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EDITORIAL COMMENTARY

IPNA's commitment to world kidney day 2026: caring for little kidneys and protecting the planet

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Introduction: The climate emergency

The climate crisis is an escalating threat to global health, and the healthcare sector itself is a significant contributor, accounting for approximately 5% of global CO_2 emissions each year [1]. The United Nations and other governmental bodies have declared a climate emergency, clearly stating that it is caused by human activity, is rapidly intensifying, will continue to worsen until at least 2050 irrespective of future emission scenarios, and is responsible for massive, unprecedented, and cascading harm to human and planetary health [2]. The International Society of Nephrology's "Green-K" initiative emphasizes that protecting our environment can no longer be considered an optional "add-on" after the immediate demands of patient care are addressed [3, 4]. Dialysis is among the most resource-intensive medical therapies, producing an estimated 3.8–10.2 tons of CO_2 emissions per patient annually [5]. Dialysis places substantial demands on water and energy resources and generates large volumes of medical waste, much of which consists of single-use plastics and disposable materials [6]. As the global prevalence of chronic kidney disease (CKD) rises and more patients require dialysis, the cumulative environmental impact of dialysis is expected to increase, potentially accelerating climate conditions that further compromise population health. This includes direct and escalating risks to kidney health, both in children and adults [7].

Emphasizing the bidirectional and interdependent relationship between kidney disease and climate change, the World Kidney Day (WKD) 2026 theme "Kidney Health for All: Caring for People, Protecting the Planet" calls for an urgent need to connect kidney health with environmental

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sustainability. The International Pediatric Nephrology Association (IPNA) is committed to advancing sustainable kidney care worldwide and has developed a Taskforce to promote environmentally sustainable, patient-centered pediatric kidney care through global awareness, education, practical tools, and community engagement.

The environmental footprint of kidney care

Dialysis is a life-sustaining therapy for people with kidney failure, yet it is associated with substantial environmental costs. Hemodialysis requires 90–500 L of water per treatment session, much of which is discarded during reverse osmosis, with approximately two-thirds of the reject water discharged into drains [8]. Energy consumption is also significant: a single 4-h hemodialysis session accounts for approximately one-fifth of a household's daily energy use [7]. Peritoneal dialysis, while offering advantages such as home-based care and reduced travel, relies heavily on single-use plastic consumables and frequent deliveries, contributing to plastic waste and carbon emissions. A typical patient on peritoneal dialysis generates over 600 kg of waste annually, much of it non-biodegradable polyvinyl chloride [9]. Incinerating these bio-hazardous wastes further increases greenhouse gas emissions and air pollutant levels [9]. Recent lifecycle assessments demonstrate that in-center hemodialysis has the highest environmental impact across most categories, including climate change, air pollution, and water depletion [10].

Although pediatric patients make up only a fraction of the dialysis population, they experience a disproportionate share of the long-term environmental and health consequences associated with current dialysis practices. Most children who require dialysis have inherited kidney disease, representing lifelong conditions beginning early in life [11]. These children have a lifetime of kidney replacement therapy ahead of them, including extended or even repeated periods on dialysis and multiple kidney transplants [12]. Compounding this burden, children are uniquely vulnerable to climate-related stressors such as heat exposure, air pollution, drought, and infectious disease, all of which have been linked to adverse kidney outcomes, including acute kidney injury, accelerated progression of CKD, and reduced nephron endowment due to maternal factors causing low birth weight or prematurity [13–17].

Additionally, pediatric dialysis units are typically located within tertiary care hospitals and are far fewer than adult nephrology centers, resulting in increased patient travel to access healthcare. A recent review by Kingdom et al. describes the environmental footprint of pediatric kidney care explicitly, including additional factors unique to this population, and highlights opportunities for improvement [18]. Addressing the ecological impact of pediatric dialysis is critical not only for sustainability but also for reducing the long-term environmental burden of a treatment many children will rely on for years to come. While pediatric nephrologists, healthcare systems, and national and international nephrology societies bear the primary responsibility for sustainable pediatric nephrology, children on kidney replacement therapy and their families can also learn about their role in promoting sustainable care.

