CONSENSUS ARTICLE

SGLT2 Inhibitors in the Primary Health Care Setting: Consensus, Challenges, and Clinical Use

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ABSTRACT

Sodium-glucose co-transporter 2 (SGLT2) inhibitors represent a major advancement in the pharmacological management of type 2 diabetes mellitus (T2DM), with robust evidence demonstrating benefits beyond glycemic control. They offer additional health benefits such as lowering the risk of heart failure hospitalizations, slowing chronic kidney disease (CKD) progression, and improving cardiovascular, renal, and metabolic health. The effective use of SGLT2 inhibitors also relies on comprehensive patient education and counseling. Patients must understand the medication's benefits, such as reducing blood sugar and preventing complications, and be instructed to stop the medication during acute illnesses or surgeries. It is vital to advice against discontinuing use without medical guidance due to potential risks. Routine check-ups for clinical status, blood glucose, and kidney-heart function are essential for safety and effectiveness. However, the application of SGLT2 inhibitors in primary care settings in rural India, specifically in Jharkhand, is low due to high costs, lack of provider awareness, insufficient monitoring systems, and treatment hesitance. Furthermore, no peer-reviewed data is available to assess their use in this region. Hence, a structured questionnaire was created by expert groups and distributed to endocrinologists, cardiologists, and general physicians. Using the DELPHI methodology, consensus statements were formed based on evidence and reviewed by 12 experts from India. Statements that garnered over 65% agreement in discussions were included in the final consensus. The consensus emphasized that SGLT2 inhibitors benefit T2DM, heart failure, and CKD, with safe, structured use and integration into primary care being key to maximizing cardio-renal-metabolic outcomes.

Keywords: Sodium-glucose cotransporter 2 inhibitors, type 2 diabetes mellitus, heart failure, chronic kidney disease, multiple metabolic benefits

Diabetes mellitus (DM), particularly type 2 diabetes mellitus (T2DM), is a progressive metabolic disorder with far-reaching consequences that extend well beyond glycemic dysregulation[1]. Among its most devastating complications are cardiovascular disease (CVD) and chronic kidney disease (CKD), both of which contribute significantly to increased morbidity and premature mortality. Despite substantial advancements in diabetes care over the past two decades, the residual cardiorenal risk in patients with T2DM remains unacceptably high. This underscores the need for therapies that not only control blood glucose but also mitigate end-organ damage[2].

The prevalence of diabetes among adults aged 45 years and older in India is growing and found to be 19.8%, affecting over 50 million individuals. A national survey of 1.65 million adults showed that 74.2% of those with diabetes were diagnosed, 59.4% were on treatment, and 65.5% achieved glycemic control highlighting gaps in effective management[3].

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A recent analysis by Kothari et al (2025) examined anti-diabetic prescribing patterns and found that metformin remained the mainstay of therapy, prescribed in 95.9% of cases, often combined with glimepiride (47.1%), with the glimepiride + metformin combination being most common (43.3%). Insulin, mainly biphasic, was used in 6.6% of patients. Nearly all prescriptions were generic, with 98.3% listed in the National List of Essential Medicines. These findings reflect current treatment practices in India and highlight the need to broaden access to effective therapies to improve glycemic control nationwide[4].

In this context, sodium-glucose co-transporter 2 (SGLT2) inhibitors have emerged as a transformative class of agents that extend well beyond traditional glycemic benefits. Initially developed as oral hypoglycemic agents, SGLT2 inhibitors have demonstrated robust cardiovascular and renal protective effects in multiple large-scale randomized controlled trials[5].

SGLT2 inhibitors bridge the gap between diabetes and cardiovascular care by improving glycemic control and reducing cardiovascular events and heart failure risk. In addition to glucose regulation activity and diuretic effects, SGLT2 inhibition supports endothelial function and vasodilation, helping the heart utilize energy more efficiently and maintain its pumping ability.

