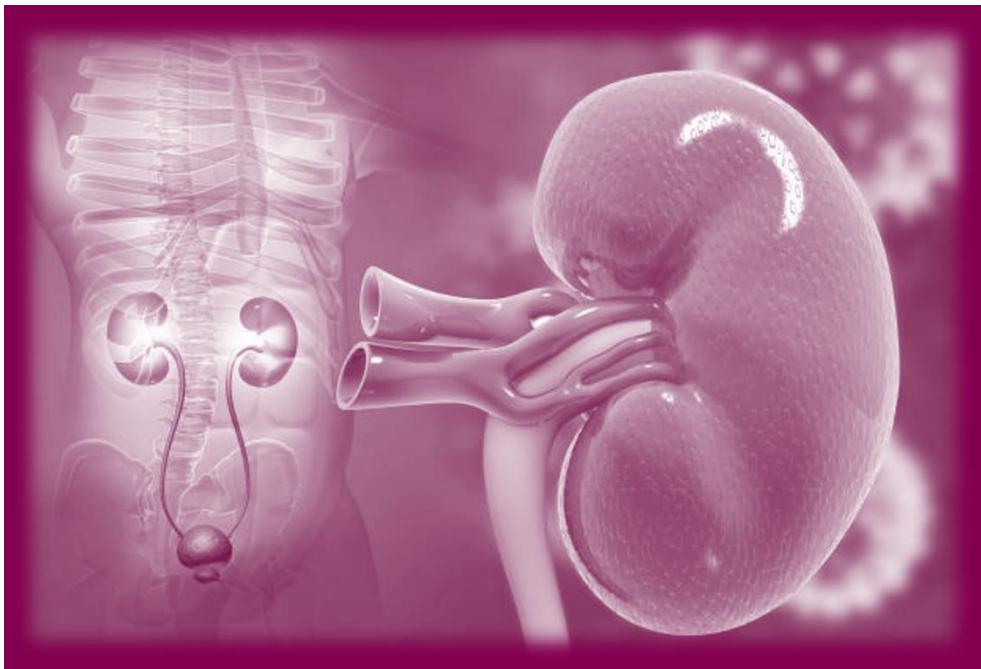


Decarbonisation of CKD treatment in the UAE

A discussion paper



**Sustainable
Healthcare
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Decarbonisation of chronic kidney disease (CKD) treatment in the UAE

Abstract

It is recognised that global health and care systems are undergoing transformative change to adapt to the needs of patients and communities, with increasing pressure to be financially, socially and environmentally sustainable. Appraising the sustainability of care pathways is seen as a crucial step to enabling a more sustainable health system¹.

The UAE has committed to achieve net-zero emissions by 2050² and addressing the impact of healthcare could aid in reaching this target. Chronic kidney disease (CKD) treatment, notably resource-intensive at advanced stages³, poses a substantial healthcare burden and environmental impact within the UAE.

A previous analysis from the SHC⁴ assessed the impact of CKD treatment at a UK population level and showed that reducing the incidence and progression of early stages of CKD can reduce the greenhouse gas (GHG) impact by reducing the need for intensive primary and secondary care interventions.

A similar life cycle assessment (LCA) of all CKD stages in adults in the UAE⁵ has estimated the environmental impact at the patient- and population-level and has confirmed a similar result. This highlights the need to intensify efforts to diagnose and intervene at early stages of CKD to minimise disease progression and reduce the more resource-intensive and environmentally harmful later stages of the disease. Additionally, it signals the significant impact that prevention might have in reducing life-time healthcare emissions by averting CKD at a population level. One important facet of this work emphasizes the role of patient transport and potential improvements in operational sustainability through the adoption of green technologies and energy-efficient practices in the design and delivery of renal replacement treatment (RRT) services to minimize associated emissions.

Whilst there has been good progress in the UAE in some facilities in the delivery of sustainability best practices, the UAE's net zero commitment may be facilitated by continued development and more implementation of sustainable solutions in CKD management. These recommendations are poised to contribute to the UAE's climate action agenda and support the nation's leadership role in COP28, signalling its commitment to a sustainable future for both healthcare and the environment.

The context for CKD

CKD is a disease characterized by progressive kidney damage over a prolonged period, resulting in the accumulation of waste products within the body. CKD is stratified into stages 1 – 5, classified by measuring the concentration of a waste product, creatinine in the blood and from this we derive an estimated glomerular filtration rate (eGFR, expressed in ml/min/1.73m²). The incidence of hospitalisation, medicines prescribed and treatments provided to each patient increases as CKD progresses from stage 1 (eGFR 90+) to stage 5 (eGFR <15). Dialysis is usually needed when patients become symptomatic at stage 5. By studying the treatment pathways associated with each stage of CKD, the GHG impact of CKD treatment can be modelled to illustrate the potential carbon savings offered at a population level.

