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Review Article

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Chronic Kidney Disease in Type 2 Diabetes: A Narrative Review of SGLT2 Inhibitor Uptake and the Gap Between Guideline and Prescription

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Abstract

Sodium-glucose cotransporter 2 inhibitors slow the progression of chronic kidney disease in type 2 diabetes, and guidelines recommend them for that indication. Prescribing does not follow. In a cohort of 1,443,403 people with chronic kidney disease, 14.8 per cent were prescribed one, falling to 1.8 per cent among those with kidney disease alone. In England, among 587,826 people with type 2 diabetes, 19.9 per cent of those at high cardiovascular risk had a current prescription against 20.2 per cent of those at low risk, so the indication made no difference to whether the drug was given. One finding reframes the problem: at a tertiary centre, 83.4 per cent of patients documented as guideline-eligible received appropriate therapy, but only 1.6 per cent of the diabetes population had eligibility recorded at all. Disparities are consistent across countries, with women, older patients, Black patients and people in more deprived areas less likely to be treated. This review examines where the gap actually lies.

Keywords: *SGLT2 inhibitors; Chronic kidney disease; Guideline implementation; Prescribing disparities; Type 2 diabetes*

Introduction

Chronic kidney disease affects a substantial minority of people with type 2 diabetes and is a principal driver of morbidity, dialysis and cardiovascular death [1,2]. Sodium-glucose cotransporter 2 inhibitors slow its progression, with randomised trials demonstrating benefit in diabetic kidney disease and subsequently in chronic kidney disease irrespective of diabetes status [3,4,5,20,21]. Collaborative meta-analysis of the large placebo-controlled trials confirms the kidney benefit across diabetes status [20], and a scientific workshop set out the implications for practice [22].

Guidelines from the diabetes, cardiology and nephrology societies recommend these agents for people with type 2 diabetes and chronic kidney disease, and the recommendations are neither recent nor equivocal [6,7,8,19]. National analyses of eligibility have quantified how many people meet the criteria [23], and prescriber patterns shifted after regulatory labelling changes [24].

Uptake has nonetheless been modest. This review examines how large the shortfall is, which patients are affected, and whether the evidence supports the usual explanation that clinicians are reluctant to prescribe.

Eligibility: Studies were included if they reported prescribing rates in defined populations with an indication for treatment, or examined factors associated with receiving or not receiving it. Trial reports are cited to establish the indication and are identified as such.

Material and Methods

Search strategy: PubMed and the archives of the major diabetes, nephrology and health services research journals were searched for studies of prescribing patterns for these agents. Search terms combined SGLT2 inhibitor with uptake, prescribing, guideline implementation, chronic kidney disease and disparities. Reference lists of the principal population studies [9,10] were screened by hand for primary sources.

Data extraction and handling: Setting, data source, the population denominator and the reported rate were extracted as published. The denominator is stated alongside every rate, because uptake calculated among all people with diabetes, among those with a recorded indication, and among those documented as eligible produce markedly different figures from the same underlying practice. This review reports measured prescribing patterns and does not constitute guidance on the prescription of any medicine to any individual. No pooling or re-analysis was performed. Figures 1 to 6 and Tables 1 to 3 reproduce published values only. This is a narrative synthesis and was not registered as a systematic review.

Results

Uptake in a large kidney disease cohort: Real-world data on 1,443,403 people with chronic kidney disease found that 14.8 per cent overall were treated with one of these agents. Use ranged from 1.8 per cent among those with kidney disease alone to 24.3 per cent among those with kidney disease, type 2 diabetes and heart failure together (Figure 1). Across all comorbidity groups, approximately half were prescribed a renin-angiotensin system inhibitor [9].

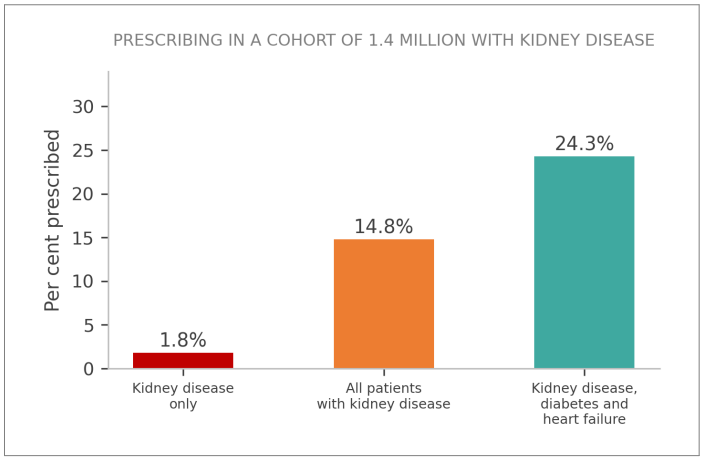

Figure 1: Prescribing by comorbidity in a cohort of 1.4 million with kidney disease [9]

The finding that should not occur: A population-based cross-sectional study of 587,826 people with type 2 diabetes in England examined current prescriptions in September 2023 by cardiovascular category. Prescribing was 19.5 per cent for those with cardiovascular disease, 29.4 per cent for those with heart failure and 30.5 per cent for those with both. For people at high cardiovascular risk it was 19.9 per cent, and for those at low risk 20.2 per cent (Figure 2) [10].