They support vascular function by improving endothelial activity, promoting vasodilation, optimizing myocardial energy metabolism, and preserving heart muscle contractility[6]. These agents also limit myocardial injury during ischemia and reperfusion, while their anti-inflammatory actions enhance left ventricular performance, lower the risk of arrhythmias, and reduce infarct size. Because of these combined benefits, SGLT2 inhibitors show therapeutic potential across several cardiovascular conditions, including coronary syndromes, arrhythmias, valvular disorders, cardiomyopathies, cancer-related cardiac complications, and cerebrovascular disease[7].

The landmark EMPA-REG OUTCOME trial was the first to report significant reductions in major adverse cardiovascular events (MACE), cardiovascular mortality, and hospitalization for heart failure with empagliflozin in patients with T2DM and established CVD. These findings were subsequently supported by the CANVAS Program (canagliflozin), DECLARE-TIMI 58 (dapagliflozin), collectively shifting the therapeutic paradigm in T2DM management from a glucose-centric approach to one focused on organ protection[5].

Furthermore, emerging evidence has shown that the benefits of SGLT2 inhibitors transcend the diabetic population, with significant improvements in heart failure outcomes and CKD progression observed in individuals with and without diabetes. Notably, trials such as DAPA-HF, EMPEROR-Reduced, and DAPA-CKD have expanded the clinical utility of SGLT2 inhibitors into the realms of heart failure with reduced ejection fraction (HFrEF) and CKD, regardless of glycemic status[1].

The mechanisms underlying these pleiotropic benefits are multifactorial. Beyond glycemic control, SGLT2 inhibitors promote natriuresis, diuresis, reduction in intraglomerular pressure, attenuation of oxidative stress and inflammation, improvement in vascular stiffness, and modulation of neurohormonal pathways, all of which contribute to their cardiorenal protection[5,8,9].

Despite the well-established pleiotropic mechanisms of SGLT2 inhibitors and their proven cardiorenal benefits, their real-world use in rural India, including regions like Jharkhand, remains extremely limited.

Recent studies have shown that only 3.22% of T2DM patients are prescribed these drugs, attributed to high costs, limited health care provider awareness, inadequate monitoring infrastructure, and hesitancy within health care systems. Additionally, there is a lack of peer-reviewed studies on SGLT2 inhibitors use in primary care settings[10].

Given the expanding evidence base and evolving clinical indications, this consensus document seeks to:

- Reaffirm the role of SGLT2 inhibitor as a cornerstone therapy in patients with T2DM at risk of or living with CVD and/or CKD.
- Highlight their applicability in nondiabetic populations with cardiovascular and renal conditions.
- Explore emerging metabolic indications, such as obesity and liver steatosis, where SGLT2 inhibitors may hold future promise.
- Initiate SGLT2 inhibitor therapies in primary care settings, particularly in rural areas, and integrate them into treatment protocols to enhance both diabetes management and cardiorenal protection.

This document represents the collective insights and expert deliberations of the advisory board to guide clinicians toward early, evidence-based, and outcome-driven use of SGLT2 inhibitors across a spectrum of cardiometabolic conditions[3] and implementing use of SGLT2 inhibitors and assuring their benefits in primary care setup, especially in rural areas especially in Jharkhand.

METHODOLOGY

The DELPHI method was utilized to develop comprehensive recommendations for the SGLT2 inhibitors, covering T2DM, its impact on the cardiorenal system, the extended role of SGLT2 inhibitors beyond T2DM, and proper patient counseling. The DELPHI technique is a structured method widely used to gather important information on scientific topics. It is based on the assumption that opinions from expert panels are generally more accurate and unbiased than those from individuals.

The methodology was conducted in three rounds. In the first round, the core group of 12 experts across India and framed the questionnaire after a thorough literature review using databases such as PubMed, Scopus, Web of Science (WOS), etc., published till 2024. The search was conducted using the following keywords: Sodium-glucose cotransporter 2 (SGLT2) inhibitors, type 2 diabetes mellitus (T2DM), chronic kidney disease (CKD), multiple metabolic benefits, oral antidiabetic medications, monotherapy, hepatic gluconeogenesis, cardiorenal protection, and metabolic protection, etc. Reference lists of retrieved studies were also analyzed. The following set of 11 questions was shared with the expert panel for their review and input.