While haemodialysis (HD) is known to be highly resource-intensive³, patients with early and late stages of CKD also impose a high healthcare resource burden, likely translating into a substantial environmental impact⁷⁻¹⁰.

The UAE Net Zero by 2050 strategic initiative² is a national drive to achieve net-zero emissions

¹ <https://shcoalition.org/sustainable-care-pathways-guidance/>

² <https://emiratesgbc.org/uae-sustainability-initiatives/>

³ In-Centre Haemodialysis at Newcastle upon Tyne Hospital, SHC, 2021

⁴ Environmental impact of the care pathway for chronic kidney disease in the UK, SHC, 2022

⁵ Zoccali et al, Poster, 60th ERA, June 2023

⁶ Internal AstraZeneca report, Burden of chronic kidney disease: UAE, HealthLumen, 2023

by 2050, making the Emirates the first Middle East and North Africa (MENA) nation to do so, and addressing the high impact of healthcare could aid in reaching this target. Despite CKD being recognised as a key area to mitigate environmental impact globally, there is a paucity of analyses on the environmental impact of different modes of treatment and of CKD overall in the UAE. The prevalence of CKD in the total Emirati population (diagnosed and undiagnosed) is projected to increase from 11.3% in 2022 to 12.9% by 2027, and the number of cases requiring dialysis or transplantation could increase by ~30.4% over the same period⁶. The demand on renal services and related GHG impacts will be expected to increase in proportion to this rise.

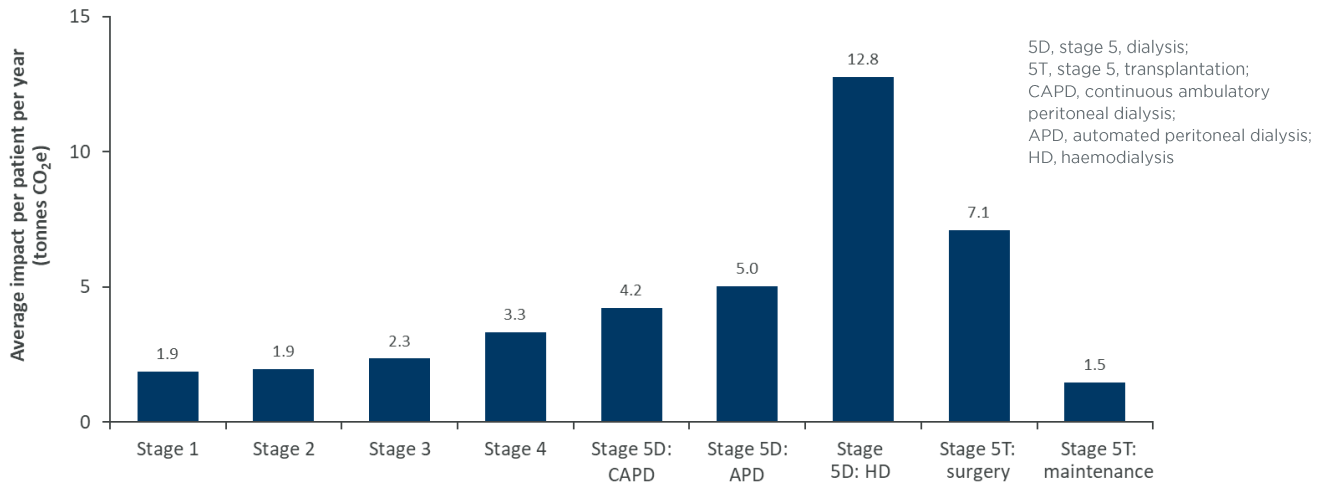
CKD treatment in the UAE

An appraisal of the life cycle assessment (LCA) of all stage of CKD in adults in the UAE⁵ has been performed with the objective of estimating the environmental impact at the patient- and population-level.

The study estimated the environmental impact using the SHC Care Pathway Guidance¹. Health care resource use (HCRU) data and environmental impact data were collected from inventory data and published sources. The carbon footprint of CKD was estimated to give the overall GHG emissions per patient-year spent in each stage of CKD.

The study found that as CKD progresses, per patient carbon emissions increase, with haemodialysis being the largest individual contributor to GHG emissions (Diagram 1). GHG emissions for CKD treatment at each of the stages 1-5 represent an additional 6.8–58.7% of CO₂e on top of the average UAE person’s annual greenhouse gas footprint (21.8 tonnes CO₂e)¹¹.

