to educate primary care clinicians and other specialists on kidney-saving care and the effectiveness of new therapies and working with them in a consulting role. Participants outlined the potential to use electronic health records to help drive early identification and improved care across specialties. Attendees also envisioned creating a preventive nephrology specialty, CKM-focused fellowships across specialties, and inpatient and outpatient CKM health clinics or services. Levin proposed embedding nephrologists in each of AHA's CKM Centers of Excellence. Many also saw the new models of care as a good way to help recruit talented young people to the field.

"By demonstrating the value and excitement that nephrology and nephrologists now bring to health care systems as a whole, the new therapies could also help to attract young physicians into nephrology and change our specialty for the better," Roy-Chaudhury said.

The workshop leaders are compiling and refining the workshop's recommendations into a report that will be published later this year. "There's a huge gap, and nephrologists are prepared to fill it," Tuttle said. "We have the right skills to do it." ■

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GREENER NEPHROLOGY

A Strategic Imperative for Sustainable Kidney Care

By Clara García-Carro and Prakash Gudsoorkar

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Nephrology is uniquely positioned at the nexus of life-preserving therapy and environmental accountability. Dialysis—essential for people with kidney failure—is among the most resource-intensive therapies in modern medicine, with a substantial environmental footprint. As climate change intensifies, the nephrology community must lead a shift toward environmentally sustainable practices. This issue of *Kidney News* brings together insights from experts advocating responsible innovation in kidney care, balancing clinical efficacy with ecological stewardship.

Dialysis and environmental burden

In-center hemodialysis (HD) is associated with high water consumption—up to 500 L per session—and annual carbon emissions reaching 10 tons of CO_2 per patient. The cumulative environmental cost of dialysis is equivalent to thousands of vehicle miles driven annually.

Home HD systems that use low-flow technology reduce water and energy consumption by up to 75%. Facilities can also invest in reverse osmosis water reuse systems, dialysate flow optimization, and energy-efficient equipment to mitigate the environmental burden while maintaining quality care.

Peritoneal dialysis: A scalable model for sustainable innovation

While less centralized, peritoneal dialysis (PD) introduces its own sustainability challenges, particularly in dialysate manufacturing, packaging, and transport. Innovations such as Baxter's on-demand dialysate generation systems and Ellen Medical's solar-powered portable units present viable alternatives by minimizing supply-chain dependencies and enabling care in resource-constrained settings. These models offer scalable, cost-effective solutions aligned with the sustainability goals of both high-income and low- and middle-income countries.

However, long-term data on outcomes and material durability are essential to ensure patient safety while promoting adoption.

Medical waste management: An overlooked opportunity

Dialysis therapies generate significant volumes of plastic and pharmaceutical waste. In PD, more than 50% of household waste is nonrecyclable plastic, complicated by ink labeling and material mixing. HD facilities face similar challenges, particularly with expired medications and packaging.

Effective waste management requires clearer waste classification guidelines, staff and patient education, and partnerships with manufacturers for recycling initiatives. Successful models in Thailand and Australia underscore the feasibility of structured waste-segregation protocols and local infrastructure engagement.

Energy use in dialysis facilities

Dialysis centers are among the highest energy consumers in health care. Transitioning to renewable energy—particularly solar—has demonstrated dramatic benefits. In one Australian initiative, solar-panel installation reduced grid reliance by 91% and energy costs by 76%.

Strategic facility-level upgrades, such as optimizing heating, ventilation, and air conditioning systems; automating lighting; and aligning machine operation schedules with energy demand, can produce measurable environmental and financial returns.

Climate change and kidney health

The link between environmental degradation and kidney diseases is now well established. Air pollution contributes to chronic kidney disease progression; heavy metal contamination in water sources increases nephrotoxicity. Heat-related acute kidney injury is rising globally, disproportionately affecting vulnerable populations, including outdoor workers in low-income regions.

Policymakers must recognize kidney health as a climate-sensitive domain and integrate environmental risk factors into public health planning.

Policy and practice: A coordinated response

Sustainable nephrology demands integrated action across clinical practice, health policy, and industry. Key priorities include:

- **Investment in green dialysis infrastructure**, including support for PD and home HD innovations that reduce resource consumption
- **Embedding environmental education** within medical training to foster long-term culture change
- **Regulatory frameworks** to standardize waste management and incentivize sustainable procurement
- **Support for early detection and prevention of kidney diseases** to reduce downstream dialysis demand

The pathway to environmentally responsible kidney care is clear and achievable. For physicians, this means rethinking care-delivery models. For policymakers, it necessitates creating environments that reward sustainability without compromising patient outcomes. The time to act is now. ■

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Reducing the Carbon Footprint and Dialysis Consumables: Challenges and Opportunities

By Marta Arias-Guillén and Frances Mortimer

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The environmental impact of dialysis is substantial, driven by high water and energy use, significant waste generation, and carbon-intensive supply chains. To align kidney care with sustainability goals, targeted interventions must be both feasible and impactful. Life cycle assessment studies indicate that conventional hemodialysis (HD) has a carbon footprint of 3.0 to 10.3 tCO_2e per patient per year, with electricity, patient transport, and water use as major contributors. This is equivalent to approximately 15 to 50 round-trip flights from London to New York or driving 7500 to 25,000 miles in an average gasoline-powered car (1, 2). Peritoneal dialysis (PD) has a smaller footprint but varies by modality and logistics. This editorial explores practical solutions to reduce dialysis' environmental burden while maintaining high-quality patient care, addressing both challenges and opportunities in achieving sustainable kidney care.

Challenges in sustainable dialysis

Sustainable dialysis faces multiple challenges that span institutional, cultural, workforce, and technical domains. Institutional barriers include rigid procurement policies that favor disposable over reusable products and a lack of clear financial incentives for green initiatives (3). Additionally, fragmented sustainability efforts across different health care settings create inefficiencies, while the absence of standardized regulations on health care waste hinders cohesive action (4).

Cultural resistance also plays a role, for example, regarding dietary recommendations, such as plant-based diets, which may not be widely accepted in all regions. Furthermore, resistance to change often stems from concerns about clinical risk, limiting the adoption of innovative sustainability practices (1).

From a workforce perspective, clinical pressures may leave little room for staff to engage in sustainability training or quality improvement projects. There is also a broader issue of lack of awareness of the links among sustainability, health, and high-quality health care (5).

Infrastructure and technical challenges further complicate sustainability efforts. While central acid delivery could significantly reduce packaging waste and transport emissions, it remains difficult to implement universally due to variations in health care settings and the need for up-front investment. Similarly, transitioning to paperless reporting and telehealth requires substantial investment in information technology, which is not always available. The lack of regulatory guidance for waste-reduction initiatives and inconsistencies in water-recycling technology availability also pose significant barriers (4).

Opportunities for sustainable kidney care

Despite these challenges, there are numerous opportunities to drive sustainable dialysis. Water and energy can be saved through strategies such as optimizing the disinfection of dialysis machines and distribution pipes and repurposing reverse osmosis reject water for hospital sanitation (4). Energy-efficient dialysis machines and facility-wide energy audits can further reduce the environmental impact.

Waste reduction is another key opportunity. Improved waste segregation can minimize landfill and incineration impacts. While transitioning to paperless reporting, central delivery of acid and use of dialysate for online priming can significantly reduce resource consumption (1). Additionally, take-back programs from manufacturers could facilitate dialysis product recycling, promoting a circular economy (5).

Patient care pathways also offer significant potential for sustainability improvements. Prevention, early detection, and effective management of chronic kidney disease all improve patient outcomes while preventing the need for resource-intensive kidney replacement therapy.

Expanding access to home HD, PD, and incremental HD can significantly reduce the environmental burden by decreasing transportation emissions and allowing for more energy-efficient treatment settings (3). Promoting dialysis closer to home when feasible further supports these efforts while enhancing patient-centered care (2).

Empowering the workforce is equally critical in driving change. Providing staff with the autonomy to test new sustainability approaches fosters innovation, while strong leadership engagement ensures that the necessary resources and oversight are available (5). Developing structured tools and peer-learning networks can further support the implementation of sustainability initiatives.

Education represents a key opportunity for sustainable dialysis. Integrating sustainability into medical curricula and providing accessible training on green nephrology practices can enhance awareness and engagement (4). Peer education, communication campaigns, and quality improvement training ensure that sustainability principles become embedded in daily practice, creating long-term systemic change.

The path forward

Sustainability in dialysis requires a structured yet adaptable approach that balances innovation with feasibility. Addressing challenges while leveraging available opportunities will be critical to achieving greener kidney care. As health care systems increasingly recognize sustainability as an essential pillar of high-quality care, integrating these initiatives into standard practice will become not just an environmental necessity but also an ethical imperative. ■

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Challenges and opportunities of reducing the carbon footprint and dialysis consumables

KidneyNews

Challenges	Opportunities
○ **High water and energy use**: Consumption of large amounts of water and electricity in dialysis	✓ **Optimizing water and energy use**: Reusing reverse osmosis reject water, energy-efficient machines
○ **Waste generation**: Limited waste segregation and recycling options	✓ **Reducing waste**: Central acid delivery, online priming, paperless reporting, and better waste segregation
○ **Procurement and policy barriers**: Preference for single-use consumables, lack of incentives for sustainability	✓ **Enhancing home dialysis**: Reducing transport emissions and improving patient autonomy
○ **Cultural and institutional resistance**: Not prioritizing sustainability in many health care settings	✓ **Sustainable procurement**: Partnering with manufacturers for take-back programs and circular economy solutions
○ **Limited staff engagement**: Time constraints and lack of protected time for sustainability projects	✓ **Empowering staff and education**: Training programs, leadership engagement, and protected time for innovation
○ **Technology and infrastructure gaps**: Inconsistent information technology systems, lack of investment in green technologies	✓ **Digital and telehealth expansion**: Virtual clinics for follow-up, improving efficiency and reducing travel

Conclusions: A shift to sustainable dialysis is crucial to reducing health care's environmental impact. Overcoming barriers and embracing opportunities will align kidney care with global sustainability goals, benefiting both the planet and patient care.