In Round 2, the developed questionnaire was distributed to various physicians pan India. In Round 3, modifications were made to certain statements to better align with the management of T2DM with SGLT2 inhibitors in the Indian subpopulation, incorporating feedback from experts in the previous round. The revised statements were then shared virtually with the physicians for further approval and 11consensus statements were formulated thereafter.

RESULTS AND DISCUSSION

The consensus meeting included detailed discussion and evaluation of the proposed statements. Each statement was rated using four options: strongly agree, partially agree, agree, and disagree. Statements that achieved over 65% agreement during iterative rounds of discussion were included in the final consensus. These statements formed the basis for the final set of recommendations.

During each meeting, two experts moderated the discussion by presenting the key questions and supporting evidence. The final consensus statements and manuscript were formulated based on expert discussions and insights shared during the meeting. The method is shown as illustrated in Figure 1. To ensure accuracy and relevance, the experts reviewed the manuscript before its publication.

Indications

T2DM is a global health issue with increasing prevalence and serious long-term outcomes. CVD, heart failure, and CKD are the leading causes of morbidity and mortality. SGLT2 inhibitors help manage diabetes by targeting metabolic, cardiac, and renal pathways, reducing morbidity and mortality. With the progression of T2DM, primary care centers face an increased burden of cardiorenal-metabolic complications, affecting patients' quality of life. Early use of SGLT2 inhibitors can prevent complications, improve outcomes, optimize health care resources, and support overall patient well-being[11,12].

The results of the outlined discussion showed that 100% of the participating doctors agreed that SGLT2 inhibitors are a well-established class of drugs with multiple metabolic benefits, preferred therapy for the management and heart failure, while 91.67% doctors agreed that SGLT2 inhibitors can be used add-on therapy for the management of CKD.

Further, among the panel members, a majority of participants (91.7%) agreed that SGLT2 inhibitors could be used as first-line monotherapy in patients intolerant to other drugs (estimated glomerular filtration rate [eGFR] 25-45 mL/min) and for cardiovascular benefits in patients with good glucose control. About 83.3% agreed that SGLT2 inhibitors could be added to existing therapy in patients with poor glycemic control and around 75% participants agreed that they could be used as first-line monotherapy in all patients with T2DM or as part of first-line dual/triple therapy in those with severe hyperglycemia.

Studies have shown that up to 22% of patients with diabetes develop heart failure and are roughly twice as likely to have heart failure as people without diabetes. Decreased ejection fraction (HFrEF), mildly reduced ejection fraction (HFmEF), and preserved ejection fraction (HFpEF) are the three ways that heart failure manifests. HFrEF is frequently caused by myocardial damage, which is mainly caused by coronary artery disease and prior heart attacks. However, people with diabetes are still susceptible to structural cardiac abnormalities that could ultimately lead to HFrEF, even if they do not have substantial coronary artery disease[13].

Early introduction of SGLT2 inhibitor therapy within the first 2 years appeared to break the link between glycemic control and cardiovascular risk, suggesting

