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Inside CKD: Modeling the Future Global Burden of Chronic Kidney Disease in Patients with Type 2 Diabetes: Results from the UK and the US

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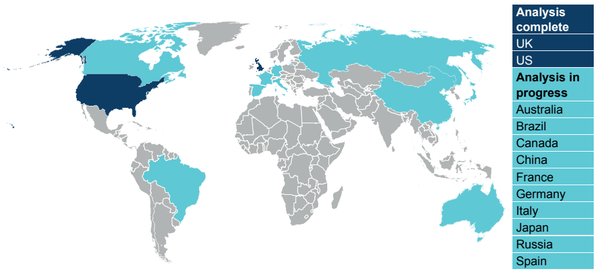
Introduction

- Chronic kidney disease (CKD) is a debilitating, long-term condition which can have a significant effect on patients' quality of life.[1]
- With an estimated global prevalence of approximately 10%,[2] and owing to the substantial healthcare costs and resource use associated with the management of CKD and in particular end-stage kidney disease,[3] the condition presents a significant public health concern.
- Type 2 diabetes (T2D) is an established risk factor for CKD, and up to 40% of patients with T2D have CKD.[4]
- Understanding future trajectories of CKD prevalence, progression and outcomes in patients with T2D is important for health policy planning.
- *Inside CKD* aims to project the global burden of CKD by using country-specific, patient-level microsimulation modelling.
  - In the current analysis we have used the *Inside CKD* microsimulation to model trajectories of the prevalence of CKD concomitant with T2D from 2021 to 2026.

Methods

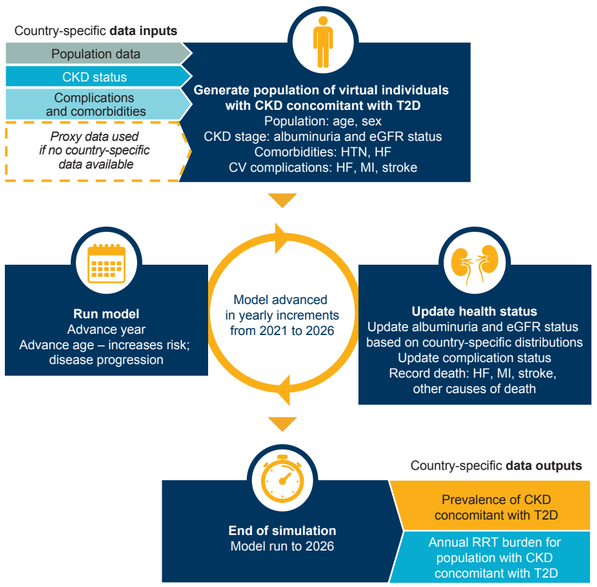
- Here, we present the projected epidemiological burden of CKD in patients with T2D for two countries for which the analysis is complete (the UK and the US; **Figure 1**).
- The *Inside CKD* microsimulation model uses validated software developed by HealthLumen (London, UK) to model the global burden of CKD (**Figure 2**).
- We constructed virtual populations representative of the general populations of each country using data from country-specific national surveys and relevant published data.

Figure 1. Countries included in the *Inside CKD* microsimulation model.



- These data included demographics, prevalence of CKD and comorbidities (uncontrolled hypertension and heart failure), and incidence of complications (heart failure, myocardial infarction and stroke).
- Virtual populations for the UK were constructed using data from the Office for National Statistics[5] and the Health Survey for England 2016.[6]
- Virtual populations for the US were constructed using data from the US Census Bureau[7] and the US National Health and Nutrition Examination Survey.[8]
- If input data were unavailable, a predefined algorithm was used to identify suitable proxy data.
- CKD stages were defined according to Kidney Disease: Improving Global Outcomes (KDIGO) 2012 recommendations, using estimated glomerular filtration rate (eGFR) and albuminuria status.[9]
  - Stage 5 CKD included patients undergoing renal replacement therapy (RRT) with dialysis (any modality) or renal transplant.