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Energy Efficiency in Dialysis Centers: Implementing Renewable Energy in Health Care

By Shaifali Sandal and Anoushka Krishnan

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Electrical energy consumption in dialysis centers is substantial due to the energy needed to run and maintain dialysis units and for water treatment and running, rinsing, and disinfecting the dialysis machines. Each dialysis session can use more than half of the daily electricity consumption of an average Australian four-person household (1). In a study from the United States that examined greenhouse gas emissions across 15 centers in Ohio, annual emissions per hemodialysis facility averaged 769,374 kg CO_2e, which corresponds to emissions from the annual energy use in 93 homes (2). While newer dialysis machines have reduced electrical energy consumption from 10.4 kWh to 5.3 kWh, overall efficiency depends on factors such as reverse osmosis effectiveness and machine functionality (3).

With rising energy costs and climate change concerns, improving energy efficiency in dialysis centers is both a financial and an environmental priority. Renewable energy is "energy derived from natural sources that are replenished at a higher rate than they are consumed" (4). Transitioning to renewable energy can reduce reliance on fossil fuels and enhance sustainability. However, integrating renewable energy into health care facilities remains challenging due to policy gaps, financial constraints, and limited stakeholder awareness (5–7). Governmental initiatives are essential for large-scale uptake of renewable energy, but grassroots efforts can also play a key role in driving energy efficiency improvements in dialysis centers (5, 8).

Solar energy is abundant and accessible, making it a promising renewable source. Photovoltaic panels generate electricity from sunlight, while concentrated solar power systems use mirrors to harness solar radiation (4). Studies from Australia show that installing a solar power system in a home hemodialysis unit can reduce grid power consumption by 91%, reduce power costs by 76.5%, and provide a return on investments in 7 to 8 years (1, 9). Expanding this approach to hospital rooftops and dialysis centers could significantly improve energy sustainability, particularly in resource-limited settings (10).

Hydropower, an excellent source of renewable electricity, offers another promising solution and is currently the largest source of renewable energy in the electricity sector (4). In Morocco, a hydroelectric generator was successfully integrated into a water-treatment system using reverse osmosis reject water to generate up to 1.6 kWh of electricity per day (8). Given the significant water waste in dialysis (5), repurposing rejected water for energy generation could enhance electrical energy consumption in dialysis centers. While solar and hydropower show strong potential, wind, geothermal, and bioenergy have yet to be effectively integrated into dialysis facilities. Further research and investment are needed to explore their feasibility in these specialized health care environments (Figure).

Furthermore, implementing simple but effective strategies can significantly enhance electrical energy consumption in dialysis facilities. Measures, such as swapping to LED [light-emitting diode] lighting, installing motion sensors, maximizing natural light while ensuring adequate shading in summer, maintaining heating and cooling systems, and turning off equipment when not in use are practical yet sustainable steps toward improving electrical energy consumption (11, 12).

Renewable energy in dialysis centers offers numerous benefits, including cost savings, reduced carbon footprints, and improved dialysis access in remote areas with unreliable electricity supply, thereby decreasing transportation-related emissions from patient travel. Despite these advantages, uptake remains low. Even in countries with strong sustainability initiatives, only 14% of dialysis centers reported using renewable energy (13). However, the most significant challenge is the lack of a robust policy framework and governmental support at regional and national levels (12). A multifaceted approach is needed to enhance energy efficiency in dialysis centers. Upgrading equipment, implementing water reuse strategies, and integrating renewable energy sources such as solar and hydropower can drive meaningful change. Policy reforms, financial incentives, and increased stakeholder engagement are essential to accelerating sustainable dialysis care. Investing in renewable energy today will not only reduce operational costs but can also help to ensure that dialysis centers are equipped to meet future energy challenges while prioritizing patient care. ■

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Dr. Sandal reports receiving an education grant from Amgen Canada to increase living donor kidney transplantation and a speaking honorarium from AstraZeneca. Dr. Krishnan reports no conflicts of interest.

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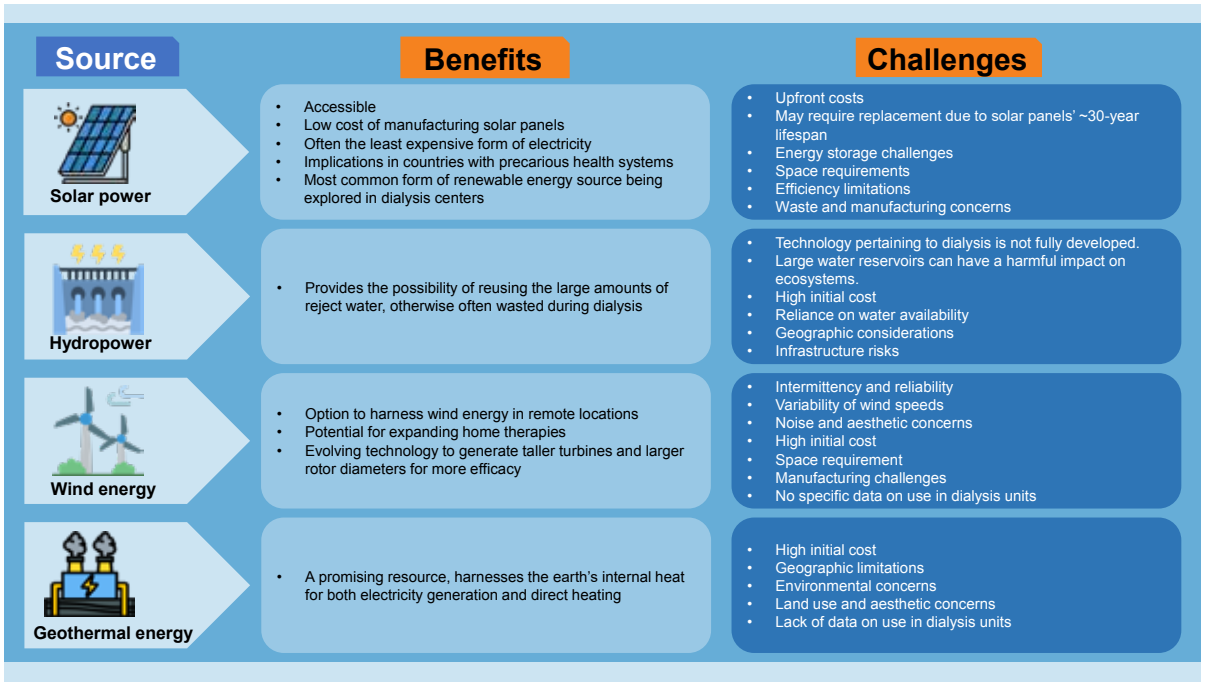
Figure. Benefits and challenges of using renewable energy sources in dialysis units to improve energy efficiency



Sustainable Water Usage in Hemodialysis: Innovations for Resource Conservation

By Faissal Tarrass, Omar Benjelloun, and Meryem Benjelloun

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Climate change is exacerbating a reduction in water availability, with serious implications for human well-being, economic development, and ecological health. Hemodialysis, a life-saving treatment for kidney failure, is a water-intensive procedure. For each dialysis treatment, approximately 320 L of ultrapure water is required (1). Additionally, for each liter of usable water to make up the dialysis fluid, up to 30% of the water entering the water-treatment system may be sent to the drain (2). With the increasing scarcity of water worldwide, questions are being raised about whether some of this water can be saved or reused.

The global patient population undergoing dialysis was approximately 4.2 million in 2024, with an annual growth rate of 5% to 7% (3, 4). This growth will lead to increased consumption of natural resources and waste production by dialysis facilities. Globally, annual dialysis water consumption reaches approximately 265 million m^3/year (5). Based on World Bank data, this quantity is equivalent to the total renewable water resources of three Middle Eastern countries—United Arab Emirates, Qatar, and Kuwait—combined (6). Given this significant water consumption, dialysis centers must emphasize water conservation. This editorial explores strategies for sustainable water management in hemodialysis, focusing on the principles of the circular water economy: reduce, reuse, and recycle.

Reduce freshwater usage

Reducing freshwater consumption in hemodialysis facilities can be achieved through several strategies. The most critical is selecting a reverse osmosis (RO) system with high recovery and low rejection rates, as oversized systems lead to excessive water wastage (7). Additional measures include fixing leaks, using flow regulators, recycling concentrate, and optimizing the selection and arrangement of RO membranes (7).

Reducing dialysate flow from 500 mL/min to 300 mL/min has been shown to significantly decrease water use by 20% to 30% (8). A recent report from India has indicated that this reduction does not compromise the adequacy or safety of dialysis treatments (8). However, there is conflicting evidence from a meta-analysis suggesting that higher dialysate flows are associated with improved urea-based markers of dialysis adequacy, such as *Kt/V* and the urea reduction ratio (9). Similarly in hemodiafiltration, decreased dialysate flow has also been correlated with a lower dialysis dose (*Kt*) and a urea reduction ratio (10). Given the importance of dialysis adequacy in affecting patient outcomes, mainly cardiovascular risk and mortality (11), further in-depth studies are needed to assess the safety and efficacy of reducing dialysate flow in both hemodialysis and hemodiafiltration settings. These investigations will help clarify the optimal practices for maintaining dialysis effectiveness while potentially minimizing water use.

Reuse RO reject water

RO systems are integral in producing ultrapure water used for dialysate preparation. However, RO systems generate significant volumes of reject water, which is typically discarded. This reject water can be repurposed for nonpotable applications, such as irrigation, cleaning, and industrial processes (12). Before reuse, the salt content of the reject water must be evaluated by measuring its electrical conductivity. Water with conductivity below 1500 µS/cm is suitable for irrigation, while water with conductivity between 1500 and 2400 µS/cm can be used for cleaning floors or flushing toilets. If the salt levels are too high, reject water can be diluted with lower salinity sources, such as rainwater or well water, to make it safe for reuse (Figure) (12).