Table 1. Results of the Questionnaire

Questionnaire	Agree		Disagree	
	n	%	n	%
Indications				
SGLT2i are a				
• Well-established class of drugs with multiple metabolic benefits	12	100.00	0	0
• Preferred therapy for the management of T2DM	12	100.00	0	0
• Preferred therapy for the management of heart failure	12	100.00	0	0
• Add-on therapy for the management of CKD.	11	91.67	1	8.33
Usage and utility				
From a primary care perspective:				
• The contraindications against SGLT2i usage can easily be ruled out at primary care level	12	100.00	0	0
• SGLT2i are effective, safe and well-tolerated	11	91.67	1	8.33
• SGLT2i efficacy and safety can easily be monitored in the primary care setting	11	91.67	1	8.33
• The medication counseling required for SGLT2i therapy can easily be offered at primary care level.		91.67	1	8.33
Place in therapeutics: T2DM				
SGLT2i can be				
• Used in as first-line monotherapy in patients with T2DM and intolerance/ contraindication to other drugs, e.g., eGFR 25-45 mL/min	11	91.67	1	8.33
• Initiated or added for cardiovascular benefits in persons with good glucose control	11	91.67	1	8.33
• Used in as first-line monotherapy in patients with T2DM	9	75.00	3	25.00
• Used as part of first-line dual or triple therapy in patients with high baseline HbA1c/ severe hyperglycemia at baseline	9	75.00	3	25.00
• Added to pre-existing therapy in patients with inadequate glycemic control.	10	83.33	2	16.67
Place in therapeutics: diabetes, heart failure, CKD, and emerging indications				
SGLT2i				
• May be considered as empirical therapy in patients with MAFLD	10	83.33	2	16.67
• May be considered as empirical therapy in patients with OSA	10	83.33	2	16.67
• May be considered as add-on therapy to insulin resistant and PCOS	10	83.33	2	16.67
• May be considered as an add-on therapy to hyperuricemia and gout.	8	66.67	4	33.33
Health care system stewardship				
Primary care physicians should				
• Be equipped with facilities for point of care blood glucose, urine ketone and urine estimation	11	91.67	1	8.33
• Ideally be equipped with facilities for point-of-care serum creatinine and eGFR estimation.	11	91.67	1	8.33
Counseling				
Patients on SGLT2i should be counseled about the need to maintain:				
• Adequate hydration	12	100	0	0
• Optimal genital hygiene	12	100	0	0
• Adherence to prescribed therapy	12	100	0	0
• Carbohydrate intake as prescribed	11	91.67	1	8.33

Table 1. Results of the Questionnaire

Questionnaire	Agree		Disagree	
	n	%	n	%
Screening and monitoring				
• Genitourinary hygiene	12	100	0	0
• Clinical well-being	11	91.67	1	8.33
• Glycemic control	10	83.33	2	16.67
• Cardiovascular and renal health	10	83.33	2	16.67
Red flag symptoms and signs				
Patients on SGLT2i therapy should be counseled to contact their health professional if they experience:				
• Itching redness or pain in genitourinary organs	12	100	0	0
• Reduced urine output	10	83.33	2	16.67
• Breathlessness, abdominal pain	10	83.33	2	16.67
• Sudden alterations in blood pressure or glucose levels	10	83.33	2	16.67
Temporary discontinuation				
Patients on SGLT2i therapy should be counseled to temporarily withhold their medication if they:				
• Have severe vomiting or diarrhea	10	83.33	2	16.67
• Experience reduction in urine output	10	83.33	2	16.67
• Have to undergo a major surgery, or a diagnostic procedure with radiocontrast medium	10	83.33	2	16.67
• During fasting.	10	83.33	2	16.67
Reassurance				
Patients on SGLT2i should be counseled not to stop their medication based on:				
• Positive urine sugar reports	12	100	0	0
• Normal plasma glucose reports	12	100	0	0
• Advice from nonqualified patients	9	75.00	3	25.00
• Mild itching, redness or pain in the genitourinary organs.	8	66.67	4	33.33
Education				
Patients on SGLT2i should be counseled that the drug is being administered for				
• Glucose control and well being	12	100	0	0
• Cardiorenal and metabolic benefits	12	100	0	0
• Prevention of long-term complications	12	100	0	0
• Improvement in fatty liver.	10	83.33	2	16.67

SGLT2i = Sodium-glucose co-transporter 2 inhibitors; T2DM = Type 2 diabetes mellitus; CKD = Chronic kidney disease; eGFR = Estimated glomerular filtration rate; HbA1c = Glycated hemoglobin; MAFLD = Metabolic dysfunction-associated fatty liver disease; OSA = Obstructive sleep apnea; PCOS = Polycystic ovary syndrome.

that timely initiation is key to achieving these benefits[12]. The following studies demonstrate the role of SGLT2 inhibitors across different cardiovascular settings (Table 2).

In addition to their cardioprotective effects, SGLT2 inhibitors have demonstrated renal benefits, including slowing the progression of kidney disease and lowering the risk of major renal events.