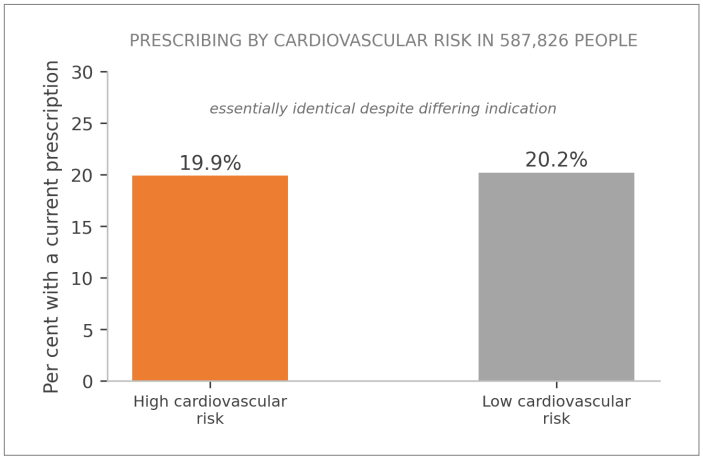

Figure 2: Prescribing by cardiovascular risk category in 587,826 people [10]

Change over time from a low base: A retrospective study of commercially insured patients between 2015 and 2019 found that 8.7 per cent of people with type 2 diabetes received one of these agents, rising to 11 per cent over four years of follow-up. Among those with cardiovascular or kidney disease the rates were lower: from 1.9 to 7.6 per cent in heart failure with reduced ejection fraction, 3.0 to 9.8 per cent in atherosclerotic disease and 2.1 to 7.5 per cent in chronic kidney disease (Figure 3) [11].

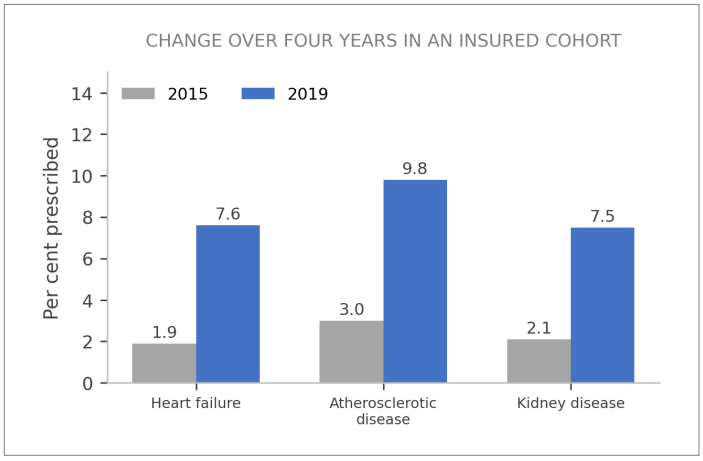

Figure 3: Change over four years in a commercially insured cohort [11]

Where higher rates have been achieved: A German university hospital cohort of 19,684 people, mean age 70.3 years and 36.8 per cent female, reported guideline-adherent therapy rising from 10.2 to 48.7 per cent among those eligible for organ-protective treatment. Uptake was lowest in those with type 2 diabetes and chronic kidney disease at 32.5 per cent and highest in those with all three cardiorenal comorbidities at 63.9 per cent (Figure 5). Use of this drug class was 44.7 per cent, of glucagon-like peptide-1 receptor agonists 9.5 per cent, and combination therapy 5.5 per cent [12].

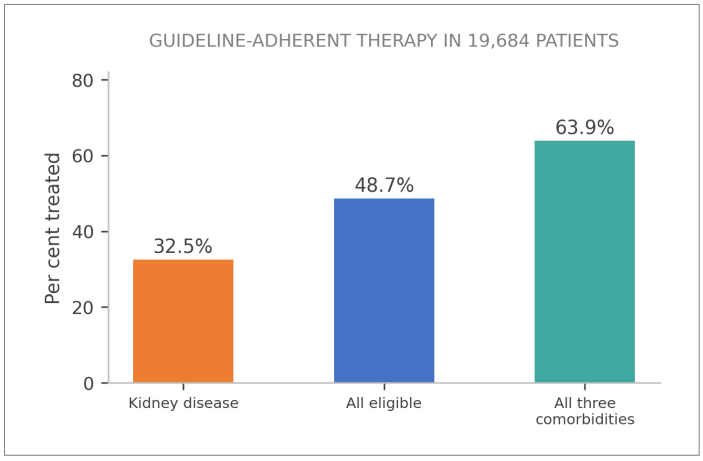

Figure 5: Guideline-adherent therapy in a cohort of 19,684 patients [12]