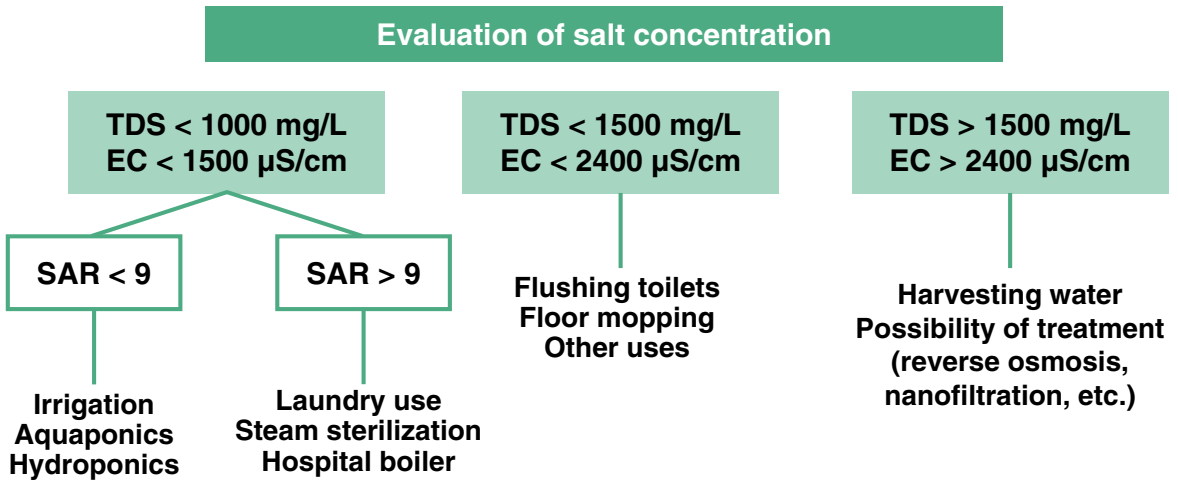
In a typical system for reject water reuse, water flows into a storage tank and is then redistributed for various purposes. Float switches regulate the system, and excess water can be diverted to a drain (12). Key considerations for planning a reuse project include the volume of reject water, its chemical composition, the location of the dialysis unit and distance to the reuse site, transmission lines, pumping requirements, storage capacity, and energy costs (12, 13). Economic evaluations of RO reject water reuse projects have shown profitability within a short payback period, making it a financially viable strategy for hemodialysis facilities (Table 1) (13).

Recycle spent dialysate

Spent dialysate is increasingly recognized as a valuable source of clean water, nutrients, and energy. Repurposing it can offer significant carbon emission reductions with important financial benefits (14).

- **Spent dialysate as a source of water reclamation.** Spent dialysate, accounting for 50% to 70% of the total water wasted in hemodialysis, can be repurposed for various applications such as landscaping, agricultural irrigation, groundwater recharge, cooling mediums, or industrial water (15, 16). Membrane technologies such as nanofiltration and RO have proven as attractive physical treatments of spent dialysate for reuse purposes (15). These systems are able to reduce salt content, micropollutants, and pathogens, including viruses, drugs, and drug metabolites. Additionally, they offer a cost reduction of 20% to 30% compared with seawater desalination, while also minimizing the environmental impacts related to wastewater disposal (15, 16).
- **Spent dialysate as a source of thermal energy.** Spent dialysate is discharged at temperatures of 20°C to 25°C, retaining significant thermal energy (17). This energy can be recovered using in-pipe or above-ground heat exchangers. In-pipe heat exchangers are installed in the sewage network to capture thermal energy, which is then transferred to a centralized heating system using a heat pump. Above-ground heat exchangers pump wastewater through an external system before returning it to the sewer (13). Globally, recovering thermal energy from hemodialysis wastewater could save up to 1600 GWh annually, equivalent to heating 140,000 homes in a European country (17). The choice of method depends on factors such as existing infrastructure, costs, and facility needs. A feasibility study can help identify the most suitable solution.
- **Spent dialysate as a source of nutrients and biofertilizers.** Spent dialysate contains high concentrations of phosphorus and nitrogen that can be recovered as struvite ($MgNH_4PO_4 \cdot 6H_2O$), a valuable fertilizer. Struvite crystallization is conducted by adding magnesium sulfate or magnesium chloride to spent dialysate to form crystals, which can be used directly as a fertilizer or as a component in slow-release fertilizers (17). A medium-sized dialysis facility can generate 2.4 kg of struvite per day, which is enough to fertilize 5 hectares (12.3 acres) of arable land annually with a profit (Table 2) (17). This innovative approach can help to minimize waste disposal and also creates a new revenue stream for dialysis facilities (17).
- **Decarbonizing hemodialysis through spent dialysate recycling.** Recycling spent dialysate offers a sustainable solution to reduce the high carbon footprint of hemodialysis treatment. Recycling spent dialysate for clean water can lead to a significant reduction in carbon emissions, potentially decreasing them to about one-third of their original levels (14, 18). Heat energy recovery from spent dialysate can result in savings of 0.5 kg of CO_2/kWh generated (17). Additionally, the recovery of nutrients in the form of struvite can further decrease carbon emissions, achieving a reduction of 0.35 kg of CO_2 for every kilogram of struvite produced (17).

Figure. A proposed algorithm strategy on possible reuse applications of hemodialysis reject water based on its characteristics



EC, electrical conductivity; SAR, serum adsorption ratio = Na^+ (mEq/L)/√ [Ca^{++} (mEq/L) + mg^{++} (mEq/L)]/2; TDS, total dissolved solids. Adapted from Tarrass et al. (12).

Raising awareness of water conservation strategies among nephrologists and health care practitioners is crucial. The integration of circular water economy principles into clinical practice and facility design will pave the way for a more resilient and sustainable future in hemodialysis. ■

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The authors report no conflicts of interest.

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Table 1. Case cost studies of reject reverse osmosis water reuse in hemodialysis

Water reuse factors	Canterbury Hospital (NHS UK)	Countess of Chester Hospital (NHS UK)	Lister Hospital (NHS UK)	Midland Regional Hospital (Ireland)	Sultan Abdul Halim Hospital (Malaysia)
Reuse option	Flushing toilet	Flushing toilet, laundry, others	Hot water	Flushing toilet	Aquaponics, horticulture
Volume of water saved, m^3	0.8/hour	1460/year	3140/year	5240/year	12/day
Implementation costs, $	19,000	14,000	7600	13,100	1047
Financial savings, $/year	9530	3990	8000	13,600	524
Payback period, months	24	42	12	12	24

NHS, National Health Service. Adapted from Tarrass et al. (13).

Table 2. Economic evaluation of a customized struvite production system

Variable	Result
Operations parameters	
Reactor size, L	500
Cycles per day	6
Struvite recovery efficiency ($PO_4^{3-}P/NH_4^+-N$), %	90/20
Molar magnesia/phosphate ratio	1.1
Yearly required $MgSO_4$, kg	45
Daily struvite production, kg	2.44
Yearly struvite production, kg	760
Installation costs, $	
Equipment cost	1350
Wastewater storage tank: 3 m^3	180
Additional costs (fittings, pipes, etc.)	80
Estimated total investment	1610
Expense	
Required $MgSO_4$ price, $/kg	0.33
Operations costs, $/year	100.3
Maintenance costs, $/year	48
Operating duration, year	10
Revenue	
Struvite market price, $/kg	0.8
Profit	
Annual cash inflow, $	608
Amortization	
Payback period, month	42

This evaluation reflects a system using hemodialysis wastewater at a medium-sized facility with 20 machines running at full capacity across two shifts daily. Adapted from Tarrass et al. (17).

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Green Home Hemodialysis: Balancing Patient Independence and Sustainability

By Maria C. Bermudez and Osama El Shamy

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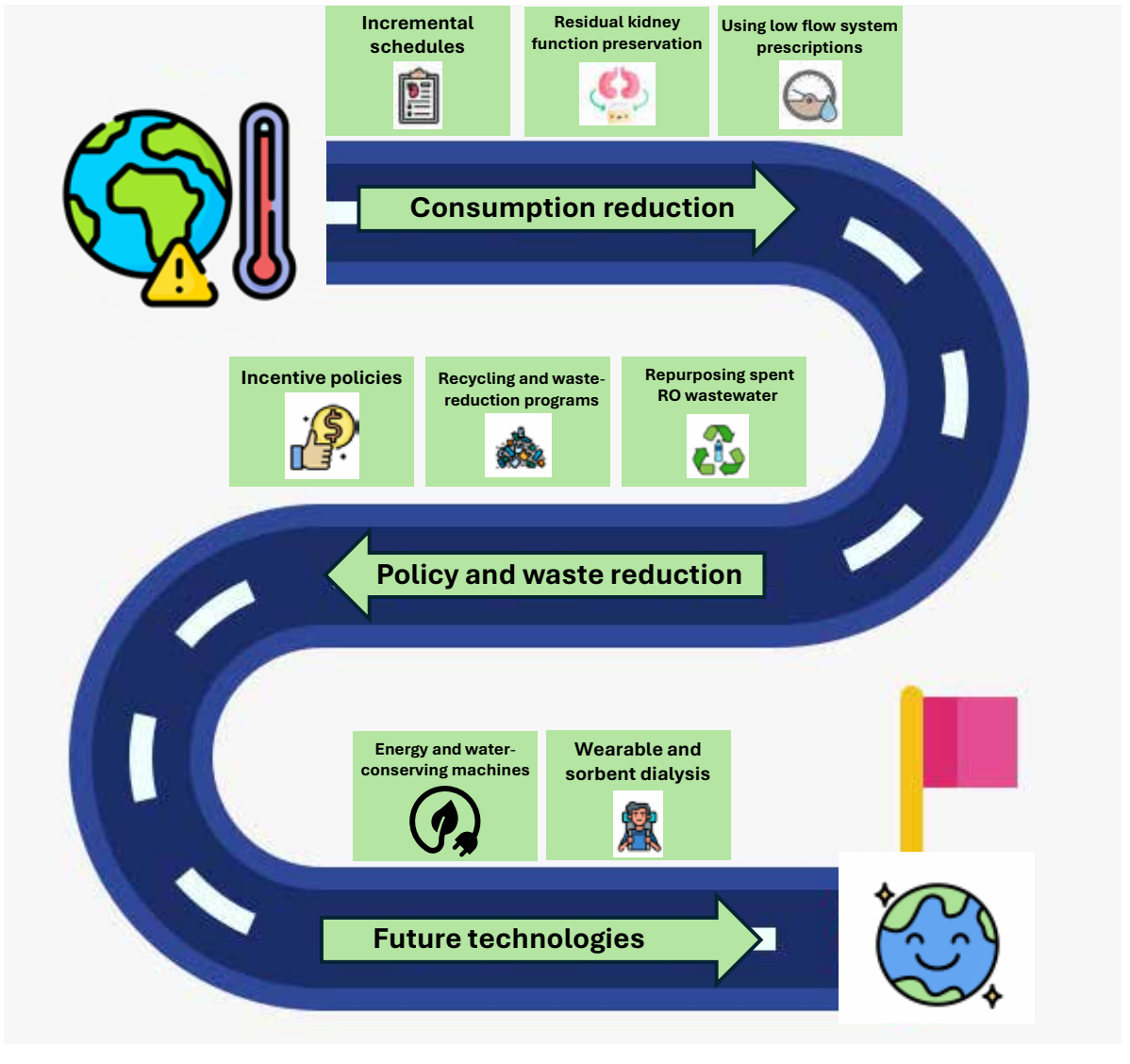
We are on the precipice of an environmental crisis. As a nephrology community, it is imperative that we not only recognize but find meaningful solutions to the component of our care that has the greatest impact on the environment: dialysis. The annual carbon footprint of providing automated peritoneal dialysis is ≤4503 kg CO_2e per patient, which is more than double the annual human carbon footprint (≤2000 kg CO_2e) (1). The global dialysis population continues to grow year after year, with 12-fold (in Indonesia), over twofold (in South Korea and Russia), and 31% (in the United States) increases between 2011 and 2021 (2).