Impaired renal function remains a prevalent and prognostically significant concern, particularly in individuals with heart failure and T2DM. Diabetes accounts for nearly 44% of new cases of kidney failure, with chronic hyperglycemia initiating a cascade of glomerular changes, glomerulosclerosis, tubule-interstitial fibrosis, and persistent declines in eGFR and albuminuria. Until recently, renin-angiotensin-aldosterone system (RAAS)

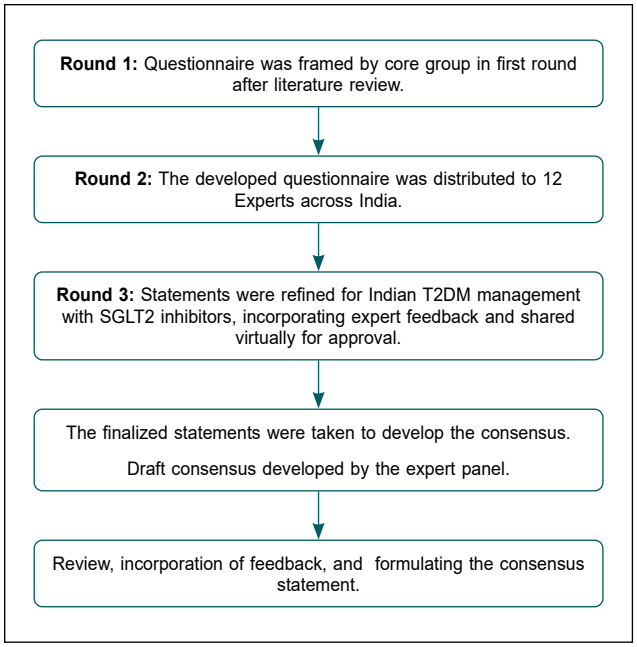

Figure 1. The Delphi process.

inhibitors represented the cornerstone of renoprotection. However, their benefits in many patients and treatment options beyond glycemic control and blood pressure reduction have been limited, especially in individuals with contraindications or altered drug handling due to kidney dysfunction[20].

SGLT2 inhibitors, originally developed for glycemic control in T2DM, has redefined the therapeutic approach to diabetic kidney disease. By inhibiting glucose and sodium reabsorption in the proximal tubule, they restore tubuloglomerular feedback, reduce intraglomerular pressure, and reverse hyperfiltration, thereby slowing disease progression. Notably, these renoprotective effects are independent of glycemic status and extend to nondiabetic CKD as demonstrated in DAPA-CKD and CREDENCE trials. Beyond hemodynamic effects, SGLT2 inhibitors reduce inflammation, fibrosis, sympathetic overactivity, and renal hypoxia, while promoting ketogenesis, autophagy, and uric acid excretion; mechanisms collectively contributing to cardiorenal benefits[21].

Table 2. SGLT2 Inhibitors in Diverse Cardiovascular Settings: Evidence from Clinical Studies

Study	Population/Setting (with Intervention)	Key Findings
EMPA-REG OUTCOME (2015)[14]	7,020 patients were treated with 10 mg or 25 mg of empagliflozin or placebo once daily.	The study found that empagliflozin treatment showed a 38% relative risk reduction in the cardiovascular death rates, 35% relative risk reduction in heart failure hospitalizations, and 32% relative risk reduction in death from any cause compared to placebo. However, there was an increased rate of genital infection among patients receiving empagliflozin, but no other adverse events.
CVD-REAL Nordic (2018)[15]	The study involved 40,908 patients with type 2 diabetes who were new users of dapagliflozin or a DPP-4 inhibitor.	Results showed that dapagliflozin was associated with lower risks of major adverse cardiovascular events (MACE), heart failure hospitalization, atrial fibrillation, and severe hypoglycemia compared to DPP-4 inhibitors. However, there were nonsignificant associations for myocardial infarction, stroke, and cardiovascular mortality.
CANVAS Program (2019)[16]	10,142 patients with T2DM and high cardiovascular risk, with a mean baseline eGFR of 76.5 ; 80% were on renin-angiotensin system blockade. Intervention included canagliflozin or placebo. In CANVAS (4,330 patients), participants received canagliflozin 100 mg, 300 mg, or placebo. In CANVAS-R (5,812 patients), patients started on canagliflozin 100 mg, with an option to increase to 300 mg or placebo.	**Results showed that canagliflozin improved multiple cardiovascular risk factors.** It lowered HbA1c by about 0.6%, body weight by 1.6 kg, systolic blood pressure by 3.9 mmHg, and diastolic blood pressure by 1.4 mmHg. It also raised HDL cholesterol by about 2 mg/dL. A small increase in LDL cholesterol (about 4.7 mg/dL) was observed, but the LDL/HDL ratio remained unchanged.
DAPA-HF trial (2020)[17]	4,744 patients with NYHA class II-IV heart failure and LVEF ≤40% were included and they were randomized to dapagliflozin 10 mg daily (n = 2,373) or placebo (n = 2,371) alongside standard therapy.	Dapagliflozin reduced cardiovascular deaths and heart failure events when compared to placebo in patients already diagnosed to have HFrEF. The primary composite outcome of worsening heart failure or death from cardiovascular causes was lower in the dapagliflozin group (16.3%) compared with 21.2% in the placebo group.