Recognition against prescribing: A retrospective analysis at a tertiary academic hospital classified patients aged 65 and over with type 2 diabetes and documented atherosclerotic disease, heart failure or chronic kidney disease as guideline-eligible. Among the 223 patients so identified, 83.4 per cent received one of these agents or a glucagon-like peptide-1 receptor agonist. However, those 223 represented only 1.6 per cent of the 14,146 older adults with diabetes in the record, and overall uptake in that population was 7.4 per cent (Figure 4). The investigators concluded that the comorbidities were underdiagnosed or incompletely recognised rather than that prescribing was inappropriate [13].

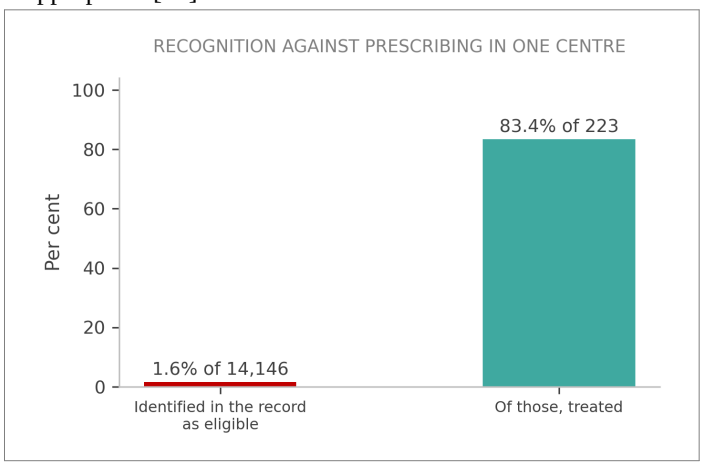

Figure 4: Recognition of eligibility against prescribing in one centre [13]

Setting	Denominator	Reported uptake
US kidney disease cohort [9]	1,443,403 with kidney disease	14.8% overall
Same cohort [9]	Kidney disease alone	1.8%
England [10]	587,826 with type 2 diabetes	19.5% to 30.5% by group
US insured cohort [11]	Type 2 diabetes, 2015 to 2019	8.7% rising to 11%
German hospital [12]	Eligible for organ protection	10.2% rising to 48.7%
Tertiary centre [13]	Documented eligible	83.4% of 223

Table 1: Reported uptake by setting and denominator, as published by the original investigators

Who is less likely to receive treatment: Across these studies the same groups appear. In England, uptake was lower in people aged over 60, in women, in Black people and in those living in areas of greater deprivation [10]. In the insured cohort, Black patients, women and those of lower socioeconomic status were less likely to be prescribed [11]. In the German cohort, female sex was the most prominent difference between treated and untreated groups [12]. In the tertiary centre, older age, female sex and unmarried status were associated with lower odds, while patients seen in cardiology or internal medicine had higher odds than those in primary care (Figure 6) [13].

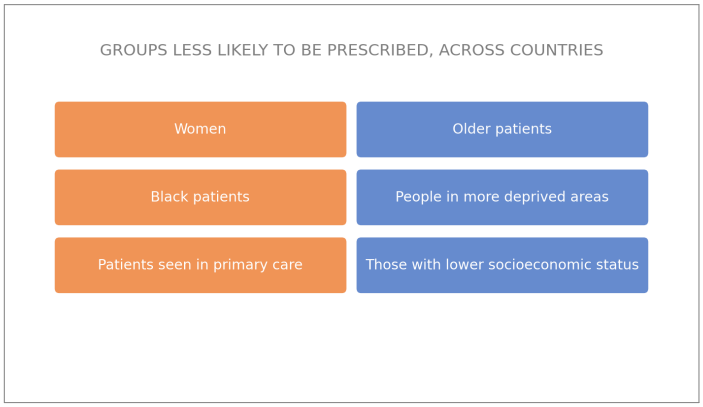

Figure 6: Groups less likely to be prescribed, consistent across countries [10,11,12,13]

Characteristic	Direction	Reported in
Female sex	Lower uptake	England, US, Germany, tertiary centre
Older age	Lower uptake	England, tertiary centre
Black ethnicity	Lower uptake	England, US insured cohort
Greater deprivation	Lower uptake	England
Seen in primary care	Lower uptake	Tertiary centre

Table 2: Characteristics associated with lower prescribing across settings [10,11,12,13]

The same pattern appears more starkly in the insured cohort, where uptake among people with kidney disease reached 7.5 per cent against 11 per cent for type 2 diabetes overall [11]. Uptake was lower in exactly the group with the strongest evidence of benefit. That is not underuse in the ordinary sense; it is misallocation.