IPNA's mission and vision in promoting green nephrology

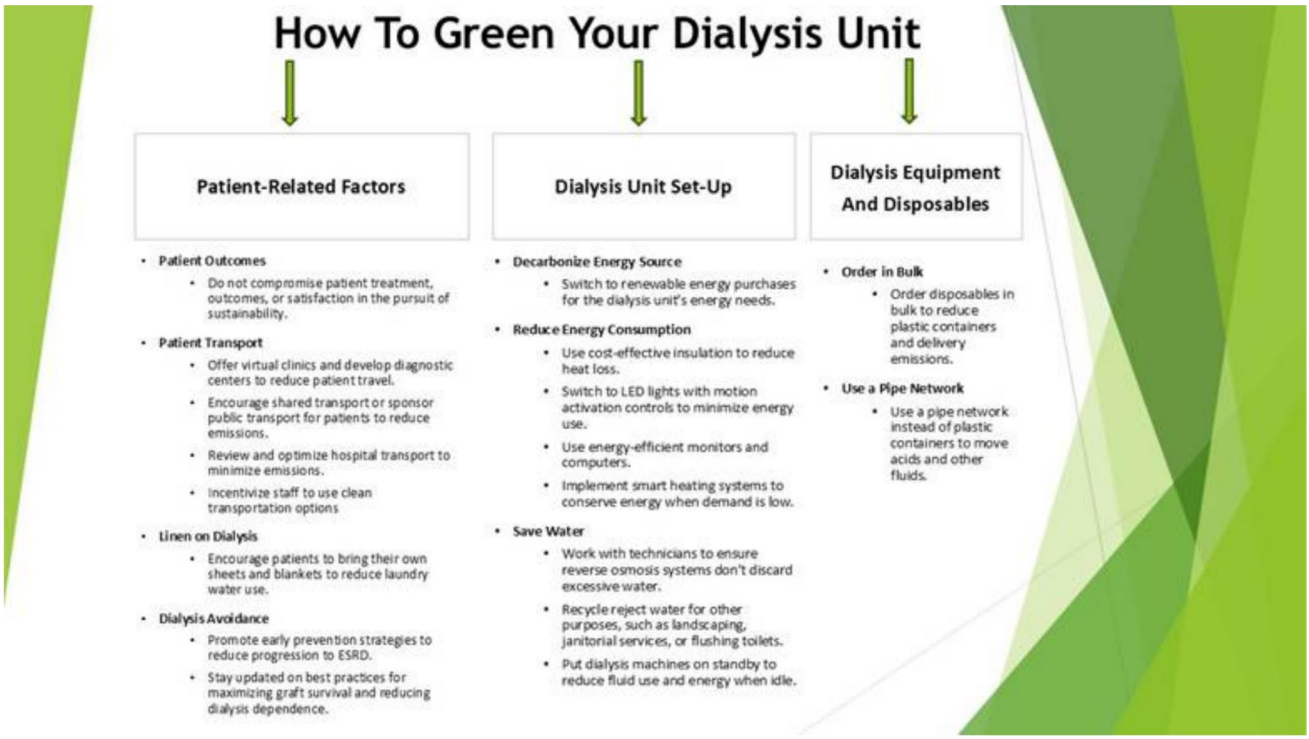
IPNA's mission has long emphasized improving children's kidney health worldwide through education, research, advocacy, and collaboration. Protecting planetary health is intrinsically linked to safeguarding child health, and pediatric nephrologists therefore have a responsibility to consider the long-term environmental impacts of healthcare delivery (Fig. 1).

IPNA's newly launched Green Nephrology Taskforce reflects a deliberate effort to integrate environmental stewardship into the association's core activities. Our Taskforce aims to promote environmentally sustainable, patient-centered pediatric kidney care through global awareness, providing practical tools, and fostering community engagement. The Taskforce brings together pediatric nephrologists and other healthcare professionals from diverse geographic and economic settings, ensuring that global collaboration informs IPNA's strategy and recommendations.

IPNA initiatives to promote WKD and beyond

IPNA is launching an expanding portfolio of coordinated initiatives designed to translate principles into measurable action at the unit, regional, and global levels. Through our "Green Champions" across all IPNA's Regional Societies, these initiatives emphasize inclusivity, feasibility across diverse resource settings, and meaningful engagement of children, families, and all healthcare professionals involved in the care of children with kidney disease. A summary of action points is listed in Table 1.