With an aging global population and longer life expectancies, we must consider ways to provide high-quality care to our patients, while emphasizing conservation efforts and initiatives to incentivize and minimize water generation. Dialysis delivery does not simply entail exuberant water consumption but also large amounts of plastic, biohazardous, and pharmaceutical waste, such as lines, dialyzers, bags, bottles, syringes, gauze, paper towels, dressing, and medications. That being said, dialysis modalities are not equal when it comes to both the total and type of waste generation. The average patient undergoing in-center, thrice-weekly hemodialysis generates just over half of the waste (390 kg vs 617 kg) and under one-third of the polyvinyl chloride waste (101 kg vs 343 kg) that a patient undergoing four exchanges per day of continuous ambulatory peritoneal dialysis generates (3). In addition, approximately two-thirds of the incoming water is wasted in a typical dialysis reverse osmosis system (i.e., for every liter of dialysate generated, 2 L is discarded). This is not sustainable.

The conventional single-pass systems in dialysis use a large amount of dialysis; in contrast, even the most inefficient home hemodialysis with a low-flow system (LFS) prescription allows for a 1:2 dialysate-to-blood flow ratio for shorter, more frequent treatments. LFS reduces water consumption by eliminating reject water, generating only dialysate (4). LFS has a 59% lower carbon footprint (1844 kg vs 4346 kg CO_2e/year) and 66% to 75% lower water usage (90–360 L vs 270–600 L/week) than conventional systems (5, 6). Home hemodialysis reduces emissions by 20% due to decreased transportation needs for patients and staff (5).

A future with less packaging and the use of more biodegradable, eco-friendly recycling materials and consumables is within reach. Biodegradable polymeric membrane materials have already been identified, and the blending of some of these polymers yielded high-permeability and acceptable selectivity membranes (7). Recycling initiatives in dialysis have been underway. One such example is a dialyzer recycling pilot program launched by one of the large dialysis organizations in collaboration with a consumables manufacturer and a waste management company. This trial program has the potential of reducing an estimated 350,000 pounds of waste (8). Finally, while it has not borne fruit in growing home dialysis utilization, financial incentives may play a role in clinicians' and facilities' keenness to adopt sustainable solutions.

Figure. A roadmap to a more sustainable, green dialysis future



RO, reverse osmosis.

In the quest to reduce the environmental impact of dialysis, home hemodialysis emerges as a sustainable, eco-friendly treatment option, reducing dialysis' ecological footprint. Its adoption requires collaboration among health care practitioners, patients, and industry stakeholders, as well as the development of guidelines by national and international nephrology societies. The Figure highlights key eco-friendly strategies and future directions (9, 10). ■

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Peritoneal Dialysis and Sustainability: Leveraging Low-Resource Models for Environmental Impact

By Nupur Gupta

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The increasing prevalence of peritoneal dialysis (PD) and increased frequency of treatments raise concerns about PD's carbon footprint caused by waste generation and resource utilization. However, the impact of pharmaceutical usage and transport of PD fluid must also be considered while evaluating environmental sustainability (1). As dialysis demands substantial resources and contributes to carbon emissions, finding alternatives for reducing its environmental footprint is critical (2).

Dialysate production

The peritoneal dialysate solution manufacturing process is complex and specialized, requiring significant energy and water. Although not widely or accurately reported, it is estimated that several liters of source water are needed to produce PD dialysate solution bags. The high cost of production, natural disasters disrupting supply chains, and supply and demand misalignment have resulted in solution shortages (3). As a solution, on-demand PD fluid generation in patients' homes addresses storage and transportation challenges, along with infrastructure requirements. Additionally, during critical times such as natural disasters, solutions can be preemptively batched in preparation.

Innovations in PD

Point-of-care solution generation systems resolve the problem of required infrastructure for dialysis production, transportation, and storage of the supplies. Notably, in 2024, Baxter developed a compact water filtration device with pharmaceutical concentrates using the Amia automated PD system. Additionally, the system is integrated through a telehealth platform. Although recent developments like Baxter's solution generation system demonstrate acceptable short-term safety and efficacy, longitudinal data are imperative to assess peritoneal membrane integrity over decadal timescales (4).

Ellen Medical Devices also developed a point-of-care system, which uses minimal water from any source to generate dialysate from premixed solute (5). Additionally, it is portable and solar powered with a manufacturing cost of less than 1000 Australian dollars. The portability and low cost allow for sustainability in low-income areas. Trials for this device were to have begun in 2020.

Waste management

A study in the United Kingdom shows that polyvinyl chloride (PVC) makes up 56% of the waste generated from patients undergoing continuous ambulatory PD with four daytime exchanges. Notably, PVC and polypropylene are found in the outer packaging of dialysate bags and drain lines (6). The ink labeling and packaging material make recycling these items challenging, resulting in other disposal methods such as landfills or incineration. Regardless of the disposal method, both the production and decomposition of plastic increase the carbon footprint of dialysis and contribute to climate change.

Effective PD waste management requires categorizing disposables into lines in automated PD and drain bags in continuous ambulatory PD, both of which can briefly come into contact with bodily fluids. Despite this, classifying the entire system as hazardous waste complicates recycling. In countries like Australia and New Zealand, local infrastructure in collaboration with manufacturers and local program-level education resulted in effective PD waste management (7). In Thailand, nursing efforts in educating patients about waste segregation resulted in 92% compliance with recycling protocols, reducing incineration needs by 50% (8). More initiatives like these are needed to reduce the carbon footprint from waste generated in PD.

Sustainability in PD requires a multifaceted approach, judicious resource utilization, innovative manufacturing solutions, and finally, staff and patient education on the environmental impact (Figure). Professional societies like the International Society for Peritoneal Dialysis and International Society of Nephrology's environmentally sustainable kidney care initiative, in partnership with the Sustainable Kidney Care Foundation, focus on equitable access to affordable, sustainable, and quality dialysis, particularly in resource-limited countries (9). By leveraging local low-resource models and promoting innovation globally, PD can become a more viable and environmentally conscious kidney replacement therapy worldwide. ■

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Figure. Low-resource sustainable solutions to address environmental concerns in peritoneal dialysis

Concerns

- Nonrenewable energy and water utilization
  - Water utilization for premixed solutions
  - Electricity for production
- Infrastructure
  - Supply chain and technology
  - Automated PD cycler utilizing electricity
  - Lack of education and local programs
- Plastic utilization
- PVC waste
- Dialysate effluent generation

Potential solutions

- Reduce energy consumption.
  - Develop solar-powered or low-energy PD cyclers.
  - Encourage the use of energy-efficient manufacturing processes.
- Minimize water waste.
  - Implement water-efficient dialysis solutions.
  - Explore water recycling techniques.
- Improve plastic waste management.
  - Develop return-and-reuse programs for PD fluid bags and tubing.
  - Promote alternative, biodegradable packaging materials.
- Enhance local sustainability efforts.
  - Establish community recycling programs.
  - Partner with local governments and waste management services.

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Pharmaceutical Waste in Nephrology: Addressing Drug Disposal in Dialysis Care

By Summer Dyer, Charles Daniels, and Linda Awdishu

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Pharmaceutical waste encompasses unused or expired drugs and drug-containing waste materials (1). Improper disposal leads to environmental contamination, which affects food and water sources for humans, animals, and aquatic life (2, 3). The ecological impact of most drugs remains largely unknown, although studies on antibiotics demonstrate their role in developing antibiotic-resistant bacteria in wastewater (4, 5). Currently, 80% of untreated wastewater flows into ecosystems, and even treated wastewater contains pharmaceutical residues (2). Dialysis units significantly contribute to pharmaceutical waste through both parenteral and oral medications.

To reduce pharmaceutical waste in dialysis units, several clinical strategies can be implemented (Table). Medication use can be optimized through patient engagement in self-care, de-prescribing unnecessary medications, and using nonpharmaceutical interventions such as dietary modifications for phosphorus and potassium management. Clinicians should consider alternative formulations by prescribing oral medications instead of parenteral formulations when clinically appropriate to reduce vial, syringe, and needle waste. Treatment protocols can be developed that use longer-acting agents, multidose vials, and reduced injection frequency when feasible.

Dialysis units can reduce their pharmaceutical carbon footprint through several operational approaches. Units should reduce shipment frequency and order medications in bulk when possible. Inventory should be monitored carefully to prevent overstocking, and stockpiling during drug shortages should be avoided. With the new Centers for Medicare & Medicaid Services' mandate incorporating phosphate binders into the End-Stage Renal Disease Prospective Payment System, which began January 1, 2025, many dialysis units will face additional medication shipments (6). Implementation of "med-to-chair" programs (7) that deliver prescriptions directly to patients during dialysis sessions can reduce packaging waste and transportation-related emissions while addressing this new mandate. To our knowledge, many large dialysis facilities use mail-order pharmacy services; however, dialysis clinics can partner with local community pharmacies to offer coordinated delivery services to lower mail and transportation waste.