Possible explanation	What the evidence suggests
Clinicians decline to prescribe	Not supported where eligibility was documented [13]
Eligibility is not recognised	Only 1.6% had it recorded in one centre [13]
Cost or access constrains use	Uptake differs by deprivation and insurance [10,11]
Specialty determines prescribing	Cardiology and internal medicine higher [13]
Uptake is simply rising slowly	48.7% reached in one centre over time [12]

Table 3: Candidate explanations for the shortfall and what bears on each

Discussion

One result in this literature is genuinely anomalous and deserves to be the starting point. In England, 19.9 per cent of people at high cardiovascular risk and 20.2 per cent at low risk had a current prescription [10]. If prescribing were being driven by indication, those numbers would differ substantially. That they are indistinguishable suggests the drug is being given for reasons largely unrelated to the risk profile it is meant to address, most plausibly for glycaemic control in the ordinary sequence of diabetes management.

The tertiary centre analysis reframes the problem and is the most useful study here. When patients were correctly identified as having atherosclerotic disease, heart failure or chronic kidney disease, 83.4 per cent received appropriate therapy [13]. Clinicians in that setting were not reluctant. But only 1.6 per cent of the diabetes population had such a comorbidity documented, which is far below any plausible true prevalence [1,2,13,30,31]. Testing for kidney disease among at-risk adults is itself incomplete: national laboratory and primary care data show albuminuria is frequently not measured [32,33,34], and early identification has been the subject of a dedicated controversies conference [32]. If that finding generalises, the intervention required is not prescriber education but systematic recording of kidney function and albuminuria [33,34], which is a different and cheaper problem.

Two caveats belong with that reading. The tertiary centre study involves 223 identified patients in a single institution, and documentation practices vary enormously between systems, so the 1.6 per cent figure should not be transferred [13]. And the German cohort shows that where eligibility was ascertained systematically, uptake still reached only 48.7 per cent, and 32.5 per cent among those with kidney disease [12]. Recognition is therefore part of the explanation rather than all of it.

The disparities are the least ambiguous finding and the most uncomfortable. Women, older patients, Black patients and people in more deprived areas were less likely to receive treatment, and this appeared independently in England, the United States and Germany [10,11,12,13]. Consistency across health systems with very different financing arrangements argues against a purely economic explanation and towards something in how risk is assessed and acted on [17,25]. Comparable disparities have been documented in the prescription of other agents in kidney disease [16,28], in kidney disease care generally [27], and among insured older adults specifically [25,26]. These are also the groups with higher rates of the kidney disease the drugs are intended to treat [1,14].

Study limitations

The limitations belong to the underlying literature. All these estimates come from routinely collected records or claims, in which eligibility is inferred from coding rather than assessed clinically, so both numerator and denominator are approximate [9,11]. Rates calculated over different denominators are not comparable, and the difference between 7.4 and 83.4 per cent in a single study illustrates how much the choice of denominator determines the headline [13]. Contraindications, intolerance and patient declining are generally not recorded, so some apparent non-prescribing is appropriate [12,15,18]. Studies of barriers to initiation describe intolerance, eGFR thresholds and competing priorities among the reasons recorded [15]. The English analysis is a cross-section at one date and cannot describe trajectories in individuals [10]. Several cohorts are single-centre or single-insurer and are not representative [12,13]. Prescribing has risen throughout the period these studies cover, so figures date quickly [11,12]. And none of these studies links prescribing to outcomes, so the clinical cost of the shortfall is inferred from trial effect sizes rather than measured [3,4,5,19,29].

Conclusion

Sodium-glucose cotransporter 2 inhibitors are prescribed to a minority of people with type 2 diabetes and chronic kidney disease, at 14.8 per cent in a cohort of 1.4 million and as low as 1.8 per cent where kidney disease is the only indication. The most revealing figures are not the low ones but the flat ones: in England, high and low cardiovascular risk produced almost identical prescribing, which means indication was not driving the decision. Where eligibility was properly documented, 83.4 per cent of patients were treated, while only 1.6 per cent had eligibility documented at all. On that evidence the shortfall is substantially a failure to recognise who qualifies rather than a refusal to treat them, and the consistent disadvantage of women, older, Black and poorer patients across three health systems is the part least explicable by either.

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Conflict of Interest

The authors declare no competing interests.

Ethics Statement

This article reviews previously published studies only. No new patient data were collected and no participants were recruited, so ethical approval was not required.

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