Policy and Kidney Community Engagement to Advance toward Greener Kidney Care

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A tell-tale “bathtub ring” encircling the perimeter of Lake Mead signals the lowest levels of the nation’s largest water reservoir since the Hoover Dam was built in 1936. 1 This water source serves a broad swath of the American Southwest, including the thousands of people with kidney failure who are dependent on regular access to large volumes of water for life-sustaining dialysis treatments. Depletion of water reserves in Lake Mead is the result of historic drought and low runoff conditions in the Colorado River Basin, driven by rising temperatures and other manifestations of global climate change.

Climate change is an increasingly perceptible threat to humanity and many health care professionals and researchers are working to broadcast the reality that climate health is human health. Kidney care professionals should be uniquely motivated to engage in this movement: first, climate destabilization contributes to the increasing global burden of kidney diseases. High ambient temperatures provoke the development of acute kidney injury and stone disease, and heat exposure is a proposed mechanism for the incompletely understood entity labeled chronic kidney disease of unknown origin. 2 Mounting evidence also reinforces links between kidney disease and numerous environmental and occupational exposures, including particulate matter air pollution, agrichemicals, and heavy metals. 3 Second, dialysis therapy—especially hemodialysis—is heavily reliant upon regular access to large volumes of fresh water and reliable power sources. 4 Declining water availability in the American Southwest and other water-limited regions may progressively undermine reliable delivery of dialysis to the growing population of people with kidney failure. The kidney community’s considerable dependence on energy- and resource-intensive therapies also confers an obligation to improve our own environmental sustainability. Finally, the kidney community has prioritized efforts to address deep-seated racial and socioeconomic disparities in kidney health and access to care. These disparities are interwoven with and exacerbated by the effects of climate change, because disadvantaged populations are disproportionately exposed to environmental- and climate-related hazards, and have more limited resources with which to recover from and prepare for future challenges. 5

Moving forward, the kidney community must rapidly transform practices to build resilience to the effects of climate change on the care of people with kidney disease, and work to moderate our own environmental footprint. Collaboration among multiple stakeholder groups—including people with kidney disease, their clinicians, professional societies, patient associations, dialysis organizations, and industry—will be foundational to these efforts. Legislative and regulatory policies are needed at the local, state, national, and international levels to coordinate these groups around common goals. 4, 6 Specifically, policy may be designed to support members of the kidney community in investigating current resource utilization, developing and implementing systematic tracking of environmental effect over time, and investing in green care processes and technological innovations. In turn, activation of these policy levers will depend on awareness and advocacy from members of the kidney community (Figure 1).

INVESTIGATING AND MONITORING OUR ENVIRONMENTAL FOOTPRINT

Effective system improvement must be grounded in a firm understanding of the environmental effect of kidney replacement therapies. A recent study based in a US dialysis organization reported an average use of 25.9 kWh of power, 600 L of water, and 14.6 kg of waste production per in-center hemodialysis treatment. The carbon emissions associated with power, water, use and disposal of supplies, and dialysis-related travel averaged 769,374 kg CO₂-equivalents per facility. This consumption roughly equates to the average annual energy use of 93

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households. These findings add to an international body of work describing the significant environmental footprint of in-center hemodialysis. There remains a relative dearth of information about the environmental effect of home hemodialysis, peritoneal dialysis, and kidney transplant. Understanding, comparing, and monitoring the environmental effect of each of these alternative treatment modalities will be an important step toward identifying areas for improvement and establishing evidence-based guidelines for sustainable kidney care.

The innovative NephroCare program in France offers a model for utilizing these types of data for continuous quality improvement. In 2005, NephroCare began mandating the collection of data on three key performance indicators of environmental effect: electricity use, water consumption, and waste production per hemodialysis treatment. Data were collected at the dialysis facility level and analyzed centrally, and then used to inform the design of targeted action plans to reduce environmental effect. Through a series of process improvement steps, NephroCare was able to significantly reduce electricity use by 30%, water consumption by 52%, and care-related waste production by 37%, while also doubling their patient care volume.

Figure 1. Key domains in sustainable kidney care. Advancement in key domains of sustainable kidney care requires mutually reinforcing efforts by kidney community stakeholders to promote awareness and advocacy and government bodies to advance policy and regulation.

DEVELOPING AND INVESTING IN GREEN TECHNOLOGIES AND PROCESSES

Efforts to promote innovations in dialysis technology and alternative forms of kidney replacement therapy—exemplified by KidneyX, a public-private partnership between the US Department of Health and Human Services and the American Society of Nephrology—are appropriately targeted at improving patients’ quality of life and clinical outcomes and reducing excess health care system costs. Opportunity exists to encourage innovation in resource conservation by routinely considering environmental sustainability when designing competitions and awarding prizes, and in other efforts to catalyze private markets. For example, regenerative dialysate technology may serve the dual purposes of supporting the development of a wearable artificial kidney, while also offering opportunities to use resources more efficiently. Artificial kidney modalities could also increase patient mobility and resiliency in the face of disruptive weather events. Until regenerative dialysate technology is more widely available, there are well-documented strategies by which dialysis facilities can conserve water and achieve cost savings by repurposing reverse osmosis reject water for other uses, such as janitorial work, equipment sterilization, and landscape care. There may also be untapped opportunities to address the environmental effects of the production and disposal of dialysis-related materials such as filters, tubing, flushes, and other single-use plastic waste.

In addition to technological innovation, processes of care may be redesigned to reduce our environmental footprint. The expansion of telemedicine and home dialysis modalities promises to improve access and options to better align care with patients’ lifestyles, but also offers opportunities to re-evaluate and reinvent our care infrastructure to reduce the environmental effect of frequent travel to clinic and dialysis centers. Dialysis organizations may also support green nephrology by intentionally prioritizing partnerships with suppliers who engage in sustainable packaging and shipping practices. Once new devices and care processes with improved sustainability profiles are tested and publicly available, the US Centers for Medicare & Medicaid Services, as the primary payer for dialysis services, can further incentivize uptake by prioritizing these approaches in reimbursement structures.

AWARENESS AND ADVOCACY

In 2022, a strong position statement from the American Society of Nephrology on the detrimental effects of climate change for people with kidney disease concluded with a rallying call to action. Climate advocacy by health professionals is increasingly urgent in...
the wake of the Supreme Court case *West Virginia v. Environmental Protection Agency*.\(^\text{10}\) In this decision, the court made clear that expertise and leadership within government agencies may be insufficient alone to direct policy. Therefore, kidney health professionals must step into this advisory role and advocate for the development of greener kidney care. Global coordinated action will benefit from the formation of an international consortium of green nephrology advocates, supported by their respective professional societies and other community stakeholders, with the goal of establishing an action plan for advancing sustainable kidney care.

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Z. Kribs reports other interests or relationships with the American Society of Nephrology. All remaining authors have nothing to disclose.

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C. Butler, Z. Kribs, and S. Struthers conceptualized the study; C. Butler and S. Struthers wrote the original draft; C. Butler, Z. Kribs, and S. Struthers reviewed and edited the manuscript.

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