Diagram 1: In the UAE, as CKD progresses, per patient carbon emissions increase, with haemodialysis the largest contributor

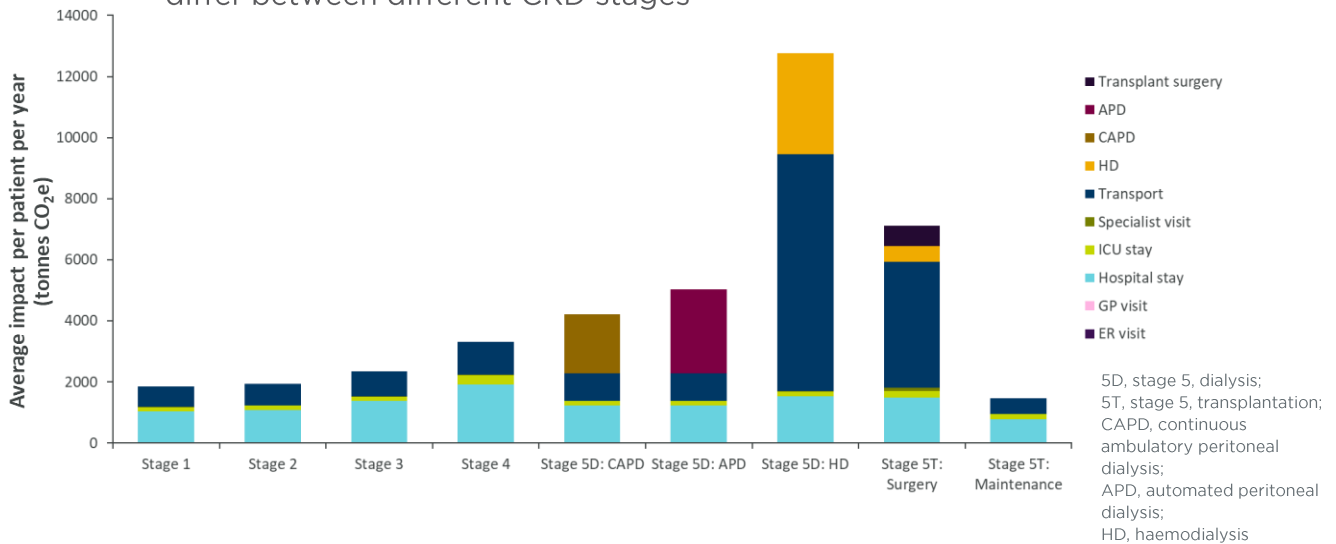


At the patient level, drivers of GHG emissions differ in the CKD stages, but an important healthcare driver of emissions at all stages was patient transport. In stages 1-3, hospitalisations predominate while at the later stages (Stages 4-5), the renal replacement therapy (RRT) modality has a large influence on overall emissions (Diagram 2).

One notable feature is the higher GHG emissions per patient associated with RRT, with emissions from haemodialysis being 450% higher than the treatment of a typical patient in stage 3. This highlights that proactive disease management aiming to slow progression to kidney failure, would likely not only impact disease burden on patients but also reduce GHG emissions from their care.

⁷ Sehgal AR et al. J Am Soc Nephrol. 2022, 33(9):1790-1795
⁸ Connor, A (2010). QJM Monthly Journal of the Association of Physicians, 103(12), 965-975.
⁹ Connor A et al Hemodial Int. 2011 Jan;15(1):39-51
¹⁰ Lim AEK et al. Aust Health Rev. 2013, 37(3):369-74
¹¹ <https://ourworldindata.org/co2/country/united-arab-emirates#per-capita-how-much-co2-does-the-average-person-emit>

Diagram 2: At the patient level, healthcare drivers of CKD treatment-related GHG emissions differ between different CKD stages



Learnings

The clinical, humanistic, and economic burdens of CKD are known to be high, and these studies show it is also associated with high environmental burdens. This is seen across all stages of renal disease, with RRT associated with the highest carbon emissions.

We highlight opportunities to mitigate the environmental impact at all CKD stages with proactive management to prevent and detect CKD, slow progression, avoid hospitalisation and reduce the GHG impact.

Committing effort to early detection and prevention would be expected to have significant impact in reducing life-time healthcare emissions. One significant risk factor for CKD is diabetes. Targeting pre-diabetic and diabetic patients, including through the deployment of digital health programmes to provide earlier detection and diagnosis and to improve management of diabetes would be expected to reduce or delay the onset of CKD and avoid emissions from its treatment. Renal services should be encouraged to enhance their efforts to reduce their resource use¹²⁻¹³ and the design of CKD treatment pathways and services should also consider sustainable transport solutions to mitigate the large contribution that patient transport makes to the overall GHG burden.

The pattern of GHG emissions in CKD show similarities in the UK and UAE and these findings suggest that additional resource allocation specifically directed towards CKD care for emissions and resource reduction can be applicable to health care systems globally to assist in the drive towards net zero.

Acknowledgements

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Disclaimer: This case study has been prepared by the Sustainable Healthcare Coalition, of which AstraZeneca is a member. AstraZeneca has provided the data and output from the LCA study performed by Maverex referenced in this report and does not guarantee the reported outcomes.

¹² [12 steps to green a kidney unit](#), UKKA, CSH & SHC, June 2023

¹³ [In-centre haemodialysis at Newcastle upon Tyne Hospital](#), SHC, June 2022