A first step in this effort is to implement a comprehensive global survey on green nephrology practices in pediatric nephrology and dialysis units. This international survey assesses current practices in water use, energy efficiency, waste management, improving dialysis delivery, heat mitigation strategies, telemedicine utilization, and targeted screening to support early diagnosis and mitigate CKD progression. By systematically capturing real-world practices,



Overview of system-level domains for reducing the environmental impact of dialysis services, addressing transport, energy use and sourcing, water stewardship, dialysis practices, workforce engagement, procurement and financing, prevention pathways, and communication. Figure generated in Microsoft PowerPoint

Fig. 1 How to green your dialysis unit

Table 1 IPNA initiatives to promote WKD and beyond

Assessing current practice
Conduct an international survey of green nephrology practices, water use, energy efficiency, waste management, heat mitigation strategies, telemedicine use, and sustainable screening approaches
Co-create practical tools
Develop a concise "Going Green" Toolkit including: • Green Nephrology Checklist (HD, PD, CKD clinic, transplant clinic) • Patient/family educational materials • Child-friendly graphics • Ready-to-use WKD slides for global IPNA centers
Engage children and families
Organize WKD 2026 activities highlighting the link between climate change and kidney health, including an art/poster contest ("My Kidneys, My Planet")
Expand community awareness
Encourage participation from regional dialysis units, university hospitals, public/private centers, school partners, and hospital administrators to amplify outreach
Assess impact
Collect feedback, photos, participation numbers, and examples of unit-level practice changes for an IPNA report and global dissemination

Summary of strategic activities led by IPNA to advance sustainable nephrology practices, engage children and families, expand community and institutional participation, and assess the impact of green nephrology initiatives during WKD and in ongoing efforts

barriers, and facilitators, IPNA aims to ensure that subsequent recommendations are grounded in relevant data.

In parallel, IPNA is developing a Green Pediatric Nephrology Toolkit designed to provide concise, practical, and adaptable guidance for daily clinical practice. The toolkit includes a structured "Going Green" checklist applicable to hemodialysis, peritoneal dialysis, CKD clinics, and transplant services, addressing water conservation, energy use, plastic and consumable reduction, waste segregation, telehealth integration, heatwave preparedness, and eco-conscious prescribing. Complementary family-facing educational materials, such as infographics, short videos, and interactive digital content, are being developed to empower children and caregivers with actionable



Fig. 2 Green nephrology in children: caring for patients and protecting the planet. Conceptual overview of the IPNA Green Nephrology project proposal, illustrating the integration of environmentally sustainable practices with patient-centered pediatric kidney care through global awareness, practical tools, and community engagement. The figure was created using BioRender.com. Elements from the BioRender library were used and adapted to develop the final illustration. BioRender license number: ER284RZIVO. The original schematic was generated in BioRender and later customized and finalized using CorelDRAW

knowledge on sustainable behaviors. All toolkit components will be intentionally designed to be scalable and feasible in low-, middle-, and high-resource settings (Fig. 2).

Education and community engagement represent another cornerstone of IPNA's sustainability agenda. Green nephrology concepts will be increasingly embedded within IPNA congresses, webinars, and training programs, reinforcing the alignment between environmental sustainability, patient safety, quality improvement, and cost-effectiveness. For WKD 2026, IPNA will coordinate child- and family-centered activities within pediatric nephrology units worldwide, including short interactive educational sessions on climate change, heat stress, hydration, and kidney health.

Impact assessment is integrated throughout the initiative. Participation data, feedback, examples of unit-level practice changes, and survey results will be compiled into a concise global IPNA report and infographic summary, with plans for annual toolkit updates, recognition of green pediatric nephrology units, and integration into ongoing IPNA educational activities. Through this approach, IPNA aims to catalyze a global culture of environmentally responsible pediatric kidney care that is practical and patient-centric.

