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Green Dialysis and its Relevance in Asia

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While human beings are living in abundance at present (with better health and wealth than ever before), we have reached this point by putting relentless pressure on our planet. Our activities are altering the oceans and ecosystems. This is to the extent that the current era has been described as 'Anthropocene'- a new geological age where humans have had the most impact on the planet. Human activities are changing our climate rapidly, with significant changes in CO₂ emissions, global temperatures and melting of ice masses since the 1960s. This has led to the UN intergovernmental panel on climate change (IPCC) calling a 'code red' for humanity.

We have all seen some of the recent impacts of climate change with drought and flood across the globe. The inequity of climate change impact becomes evident when comparing maps showing the regions contributing to highest carbon emissions vs regions most likely to be impacted by climate change. For countries in the South-East Asia region, the effects are likely to impact all countries from glacier melt in the Himalayas that will increase flooding and reduced food and water resources. Endemic diseases like cholera and dengue are expected to rise disproportionately along with scarcity of food and potable water.

In the Republic of Korea for instance, which has one of the highest population densities in the world, air temperature and sea level has risen by 1.5 C and 1-6 mm/year respectively between 1990-2000 with increasing numbers of hot days in Seoul.

Climate change is the biggest global health threat of the 21st century. It is already impacting health in many ways, including by leading to death and illness from increasingly frequent extreme weather events, the disruption of food systems, increases in zoonoses and vector-borne diseases, and mental health issues. These climate-sensitive health risks are disproportionately felt by the most vulnerable and disadvantaged people and communities. We are likely to have an additional 250,000 deaths from 2030-2050 due to CC with very high direct costs to healthcare. Unfortunately, **developing countries are least likely to cope without assistance to prepare and respond**. For instance, the largest climate crisis refugees come from some of the most populated developing parts of the world (such as China, Bangladesh and India).

The climate crisis can also affect renal patients on dialysis. Dialysis units in vulnerable areas need effective climate crisis management plans. Patients in vulnerable areas may need education on early evacuation and always have an emergency kit available.

Climate change may potentially increase episodes of acute kidney injury (via heat stress mechanisms), chronic kidney disease (the CKD-U epidemic), vector borne diseases and kidney stone disease.

If healthcare was a country, it would be the 5th largest greenhouse gas emitter in the world. A large portion of emissions comes from the healthcare supply chain itself. Both hemo and peritoneal dialysis (HD and PD) contribute to environmental issues.

HD is water intensive- a standard 4-hour session can draw up to 500L of mains water. Most reverse osmosis (RO) machines reject 2/3rd of feed water (highly purified). Up to 1 million L per annum can

be sent to the drains in large metro areas. HD uses a lot of energy. For instance, energy use across two HD centres in Melbourne was found to be 12.0 and 19.6 kWh. Each HD session can generate up to 2.5kg of infectious waste per patient which often ends up in landfill. HD also contributes heavily to carbon emissions. While PD uses less power and water than HD, it is a daily therapy so generates more waste overall. Its environmental impact though poorly studied is likely to be large. While data on transplant are lacking, we can assume that while there is a high initial environmental cost compared to HD, this is likely to lessen over time.

Unfortunately, there are increasing numbers of patients with kidney disease and a higher demand for dialysis services. There is a pressing need for purpose build HD centres to minimize environmental impact.

Because of the impact of climate change on kidney disease and the impact of kidney care on the environment, improvements in this sphere should be seen as core business, not just an optional consideration!

Several countries are now taking a serious call to action to try and improve the impact of kidney care on the environment. Utilizing solar power in HD units, repurposing 'reject' water for cleaning/ aquaponics, improving waste segregation and recycling and using biophilic designs are all ways to incorporate changes to improve efficiency and reduce waste in dialysis units.

There is much that we can do to contribute. Apart from reducing the impact of dialysis, slowing the progression of kidney disease, and improving access to transplantation will help reduce the impact of our treatments. Individual dialysis units must focus on gauging their energy/ water usage and waste generation. The renal community needs to collaborate with industry, engineering, and other disciplines to improve R and D (research and development: i.e., develop more efficient dialysis machines, etc). Renal societies across the world (Australia, UK, Canada and now the ERA-EDTA) now have working groups focussing on sustainable kidney care. Japan, Italy and Brazil have put out statements calling for change. The Republic of Korea has prioritized the impact of climate change on vulnerable groups and has enlisted several governmental actions to address this including developing broader public health legislation, enhance disease surveillance and improve emergency preparedness.

Lastly, where can people start in their own units? This could be as simple as educating your team members on this topic, creating awareness, starting a 'green' group within your department, auditing your energy/ water usage and waste generation, conducting projects on green dialysis themes and preferentially using electronic communication and telehealth where possible. Small steps can lead to big changes.

Ultimately, this is a defining period in human history and the time to act is now. There is a bidirectional impact of kidney disease and kidney care on the environment. We are part of the problem, therefore, must also be part of the solution.