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Can Dialysis Be Sustainable? Strategies to Minimize Water Waste and Carbon Emissions

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To the Editor,

Maintenance hemodialysis is lifesaving but demands significant resources resulting in an increasing environmental impact that must be acknowledged. Contemporary hemodialysis requires large amounts of purified water, electrical power and produces substantial plastic and medical waste. Life-cycle studies suggest that one session can use, up to 490 litres of water when accounting for priming, rinsing and reverse osmosis (RO) waste greatly surpassing the daily water use of a single person [1]. Similar analyses from green nephrology initiatives demonstrate that a conventional hemodialysis session may generate more than 300 litres of RO reject water that is commonly discarded [2]. Patients encounter hundreds of liters of dialysate weekly, while 50–70% of the total water is frequently discarded as RO reject, which is typically released straight into drains [3].

Conventional Hemodialysis also generates the substantial carbon footprint. Recent comparative studies indicate that in-centre hemodialysis ranks among the highest in emissions per patient, frequently surpassing 4,800 kg CO_2-equivalent annually. This is largely due to electricity consumption, dialysate manufacture, disposable materials and transportation [4]. These findings have suggested the development of green dialysis and sustainable nephrology discipline aimed at combining patient care with environmental responsibility and resource management [5].

A recent systematic review from the Indian context highlighted that simple measures—such as reusing RO reject water for non-potable purposes (including toilet flushing, gardening, and floor cleaning) and for many non-clinical applications, it should be safely repurposed within hospitals with appropriate plumbing modifications and routine quality checks. A typical Indian dialysis unit running 40 patients per day could save approximately 8,000–10,000 litres daily by reusing RO reject water for non-potable purposes [6]. By optimizing dialysate flow rates—can substantially reduce water wastage without compromising dialysis adequacy. Lowering dialysate flow (Qd) from 500 mL/min to 400 mL/min in stable patients preserves small-solute clearance while reducing overall 20% water and concentrate use [7].

Incremental hemodialysis with specialized peritoneal dialysis protocols may necessitate less resources per dialysis dosage compared to traditional thrice-weekly, high-volume in-center hemodialysis, thus decreasing water usage and emissions [8]. We urge nephrologists, dialysis technologists, hospital administrators, and policymakers to view sustainable dialysis not as an optional add-on, but as an essential dimension of quality and safety. Implementing simple, low-cost strategies in water management, dialysis planning, and staff engagement can conserve essential resources, reduce operational expenses, and support more resilient patient care in a climate-challenged future.

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