Practical strategies for green dialysis for children

To advance sustainability in dialysis care, professional societies and dialysis programs increasingly endorse evidence-based strategies that reduce environmental impact across multiple domains, including resource use, waste management, facility design, procurement, clinical practice, and education. Emerging evidence shows that many sustainability measures not only reduce environmental burdens but also deliver cost savings and improved operational efficiency, strengthening the case for widespread adoption. Energy-efficient dialysis machines, optimized heating, ventilation, and air conditioning systems, renewable energy integration, and water reclamation infrastructure are increasingly adopted, with network-wide best practices demonstrating significant resource savings over time. An analysis from dialysis networks implementing green technologies have reported up to a 29.6% reduction in electricity use and a 52% reduction in water consumption per session following facility upgrades [19].

Dialysis machines equipped with automated dialysate flow-matching systems can reduce dialysate use by 8–19% per session without compromising treatment quality, a benefit particularly relevant in pediatric settings, where lower blood flow rates are typically used [20–22]. Over time, these per-session reductions translate to thousands of liters of dialysate saved annually per child. Water conservation is further supported by high-efficiency reverse osmosis systems, which have demonstrated a capital payback in less than 3.3 years through reduced water consumption [23]. Effective waste management through centralized concentrate delivery systems reduced plastic and cardboard waste from 13,617 to 2642 kg annually (an 81% reduction) and hazardous acid waste from 12,100 to 2351 L annually (an 81% reduction) at a single facility [24].

Incremental dialysis, defined as tailoring treatment frequency based on residual kidney function rather than defaulting to a standard three sessions per week, has been associated with a 16% reduction in costs in observational cohorts without increases in mortality or hospitalization [25]. Given that nearly 50% of pediatric patients begin dialysis with meaningful residual kidney function, individualized schedules could offer substantial environmental and quality-of-life benefits [26]. Collectively, these reports underscore that green dialysis in pediatric nephrology is not only feasible but yields measurable ecological, economic, and patient-centered benefits.

Barriers across settings

Implementing green dialysis practices in pediatric nephrology presents several interconnected challenges that demand urgent attention from clinicians, administrators, and policymakers. Economic obstacles pose significant barriers to implementing green dialysis, particularly in resource-limited settings or smaller pediatric units. The upfront costs of introducing sustainable solutions in healthcare settings, such as renewable energy systems, water recycling technologies, or centralized dialysate production, may deter adoption [27]. Pediatric dialysis programs, often serving smaller patient populations than adult units, may face disproportionate financial pressures when investing in such infrastructure [18, 28]. For programs operating with tight budgets, these upfront costs can compete with the immediate need to prioritize direct patient care. To overcome these barriers, priority should be given to economically feasible interventions that address pressing environmental and resource concerns and, where possible, partner with local adult dialysis centers to share water treatment plants for hemodialysis, consumable transport, and waste management systems.

Another challenge is the limited awareness of and focus on sustainability within pediatric nephrology. Many dialysis facilities lack an environmental sustainability strategy or conduct sustainability audits, and only a small percentage provide ecological training to staff [29]. This reflects a broader trend in healthcare where environmental concerns are often considered secondary to delivering immediate patient care [30]. To overcome these barriers, it is essential to reframe sustainability as an integral part of high-quality, patient-centered care, rather than an additional burden.

A call to action

The IPNA is fully committed to driving transformative change, empowering pediatric nephrologists to integrate sustainability into their clinical practice. Achieving environmentally sustainable pediatric nephrology requires coordinated global efforts from healthcare professionals, manufacturers, policymakers, and patients. With WKD 2026 as a springboard for our activities, IPNA will work toward a future in which sustainability is embedded in education and clinical practice, and kidney care causes minimal harm to planetary health.

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Declarations

Ethics approval This article does not contain any studies with human participants or animals performed by any of the authors. Therefore, ethical approval was not required.

Competing interests Rukshana Shroff has consultancy or advisory board relationships with Fresenius Medical Care, Vitaflo, Triomed, and Humacyte; has received honoraria or speaker fees from Fresenius Medical Care, Vitaflo, Amgen, and AstraZeneca; has received research funding or grants from Fresenius Medical Care and Vitaflo; and has received travel support or meeting sponsorship from Fresenius Medical Care, Vitaflo, and Amgen. All other authors declare that they have no competing financial or non-financial interests relevant to the content of this article.

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