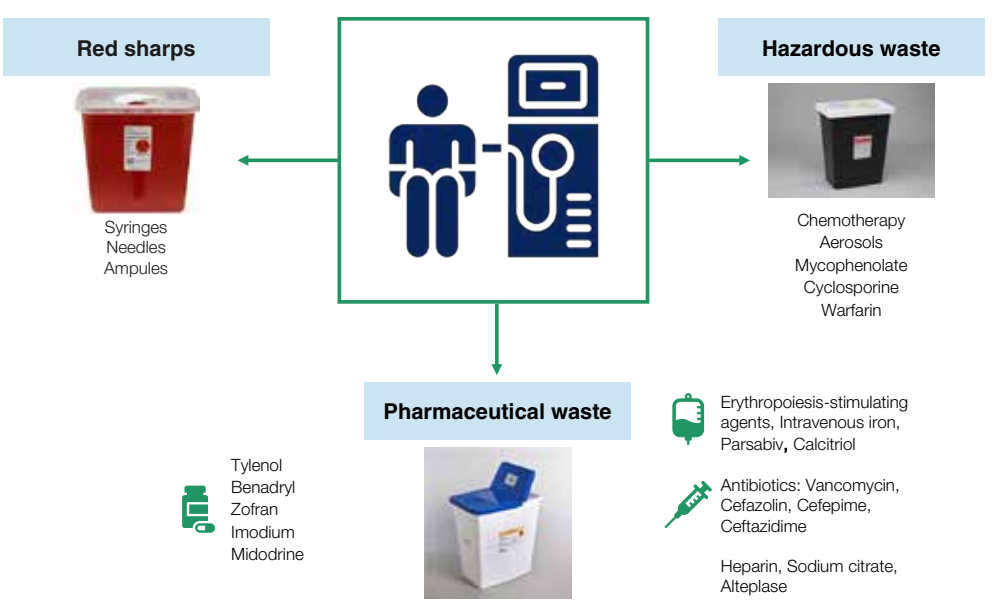
The Environmental Protection Agency recommends four primary goals for pharmaceutical waste management (8). First, no drugs should be disposed in sewers. Second, no drugs should be disposed in regular trash. Third, diversion of controlled substances during "wasting" must be prevented. Fourth, hazardous drugs that cannot be credited should not be returned through reverse distributor systems. The Figure illustrates the proper waste-bin destinations for common medications used in dialysis, helping staff identify which pharmaceuticals belong in hazardous waste, pharmaceutical waste, or red sharps containers based on medication type. Dialysis units should regularly assess health care personnel's knowledge of waste practices and ensure proper drug disposal.

Through clinical strategies, operational improvements, and proper disposal practices, dialysis units can significantly reduce pharmaceutical waste and its environmental impact. We call upon dialysis professionals to establish "Green Committees," comprising nurses, technicians, and pharmacists, to review and optimize existing waste-management policies and procedures. National and international societies are uniquely positioned to create guidance statements to prioritize these initiatives, aid standardization of processes, and support resource allocation for dialysis facilities. Education on pharmaceutical waste management is essential for all dialysis staff to ensure compliance with regulations and protection of human health and the environment. ■

Table. Green strategies to improve the environmental impact from pharmaceuticals

Strategy	Description	Impact
De-prescribe, change drug formulation or product, or adjust dosing frequency.	• Reduce prescriptions for unnecessary drugs. • Use oral versus intravenous products. • Use multidose vials over single-dose vials. • When feasible, use longer-acting products, and dose less frequently. • Use concentrating fluids for intravenous antibiotics.	• Reduce waste generated from unnecessary prescriptions. • Reduce waste generated from syringes and vials.
Reduce packaging waste.	• Purchase in bulk, and minimize the number of shipments. • Monitor inventory to prevent overstocking. • Avoid stockpiling during drug shortages. • Develop a "med-to-chair" prescription drug program.	• Reduce packaging and carbon footprint from reduced trips to pharmacy.
Optimize how drugs are wasted.	• Reduce wasting of medications into red sharps containers, which are most likely autoclaved. • Optimize outdated drug take-back from pharmacy. • Sort hazardous from nonhazardous drugs.	• Autoclaving causes the medication to enter the atmosphere and/or sewer system. • Receive credit from manufacturer for outdated drugs. • Disposal costs may be higher for hazardous waste disposal.
Apply health care personnel education.	• Seek education on what is pharmaceutical waste and proper segregation, handling, and disposal.	• Reduce costs associated with inappropriate disposal.

Figure. Pharmaceutical waste disposal for patients on dialysis



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Environmental Pollution and Kidney Diseases: A Growing Public Health Concern

By Alejandro Garcia-Rivera, Omar Sanchez-Vazquez, and Brenda Cortez-Flores

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Environmental pollution is increasingly recognized as a major risk factor for kidney diseases, contributing to the increasing global burden of chronic kidney disease (CKD) and other kidney disorders. Climate change, air and water pollution, and exposure to heavy metals and toxins play critical roles in the development and progression of kidney diseases (1).

Air pollution and kidney diseases

Air pollution, primarily caused by fine particulate matter ($PM_{2.5}$), nitrogen dioxide, and the ozone, enters the bloodstream through the lungs, triggering systemic inflammation, oxidative stress, and endothelial dysfunction, all of which contribute to kidney injury (1, 2). Chronic exposure to air pollution has been linked to increased risks of albuminuria, CKD progression, and kidney failure (3, 4). Additionally, long-term exposure to high levels of $PM_{2.5}$ in predisposed individuals has been associated with an increased incidence of glomerular disease, particularly membranous nephropathy, since $PM_{2.5}$ may trigger the production of cytokines that alter the structure of the phospholipase A_2 receptor (PLA_2R) in the lungs, leading to the generation of autoantibodies against PLA_2R. These autoantibodies, once spilled into the circulation, bind to PLA_2R on glomerular podocytes, forming immune complexes that damage the cells and ultimately result in membranous nephropathy (1, 5).

Water contamination and nephrotoxicity

Acute and chronic exposure to heavy metals (e.g., lead, cadmium, and mercury) is associated with different types of nephrotoxicity. Contaminated food and water, industrial waste, and occupational exposure are common sources of heavy metals. Acute cadmium exposure may cause acute kidney injury (AKI) due to acute tubular necrosis and Fanconi syndrome, while chronic exposure is associated with proteinuria and a decreased glomerular filtration rate (GFR). Chronic exposure to low levels of lead has been associated with tubulointerstitial nephritis. Interestingly, chronic mercury exposure may cause nephrotic syndrome, most commonly due to PLA_2R-negative membranous nephropathy, through immunotoxicity mechanisms that promote the production of autoantibodies against membrane proteins on podocytes (1, 6).

Heat-related kidney injury

Rising global temperatures, due to climate change, directly and indirectly affect kidney health. Heat stress and dehydration, particularly among outdoor workers in hot climates, increase the risk of heatstroke-associated AKI and CKD of unknown etiology (7). This phenomenon has been widely documented among agricultural workers in Central America, India, and other regions with hot climates, where prolonged heat exposure and inadequate hydration contribute to repeated kidney damage (8). Climate change also exacerbates the spread of vector-borne diseases (e.g., dengue fever and malaria), further impacting kidney health (9).

Toxins, pesticides, and occupational hazards

Environmental toxins, including pesticides, have been implicated in nephrotoxicity and CKD (10). Agricultural workers exposed to herbicides and pesticides, such as paraquat and glyphosate, have shown higher incidences of CKD (11). Furthermore, occupational exposure to nephrotoxic substances, such as heavy metals in mining and manufacturing, contributes to kidney injury (1).

Mitigation strategies and public health interventions

Addressing environmental risk factors for kidney diseases requires a multidisciplinary approach. Key interventions include:

- **Regulatory enforcement:** Governments must implement stricter air- and water-quality regulations to minimize pollutant exposure.
- **Public health initiatives:** Education, early detection, and preventive measures should be prioritized for high-risk populations.
- **Sustainable health care practices**: Health care professionals should advocate for environmentally friendly policies, such as green dialysis, and integrate environmental risk assessments into routine nephrology care.

Environmental pollution is a significant threat to kidney health. The impact of air and water pollution, climate change, and occupational hazards on AKI and CKD is becoming increasingly evident. As global temperatures increase, and pollution levels continue escalating, urgent action is needed to mitigate environmental risk factors and protect kidney function in vulnerable populations. Collaborative efforts among policymakers, health care professionals, and environmental advocates are essential to combat this growing public health challenge. ■

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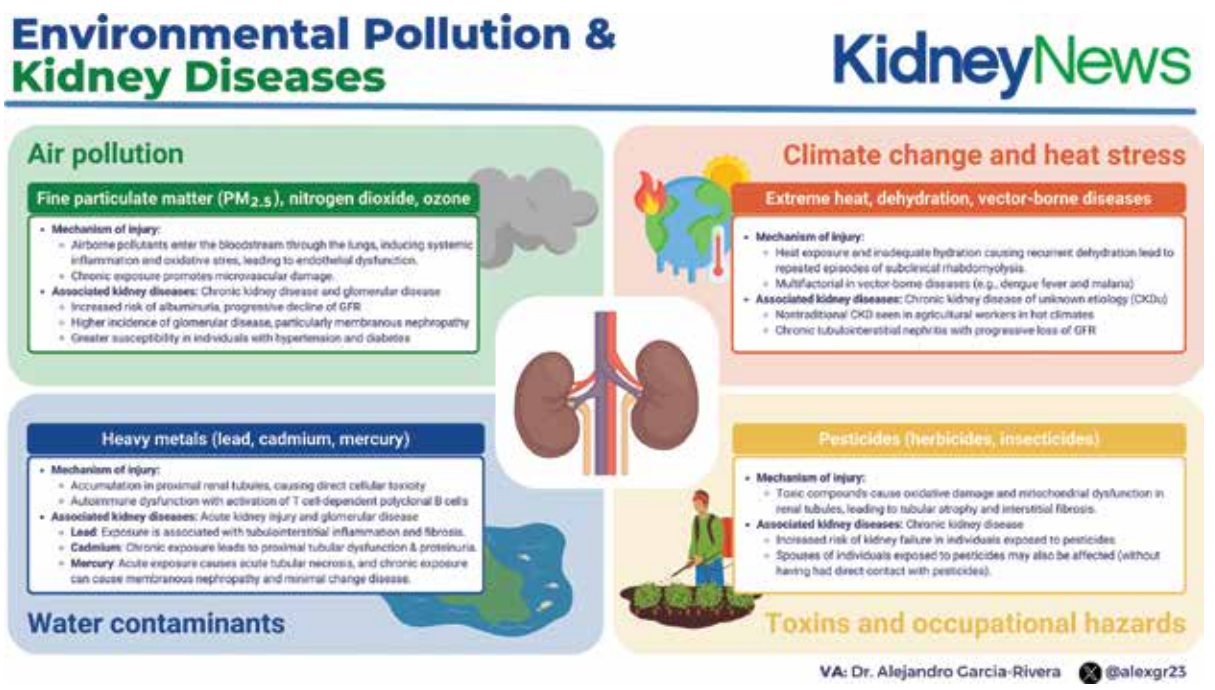

Xenotransplantation: The Future Starts Now

By Aprajita Mattoo and Vineeta Kumar

https://doi.org/10.62716/kn.000452025

For decades, a remark by transplant surgeon Norman Shumway, MD, seemed prophetic: "Xenotransplantation is the future of transplantation, and always will be" (1). Xenotransplantation has had a long and complicated history since its inception in 1964 when Thomas E. Starzl, MD, PhD, first transplanted baboon kidneys into six humans with terminal kidney disease (2). Following nearly 30 years of research on nonhuman primate (NHP) donor organs, the field underwent a major reset in the 1990s when the focus shifted from NHP donors to genetically engineered porcine organs (3). Despite steady advancements since then, inherent limitations of NHP models stalled clinical translation (4)—until last year's milestone: the first successful porcine kidney transplant into a living human.

