After T2D, CKD and HF aren't separate risks. Here's why

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> Clinicians have long known that type 2 diabetes raises the risk of both chronic kidney disease (CKD) and heart failure (HF), but the order in which these complications tend to arrive, and what that first complication predicts about the second, has been surprisingly poorly mapped. A new analysis presented at the EASD Annual Meeting in Milan puts real numbers on that sequence, using data from more than 1.6 million patients.

KEY TAKEAWAYS

- The Pivot: CKD and HF are not independent risks after a type 2 diabetes diagnosis, whichever arrives first sharply raises the five-year risk of the other.
- The Data: CKD-first risk was 19.0% versus 8.3% for HF-first, but the risk of CKD after HF (42.0%) was nearly double the risk of HF after CKD (22.7%).
- The Action: A type 2 diabetes diagnosis alone should trigger proactive surveillance for both organs, not sequential screening that waits for the first complication to appear.

The analysis, part of the observational CALOR study programme, drew on Optum's de-identified Clinformatics Data Mart Database in the United States, with UK and Japan data collection ongoing. Researchers used a semi-Markov multi-state model to track adults from the point of a new type 2 diabetes diagnosis, estimating the five-year risk of developing CKD first or HF first, the risk of the alternate complication within five years of the first, and the composite risk of CKD, HF or death at five and ten years.

Data from 1,617,508 patients newly diagnosed with type 2 diabetes were analysed. Mean age was 59.3 years (SD 14.5) and 51.3% were female. Diagnosed dyslipidaemia was present in 72.2% of patients and hypertension in 68.4%, a baseline risk profile that helps explain how quickly complications followed.

CKD arrives first more than twice as often as heart failure

Within five years of a type 2 diabetes diagnosis, the risk of developing CKD first was 19.0% (95% CI 18.9-19.1), more than double the 8.3% (95% CI 8.2-8.4) risk of developing HF first. That asymmetry matters for how early screening is prioritised: on this data, a newly diagnosed patient is substantially more likely to show kidney involvement before any sign of heart failure than the reverse.

The picture changes once one complication has already occurred. Among patients who developed HF first, the five-year risk of subsequently developing CKD was 42.0% (95% CI 41.6-42.5), roughly five times higher than the population-wide first-five-year CKD risk. Among patients who developed CKD first, the five-year risk of subsequently developing HF

was 22.7% (95% CI 22.5-23.0), also substantially higher than the first-five-year HF risk. In other words, whichever complication shows up first, it sharply raises the odds of the other following.

The combined burden over a decade

Looking at the composite outcome of CKD, HF or death, the risk was 32.9% (95% CI 32.8-33.0) at five years and 55.1% (95% CI 54.9-55.3) at ten years from the type 2 diabetes diagnosis. That means, on this data, more than half of newly diagnosed patients experience at least one of these outcomes within a decade.

The authors frame this as evidence for early, proactive and comprehensive management from the point of diagnosis, rather than waiting for the first complication to trigger cardiorenal-specific screening. The study was funded by AstraZeneca, a maker of both SGLT2 inhibitor and GLP-1 receptor agonist therapies used in cardiorenal protection.

The CALOR study's findings underscore a critical need for integrated cardiorenal risk management in patients with type 2 diabetes (T2D) from the outset. The observed high incidence of CKD preceding HF, and the substantial increase in risk for the alternate complication once one has manifested, challenges traditional siloed approaches to managing these conditions. Clinicians should consider these interdependencies when developing screening protocols and treatment strategies, moving beyond a reactive stance to a proactive, preventative paradigm.

The study's reliance on a large, de-identified administrative claims database provides robust real-world evidence, reflecting a broad patient population encountered in routine clinical practice. However, this methodology inherently carries limitations. Diagnostic codes may not always perfectly capture clinical severity or nuances, and the absence of detailed laboratory values or imaging results could limit the precision of CKD and HF diagnoses compared to prospective clinical trials. Furthermore, the observational nature of the study precludes definitive conclusions about causality, although the temporal sequence of events strongly suggests a progressive disease trajectory. Unmeasured confounders, such as socioeconomic status, adherence to medication, or specific lifestyle interventions, could also influence the observed risks.

Implications for Clinical Practice: A Unified Cardiorenal Approach

The CALOR study provides compelling evidence for a paradigm shift in the management of type 2 diabetes, advocating for a unified cardiorenal approach rather than sequential management of complications. The finding that over half of newly diagnosed T2D patients will experience CKD, HF, or death within a decade necessitates early and aggressive risk mitigation strategies. This means moving beyond glycemic control alone to actively screen for and manage cardiorenal risk factors from the point of T2D diagnosis, rather than waiting for the emergence of overt organ damage.

Specifically, the data supports intensified screening for CKD, given its higher incidence as the initial complication. Regular assessment of estimated glomerular filtration rate (eGFR) and urine albumin-to-creatinine ratio (UACR) should be standard practice in all T2D patients, even those without overt symptoms. Similarly, while HF may present later, the high subsequent risk once CKD is established highlights the importance of monitoring for cardiac symptoms and

signs. The study reinforces the value of therapies with proven cardiorenal benefits, such as SGLT2 inhibitors and GLP-1 receptor agonists, which have demonstrated efficacy in reducing the risk of both CKD progression and HF events in T2D patients. Their early initiation, especially in patients with established cardiovascular disease or CKD, is strongly supported by guidelines and now by this real-world observational data.

However, it is crucial to acknowledge that while the study highlights the interconnectedness of these conditions and the need for early intervention, it does not prescribe specific treatment algorithms. Clinical decision-making must still be individualized, considering patient comorbidities, contraindications, and shared decision-making. The study also does not differentiate between various phenotypes of heart failure (e.g., HFpEF vs. HFrEF), which may have different underlying pathophysiologies and treatment responses. Future research, including interventional studies, is needed to further refine optimal screening intervals and therapeutic strategies tailored to specific risk profiles within the T2D population.

Ultimately, the CALOR study serves as a powerful reminder that type 2 diabetes is a systemic disease with profound implications for both kidney and heart health. Healthcare professionals should integrate these findings into their clinical practice, fostering a proactive, multidisciplinary approach that prioritizes early detection, comprehensive risk assessment, and the timely implementation of evidence-based therapies to mitigate the devastating burden of cardiorenal complications.

> **CLINICAL IMPLICATIONS**
> For clinicians managing newly diagnosed type 2 diabetes, this data argues against a wait-and-screen approach to cardiorenal complications. The steep rise in CKD risk after an HF diagnosis, and the meaningful rise in HF risk after a CKD diagnosis, suggests that the appearance of either complication should prompt active surveillance for the other, not just management of the one that presented.
> The size of the dataset, over 1.6 million patients, gives these estimates real statistical weight, though the analysis is observational and US-based (with UK and Japan data still pending), and diagnosis codes and eGFR criteria for CKD may under- or over-capture true incidence depending on local testing patterns.
> Given the funding source, the findings should be read alongside the trial evidence for SGLT2 inhibitors and GLP-1 receptor agonists in cardiorenal protection, rather than as a standalone case for any specific drug class, the abstract itself makes no treatment recommendation.

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REFERENCES

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