Figure 2. Overview of the *Inside CKD* microsimulation model.



CKD, chronic kidney disease; CV, cardiovascular; eGFR, estimated glomerular filtration rate; HF, heart failure; HTN, hypertension; MI, myocardial infarction; RRT, renal replacement therapy; T2D, type 2 diabetes.

Results

Prevalence of CKD

- From 2021 to 2026, the population of patients with CKD concomitant with T2D is projected to increase from 1.76 M to 1.87 M in the UK and from 14.4 M to 15.3 M in the US.
- Independent of aging, the prevalence of CKD concomitant with T2D is projected to increase in both countries from 2021 to 2026 (5.8% increase in the UK and the US; **Figure 3**).
  - The profile of CKD cases by stage is also projected to change over time, with increases in the proportion of later-stage disease (CKD stages 3b–5; **Figure 3**).

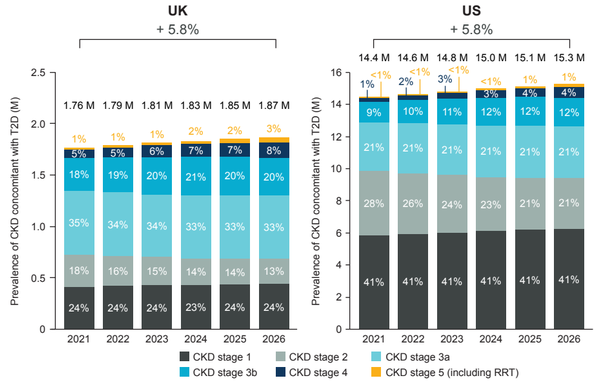
Renal Replacement Therapy

- From 2021 to 2026, the prevalence of RRT cases in patients with T2D is projected to increase from 14 438 to 16 582 in the UK and from 203 913 to 217 838 in the US.
- The breakdown of projected annual RRT burden stratified by treatment modality is presented in **Figure 4**.

Limitations

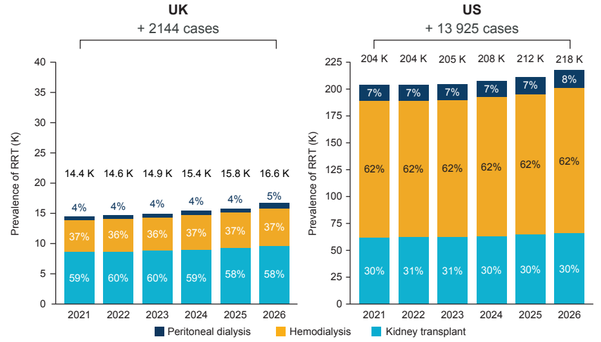
- Model inputs, outputs and assumptions are subject to additional review and update as part of a global model standardization; model outputs presented here should therefore be considered preliminary in nature.
- Projections presented here assume no major changes in the management of CKD (e.g. reimbursement, technology or intervention policy) over the projection period.

Figure 3. Projected annual increase in prevalence of CKD concomitant with T2D from 2021 to 2026 by CKD stage.



Owing to rounding, the sum of percentages may not equal 100%.
CKD; chronic kidney disease, T2D, type 2 diabetes.

Figure 4. Projected annual increase in prevalence of RRT from 2021 to 2026 for patients with CKD concomitant with T2D.



CKD, chronic kidney disease; RRT, renal replacement therapy; T2D, type 2 diabetes.

Conclusions

- The *Inside CKD* microsimulation model predicts that the prevalence of CKD concomitant with T2D will increase by 5.8% in both the UK and the US from 2021 to 2026, with a trend towards increased prevalence of more advanced CKD stages (3b–5).
- Additionally, the prevalence of RRT in patients with CKD concomitant with T2D will also continually increase over the same time period in these two countries.
- Together, these projections indicate that CKD in patients with T2D will pose a substantial challenge for public health and underline the need for interventions to increase early diagnosis and delay disease progression.

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Disclosures

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