With these trials on the horizon, xenotransplantation offers renewed hope for over 100,000 patients awaiting kidney transplants.

In March 2024, a 62-year-old man with kidney failure received a porcine kidney at Massachusetts General Hospital (MGH) (5). The xenograft functioned immediately, producing urine within 5 minutes of implantation. Serum creatinine dropped from 11.8 to 2.2 mg/dL by postoperative day (POD) 6. A severe cellular rejection on POD 8, partly due to low tacrolimus levels, was successfully treated with an interleukin-6 receptor blockade, corticosteroids, antithymocyte globulin, a C3/C3b blockade, and increased maintenance immunosuppression (Figure). The patient lived with a functioning xenograft for 51 days before passing away unexpectedly from a presumed cardiac arrhythmia, unrelated to the transplant.

Although the patient died, the case is a breakthrough for the field, showing that a porcine kidney can maintain durable kidney function in a human without the development of hyperacute rejection, that a cellular rejection can be treated with a relatively standard approach to immunosuppression, and that a porcine kidney can effectively maintain hemodynamic and electrolyte homeostasis. However, critical questions remain. Chief among them is what the optimal combination of porcine breed, genetic modifications, and immunosuppressive regimens required for long-term xenograft success is. While the galactose-α-1,3-galactose (α-Gal) knockout is essential, additional genetic modifications are still under investigation (6). Human immune responses differ from those of NHPs, raising questions about the relevance of preclinical models. Some immunosuppressants, ineffective in NHPs, may work in humans—such as eculizumab—while more commonly used allotransplant drugs, like tocilizumab, may be less effective in xenotransplantation (7, 8).

Comparing the MGH case with the second case of a porcine kidney-to-human xenotransplant at New York University (NYU) Langone Medical Center in May 2024 highlights the complexity of the issue at hand. The team at MGH used a triple glycan knockout kidney with seven human transgenes from a Yucatan miniature pig, along with CD40 and C5 inhibition (5). The team at NYU used an α-Gal knockout kidney from a Landrace pig with a CD80/CD86 blockade and C3/C3b inhibition (9). Despite these vastly different approaches, both patients maintained graft function for well over 1 month without the development of hyperacute or antibody-mediated rejection (9).

In February 2025, the US Food and Drug Administration approved clinical trials for genetically modified pig kidneys in people with kidney failure. The trials will begin with six patients and expand to 50, testing the xenokidney, UKidney. Similarly, eGenesis plans trials with 69 kidney genomic edits. With these trials on the horizon, xenotransplantation offers renewed hope for over 100,000 patients awaiting kidney transplants. The future of xenotransplantation is here—the real work starts now. ■

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Dr. Mattoo reports no conflicts of interest. Dr. Kumar provides consulting services to Alexion Pharmaceuticals.

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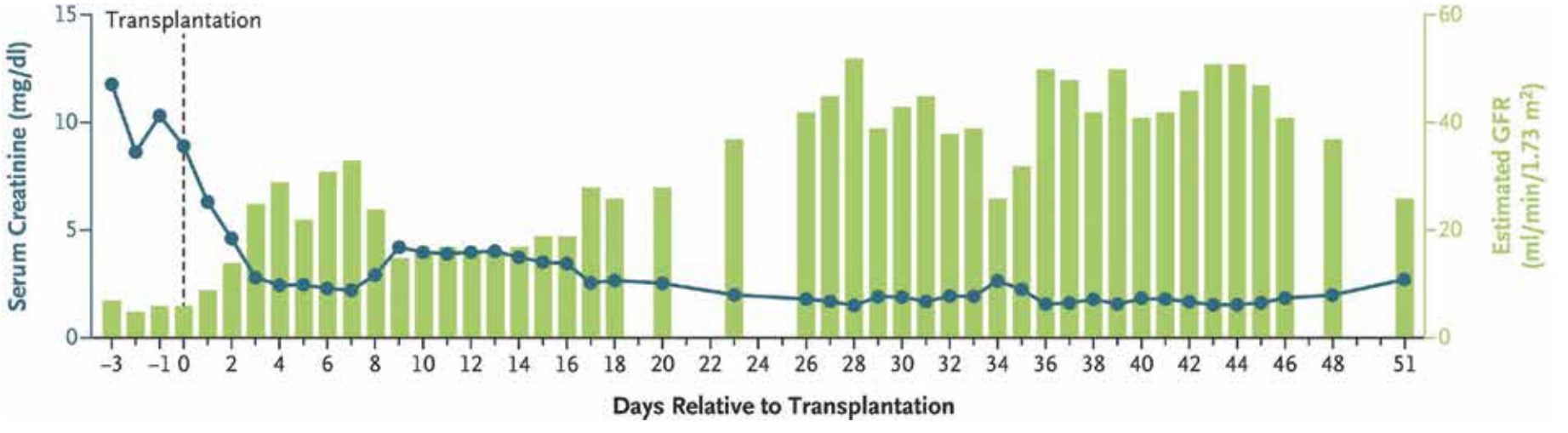
Figure. Plasma creatinine and estimated GFR following transplantation



The graph demonstrates plasma creatinine and the estimated glomerular filtration rate (eGFR) after porcine kidney xenotransplantation. Plasma creatinine levels decreased to 2.2 mg/dL by POD 6. An increase in creatinine was noted after a rejection episode on POD 8, but levels returned to baseline by POD 20 after treatment. The baseline creatinine level was 1.5 to 2.0 mg/dL with an eGFR of approximately 45 mL/min/1.73 m^2. Reprinted with permission from Kawai et al. (5).

ASN Makes Key Legislative and Regulatory Progress

By David White and Lauren Ahearn

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ASN has been actively pursuing new and existing policy actions in the legislative and regulatory arenas. Recent activities have focused on alleviating some penalties for physicians in the Merit-Based Incentive Payment System (MIPS), securing ASN priorities in the March government funding bill, pushing to make permanent the COVID-19 telehealth flexibilities, and protecting affordable access to the Centers for Medicare & Medicaid Services' (CMS') data for researchers.

ASN advocacy helps physicians avoid a MIPS penalty due to the nationwide intravenous fluid shortage

In response to advocacy efforts by ASN and the American Medical Association, CMS announced that physicians impacted by the nationwide intravenous fluid shortage caused by Hurricane Helene could apply for an exemption from MIPS penalties. This decision came after a joint push urging CMS to protect physicians from MIPS penalties due to the crisis. As a result, CMS accepted new hardship extension applications under the Extreme and Uncontrollable Circumstances category through April 14, 2025. This extension allowed affected physicians to avoid a potential MIPS penalty of up to 9%, impacting the 2024 performance period, which would influence Medicare payments in 2026.

Congress includes ASN advocacy priority in March government funding bill

ASN has long advocated for improvements in the US transplant system to increase access to kidney transplants. Key efforts have included supporting the 2023 Securing the US Organ Procurement and Transplantation Network (OPTN) Act, pushing for increased federal funding for transplant programs, and advancing bipartisan legislation to support living kidney donors, like the Honor Our Living Donors Act.

Since 2024, ASN has focused on a crucial technical issue: ensuring the continued collection of patient waitlist registration fees, which are vital to the operation of the US transplant system. These fees, approximately $900 per patient, are collected by transplant programs to fund the daily functions of OPTN. Although Congress allocates millions annually for the system, the majority of the operational funds come from these fees.

A legal challenge emerged when the 2023 Securing the US OPTN Act allowed the Health Resources and Services Administration to work with multiple contractors, requiring new legal clarity on the collection and use of these fees across different contractors. ASN worked with bipartisan congressional leaders, including Senators Bill Cassidy (R-LA), Chuck Grassley (R-IA), and Ron Wyden (D-OR), to introduce and advocate for legislation clarifying this issue.

In 2024, the bill was introduced in both the Senate and House, and although it was delayed by a last-minute disruption, ASN persevered. By March 2025, the clarification was included in the government funding package passed by Congress, highlighting the bipartisan support for the transplant system. This success was a significant step, but ASN's advocacy is ongoing, with plans to ensure that this clarification is included in the fiscal year 2026 appropriations bill for the Department of Health and Human Services. Additionally, ASN continues to push for increased funding for the transplant system, enactment of the Honor Our Living Donors Act, and support for kidney innovation through Kidney Innovation Accelerator (KidneyX).

ASN champions bipartisan push to make telehealth flexibilities permanent with the CONNECT for Health Act

Congress is moving forward with legislation that ASN strongly supports to make telehealth flexibilities, which are set to expire on September 30, 2025, permanent US policy. The Creating Opportunities Now for Necessary and Effective Care Technologies (CONNECT) for Health Act has been reintroduced in the Senate with overwhelming bipartisan support.

The bill was reintroduced on April 3rd by Senators Brian Schatz (D-HI), Roger Wicker (R-MS), Mark Warner (D-VA), Cindy Hyde-Smith (R-MS), Peter Welch (D-VT), and John Barrasso (R-WY) and a bipartisan group of 60 senators in total. The CONNECT for Health Act will expand coverage of telehealth services through Medicare, make COVID-19 telehealth flexibilities permanent, and make it easier for patients to connect with their doctors—all with the goal of improving health outcomes for Americans. Telehealth provides essential access to care, with nearly one-quarter of Americans accessing telehealth in a given month, according to the most recent available data.

"Telehealth reflects the world we live in and is vitally important to millions of Americans," said ASN President Prabir Roy-Chaudhury, MD, PhD, FASN. "The health care system needs a clear law governing telehealth, and that's what the CONNECT for Health Act would do if passed. As a matter of fact, ASN pioneered making telehealth available to patients on home dialysis under the Bipartisan Budget Act of 2018. We are urging Congress to pass the CONNECT [for Health] Act now and not wait for provisions that have expanded telehealth access more broadly to expire."

The CONNECT for Health Act would:

- permanently remove all geographic restrictions on telehealth services;
- permanently allow health centers and rural health clinics to provide telehealth services;
- allow more eligible health care professionals to use telehealth services;
- allow for the waiver of telehealth restrictions during public health emergencies; and
- require more published data to learn more about how telehealth is used.

ASN voices strong opposition to CMS' proposal on data access, warns of harm to kidney disease research and patient care

In 2024, CMS announced its decision to discontinue the physical delivery of critical health care data in support of external research projects. Instead, beginning as early as 2026, researchers will be required to use the Chronic Conditions Warehouse Virtual Research Data Center to conduct all research using CMS Research Identifiable File data. Recently, CMS issued a Request for Information on data feedback.

ASN believes the proposal jeopardizes the future of research on kidney diseases and will likely directly harm Medicare and Medicaid beneficiaries' access to and quality of care. Last month, ASN once again shared its objections to the proposal (1) and has made plans to elevate this issue again with CMS leadership.

ASN maintains its strong concerns related to:

- the lack of transparency regarding the future of CMS kidney-related data in light of this proposal;
- the unique nature of the federal government's role in kidney care given Medicare's End-Stage Renal Disease program and thus, the potential for jeopardizing the real-time research necessary for policymakers to improve kidney care;
- the impact of increased costs for researchers and their institutions, especially those at smaller, less financially endowed universities; and
- the potential to impede the future capacity of researchers across specialties but in particular, in the realm of kidney diseases.

ASN is deeply concerned about how this policy change could further exacerbate the challenges faced by populations already disproportionately burdened by kidney diseases as well as the broader implications that it may have on Medicare policy and spending. Claims-based research on kidney diseases serves as a critical tool for documenting and addressing deficits in access to needed health care services, optimizing Medicare spending, and improving the quality and efficiency of care for the millions of Americans affected by kidney diseases. ASN also believes there is a very real possibility that this proposal will cripple the future capacity of researchers and, more importantly, publicly available research vital to informing health care practitioners, scientists, and policymakers alike.

To keep track of ASN's policy efforts throughout the year, follow coverage in *Kidney News* and the ASN podcast feed, and visit ASN's Kidney Health Advocacy webpage (https://www.asn-online.org/policy/). For real-time updates from ASN Policy, follow @ASNAdvocacy on X. ■

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Series Highlights Importance of Lifestyle Behaviors in Managing Kidney Health

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Editors of *CJASN* recently embarked on a special 18-article educational series, titled "Lifestyle Medicine and Kidney Health," guest edited by Donald E. Wesson, MD, MBA, FASN, The University of Texas Southwestern Medical Center, Dallas; Jaimon T. Kelly, PhD, University of Queensland, Australia; and Mona Boaz, RD, PhD, Department of Nutrition Sciences, Ariel University, Israel.

Kidney News (*KN*) recently asked the guest editors about this important topic and their plans for the series.

KN: What is lifestyle medicine?

Editors: Lifestyle medicine is an approach to health care in which we emphasize the role of lifestyle behaviors in preventing, treating, and managing chronic diseases. These behaviors include nutrition, physical activity, stress management, sleep hygiene, spirituality and mindfulness, social relationships, and avoiding harmful substances. These behaviors are done in conjunction with, not in exclusion of, traditional medical care to promote overall health.

KN: Why is lifestyle medicine important for improving outcomes in people living with kidney diseases?

Editors: Lifestyle medicine is important for improving outcomes for everyone! But people with kidney diseases can adopt a number of behaviors that may slow the rate of decline of their kidney function and reduce their risk for other diseases and health complications. Such concomitant conditions include heart disease and stroke, for which they are at increased risk compared to people without kidney diseases. Altering diet and increasing physical activity in such a way as to reduce blood pressure and other risk factors for these outcomes are of great benefit to this population. Also, many people with kidney diseases struggle with challenges such as problems sleeping, depression, obesity, and loneliness that can be helped with lifestyle interventions.

KN: How do lifestyle recommendations differ among patient populations within the kidney community?

Editors: The same pillars of lifestyle medicine would be addressed at all stages of kidney disease, and these pillars can be individualized to reflect someone's course and stage of the disease, personal and cultural preferences, and interactions with medications and other treatments.

KN: What is the goal of the special series in *CJASN*?

Editors: We would like to highlight the role of lifestyle medicine in the context of individuals with kidney diseases and to increase awareness of lifestyle medicine among all health care practitioners involved in kidney care. We hope that health care practitioners will further investigate the possibility of including these approaches in their clinical work, and we also hope that patients will learn about this topic and initiate discussions about it with their health care team.

We would also like to inform health system leaders of the importance of incorporating into their operations ways by which to facilitate implementation of these healthy behaviors into the management of patients receiving care in their institutions. Furthermore, we would like to reach policy leaders to highlight the need for societal environmental changes that would better allow, and even promote, these healthy behaviors.

KN: What can readers expect from the series?

Editors: Readers of this series can expect to learn about various aspects of lifestyle medicine, including practical clinical applications of these interventions. The series is set up in a way to allow readers from all disciplines to identify effective ways to recommend a range of healthy lifestyles to people living with kidney diseases. We believe that each contributing author has assessed the evidence base for these treatments and presents them honestly and objectively.

KN: In your introductory editorial, you note that there are relatively limited studies on lifestyle medicine and kidney diseases. What opportunities exist to better understand the lifestyle behaviors in practice?

Editors: Exposure to the topic and extensive reading are essential to expanding the role of lifestyle medicine in clinical practice. Importantly, we hope that our series will spur research in the area so that the efficacy and limitations of this approach can be assessed.

To access the Lifestyle Medicine and Kidney Health series, visit https://journals.lww.com/asnjournals/Pages/Lifestyle-Medicine-and-Kidney-Health.aspx.

Is Bloodless Medicine the Future of Nephrology?

By Elena Bosack and Marie Anne Sosa

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Bloodless medicine refers to a set of strategies and products that may serve as alternatives to allogenic blood transfusion or other blood-based products such as platelets or plasma.

Who might need bloodless medicine?

Bloodless medicine has often been colloquially equated with the Jehovah's Witnesses religion, a faith that prohibits the acceptance of blood products while permitting other medical treatment (1). However, patients refuse blood transfusion for many reasons, from fear of infectious or allergic reactions to concerns about the vaccination status of blood donors (2). Furthermore, blood transfusion may be contraindicated in certain clinical scenarios, such as among patients with severe transfusion reactions, with a significant antibody load, or those at risk of severe volume overload. In other cases, bloodless medicine may not be a choice. Last year, the American Red Cross experienced the lowest number of blood donations in 20 years, prompting declarations of emergency blood shortages across the United States (3). With health care costs on the rise, and blood donations on the decline, widespread availability and accessibility of blood products may not be guaranteed in years to come.

What are bloodless alternatives?

The paradigm of bloodless medicine includes both strategies to prophylactically reduce the need for blood transfusion as well as nonblood-based products that assist management. Such "blood conservation" methods include minimizing iatrogenic blood loss for laboratory testing; tolerating lower hemoglobin levels; treating preoperative anemia with iron, vitamin B12, and folate as indicated; salvaging intraoperative blood (e.g., "cell saver" technology); performing autologous hemodilution; and optimizing surgical hemostasis such as with new electrocautery methods, antifibrinolytics, and hemostatic agents (4). Anemia tolerance can be maximized with supplemental oxygen and reduction of oxygen demand with bed rest, sedation, and strict fever control (5). Products such as epoetin alfa and darbepoetin alfa are staples in bloodless medicine, thanks to their ability to promote erythropoiesis, whereas newer products such as perfluorocarbon emulsion, hemoglobin-based oxygen carriers (e.g., Hemopure), oxygen-releasing microparticles, and artificially engineered erythrocytes remain under keen investigation (6).

How does bloodless medicine compare?

While studies on outcomes of bloodless medicine are mainly limited to case studies and series, some larger retrospective case-control and cohort studies demonstrate similar patient outcomes in adult patients receiving bloodless medicine compared with standard care (7, 8). In fact, some studies go so far as to suggest that bloodless medicine results in superior care, although a more robust subgroup analysis is needed to support this claim (9). Studies that examine the safety and efficacy of bloodless medicine in nephrology are especially lacking.

However, several case series of kidney transplants among members of Jehovah's Witnesses demonstrate that the procedure can be performed safely and is tolerated well (10–12). More recently, a large 2021 case-control study compared a variety of hematologic and transplantation-specific endpoints in 143 members of Jehovah's Witnesses who had received kidney transplants with matched controls and found no differences in the mean estimated glomerular filtration rate and in the incidences of treated acute rejections, death, and graft loss at 12 months (13).

While allogenic blood transfusion has long been taken for granted as a safe and reliable therapy, recent blood shortages and a growing culture of patient refusal are ushering in an era in which blood transfusions may not always be an option. In light of these changing tides, nephrologists must be prepared to incorporate bloodless medicine into their practice to ensure optimal patient care in all situations. ■

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The authors report no conflicts of interest.

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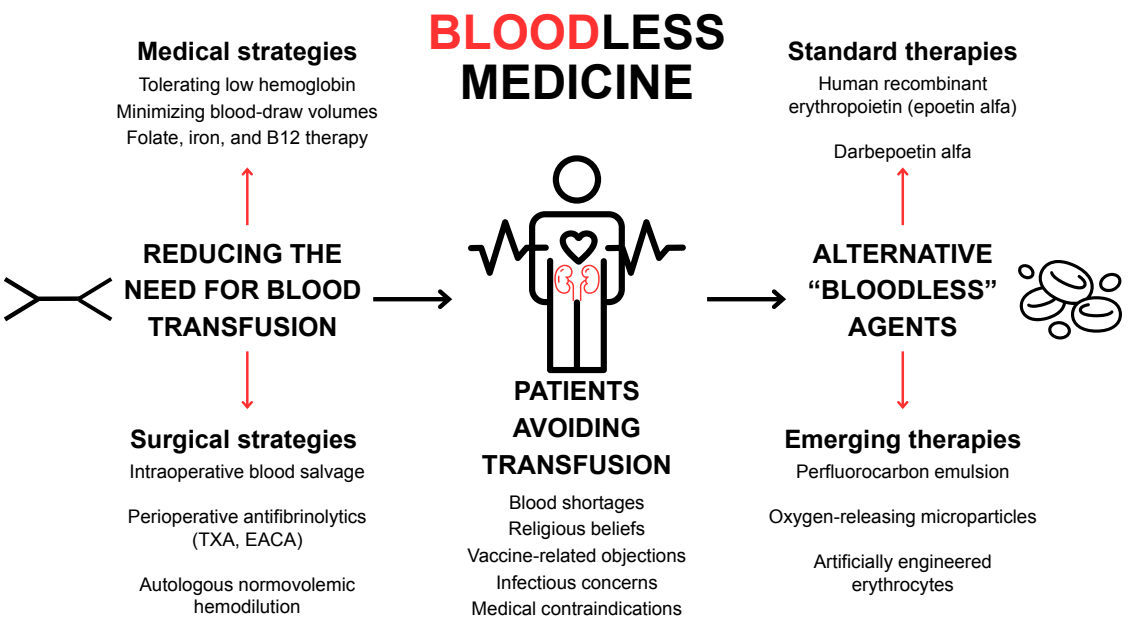

EACA, epsilon aminocaproic acid; TXA, tranexamic acid.

Preeclampsia and Rare Genetic Variants in the Terminal Complement System

By Shreepriya Mangalgi and Silvi Shah

https://doi.org/10.62716/kn.000432025

Preeclampsia is a pregnancy-specific multisystem disorder characterized by new-onset hypertension with significant end-organ damage, with or without proteinuria (1). Preeclampsia affects 3% to 5% of pregnancies and contributes to significant maternal and fetal morbidity and mortality (2). Over the past 150 years, the understanding of its pathophysiology has evolved, but consensus on its true etiology remains elusive. It is often described as one of the "great obstetrical syndromes" (3). Current understanding supports a multiple-hit theory that leads to uteroplacental ischemia and systemic endothelial dysfunction. Preeclampsia is also known to have a familial predisposition.

The complement system is believed to play a crucial role in maintaining immunologic tolerance at the maternal–fetal interface. Complement-facilitated phagocytosis helps clear placental fragments that enter the maternal circulation during syncytiotrophoblast turnover (4). Inadequate regulation of the complement cascade can result in improper clearance of this debris, leading to its deposition in tissues and vascular walls, which may trigger an inflammatory response (5). Several studies have examined the role of complement factors (CFs) or their split products in preeclampsia (6). Genetic variants in complement component 3 (C3), CFH, and complement receptors CR3 and CR4 have been linked to increased risk of preeclampsia (4, 7).

A recent study by Lokki et al. published in *Genes and Immunity* examined the role of rare genetic variants within the terminal complement system in preeclampsia (8). The authors used targeted exomic sequencing to analyze exomes and splicing regions of selected genes within the complement system in both patients with preeclampsia and controls. The exomic sequencing data were sourced from the Finnish Genetics of Pre-eclampsia Consortium (FINNPEC) and the national FINRISK study. Association testing was conducted to determine whether variants in genes coding for 40 components of the complement system were present in 609 Finnish mothers with preeclampsia and in 2092 controls.

The study found 14 variants within 9 genes that were associated with preeclampsia related to the terminal classical and alternative pathways but none in the lectin pathway. Among these, 11 were classified as rare variants (with a minor allele frequency of <0.1), including 6 missense mutations. Six variants were identified in the common terminal pathway: two variants each in C5, C6, and C8B. The two rare missense variants in C5 (rs200674959 and rs147430470) and one in C6 (rs41271067) were found to be predisposing variants. Additionally, one rare variant in C6 (rs114609505) and one common variant in C8B (rs605648) were associated with a protective effect. No associated variants were discovered in the membrane attack complex (MAC) inhibitor protectin (CD59). Other potential associations included rare predisposing variants in the genes coding for C-reactive protein (rs1800947), CFI (rs200040240), and C3 (rs45532534), as well as a protective association with a common variant in CFH-related 4 (rs7417769).

This study contributes to the expanding literature on the role of rare complement variants in preeclampsia. It emphasizes the importance of the common terminal pathway, which has been less examined previously. In the future, it would be intriguing to explore whether targeting the complement pathway could offer therapeutic potential for managing preeclampsia.

One major limitation of the study is that both participant groups come from a single country. Although the study does not specify the participants' race or ethnicity, the Finnish population is predominantly homogeneous. It is still unclear whether these rare complement variants are linked to preeclampsia in populations outside of Finland.

To summarize, the authors are to be applauded for this important work. Genetic mutations in the terminal complement system may lead to increased susceptibility to preeclampsia, and targeting the terminal complement pathway could be a potential therapeutic strategy. ■

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The authors report no conflicts of interest.

Understanding rare genetic variants within the terminal pathway of the complement system in preeclampsia

KidneyNews

FINNPEC + FINRISK
pooled, case-control cohort

- Sequencing study, Europe
- Mothers with preeclampsia (PE) **n = 609**
- Mothers without PE **n = 2092**
- Targeted exome sequencing of selected genes within the complement system

Results

14 Variants in 9 genes coding for components of the MAC (C5b-9) associated with PE → **11** Rare (minor allele frequency, <0.1) → **6** Missense mutations

Rare missense variants in C5 gene

Both predispose to PE

rs200674959 (I1296V)
(located in conserved complement activating CUB domain)
OR (95% CI) = 24.13 (1.25–467.43); **p = 0.01**

rs147430470 (I330T)
(located in MG3)
OR (95% CI) = 22.75 (1.17–440.78); **p = 0.01**

Rare missense variants in C6 gene

Predispose to PE

rs41271067 (D396G)
(located in MAC/PF)
OR (95% CI) = 2.93 (1.18–7.10); **p = 0.01**

Protective of PE

rs114609505 (T190I)
(located in MAC/PF)
OR (95% CI) = 0.47 (0.22–0.92); **p = 0.02**

Conclusions: Rare complement variants may play an important role in risk for PE. Variants of uncertain significance in genes coding for components of the terminal pathway of the complement system may, in the context of physiologic changes typical to PE, become pathogenic.
CI, confidence interval; CUB, complement C1r/C1s, Uegf, Bmp1; MG3, macroglobulin-like domain 3; OR, odds ratio; PF, perforin domain.

Lokki AI, et al.; FINNPEC Core Investigator Group. **Understanding Rare Genetic Variants Within the Terminal Pathway of Complement System in Preeclampsia.** *Genes Immun* 2025; 26:22–26. doi: 10.1038/s41435-024-00310-6

Visual abstract by Krithika Mohan, MD, DNB @krithicism

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CAR-T Cell Therapy for Autoimmune Diseases Wins NephMadness 2025

By Matthew Sparks

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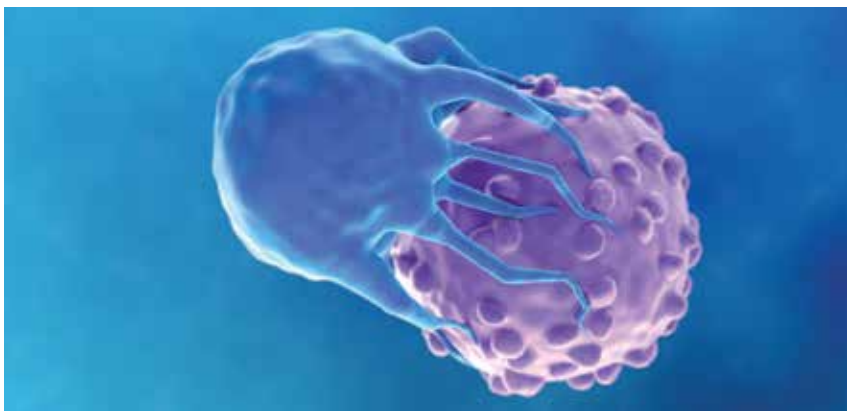
NephMadness 2025 has concluded, marking the 13th edition of this educational tournament that celebrates World Kidney Day by spotlighting pivotal topics in nephrology. Modeled after the NCAA's [National Collegiate Athletic Association's] March Madness, NephMadness engages clinicians, trainees, and enthusiasts in a bracket-style competition in which nephrology concepts vie for the top spot, with outcomes determined by a Blue Ribbon Panel of experts.

This year's champion is Chimeric Antigen Receptor T Cell (CAR-T) for Autoimmune Diseases, emerging victorious from the CAR-T for Kidney Diseases region. In a thrilling final matchup, CAR-T faced off against Minimal Change Disease (MCD) Diagnosis and Pathogenesis. Despite MCD's early lead, CAR-T mounted a strong comeback, culminating in a decisive score of 5 to 4, as determined by the Blue Ribbon Panel.

The 2025 tournament featured a diverse array of regions, including:

- CAR-T for Kidney Diseases: Highlighting innovations like CAR-T cell therapy for autoimmune kidney diseases
- MCD: Focusing on diagnosis, pathogenesis, and relapse
- Disaster Nephrology: Examining kidney care challenges during events like the Los Angeles wildfires and the current global conflicts
- Green House: Addressing environmental nephrotoxins and their impact on kidney health
- Hemodialysis: Exploring advancements in personalized dialysis treatments
- Resistant Hypertension: Investigating novel approaches to managing difficult-to-control blood pressure
- Genetics: Delving into the genetic underpinnings of kidney diseases
- Obesity in Kidney Transplant: Discussing weight management in kidney donors and transplant recipients



One of the unique aspects of NephMadness is the global participation and the creative celebrations it inspires. This years' gatherings focused on the "Back to the Future" theme with costumes, decorations, and nephrology-related treats. The winner of the best party category for the second year in a row was the General Hospital of Mexico in Mexico City.

As the nephrology community reflects on the insights and discussions sparked by this year's tournament, anticipation builds for NephMadness 2026. What emerging topics will take center stage, and which concepts will capture the imagination of participants worldwide? ■

Matthew Sparks, MD, FASN, is an associate professor of medicine at Duke University, Durham, NC. He is a cocreator of NephMadness and serves on the NephMadness Executive Team.

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