EMPULSE Trial (2021)[18]	530 patients hospitalized with acute de novo or decompensated chronic heart failure, any LVEF, with/without diabetes, empagliflozin 10 mg once daily, started in-hospital (24 hour-5 days after admission) for 90 days and compared with placebo.	Clinical benefit with empagliflozin was seen in both acute de novo and decompensated chronic heart failure, irrespective of LVEF or diabetes status. The drug was well-tolerated. Initiating empagliflozin during hospitalization provided significant benefit over 90 days.
The EMPEROR-Reduced trial (2023)[19]	3,730 chronic heart failure patients (NYHA II-IV, LVEF ≤40%) were randomized 1:1 to empagliflozin 10 mg (n = 1,863) or placebo (n = 1,867) alongside standard therapy. Median follow-up was 16 months. Mean age was 67 years; 24% were female. Inclusion required age ≥18, heart failure hospitalization within 12 months, and elevated NT-proBNP adjusted for EF and atrial fibrillation.	The results of this trial indicate that empagliflozin is superior to placebo in improving HF outcomes among patients with symptomatic stable HFrEF (EF ≤40%) on excellent baseline guideline-directed medical therapy, irrespective of diabetes status.

DPP-4 = Dipeptidyl peptidase 4; T2DM = Type 2 diabetes mellitus; HbA1c = Glycated hemoglobin; HDL = High-density lipoprotein; LDL = Low-density lipoprotein; NYHA = New York Heart Association; LVEF = Left ventricular ejection fraction; HFrEF = Heart failure with reduced ejection fraction; NT-proBNP = N-terminal pro-B-type natriuretic peptide; EF = Ejection fraction.

The EMPA-KIDNEY trial demonstrated that empagliflozin, an SGLT2 inhibitor, offered significant cardiorenal benefits in patients with CKD who were at risk of progression. Patients were treated and monitored for 2 years, and survivors were observed for an additional 2 years. The main outcome assessed was a combination of kidney disease progression or cardiovascular death[22].

Kidney disease progression occurred in 23.5% of patients receiving empagliflozin compared with 27.1% in the placebo group. Death or progression to end-stage kidney disease was reported in 16.9% versus 19.6%, while cardiovascular death was observed in 3.8% compared with 4.9%. Notably, the protective effects of empagliflozin on kidney and heart outcomes persisted for up to 12 months after discontinuation across a wide spectrum of patients with CKD[23].

Given this robust and multifaceted profile, the consensus recognizes SGLT2 inhibitors as an adjunctive therapy in CKD patients, for their ability to delay disease progression, reduce albuminuria, and improve long-term renal outcomes. Their early integration into standard care pathways represents a critical evolution in managing CKD[21,23].

Building on these evidences and expert discussions, the following consensus statement was formulated.

Consensus Statement 1

SGLT2 inhibitors play an important role in metabolic disease management, while also serving as effective glucose-lowering agents in diabetes, with established cardiovascular benefits in heart failure and renal protection in CKD.

Usage and Utility

Moving forward, the panel discussed the usage and utility of SGLT2 inhibitors from a primary care perspective, highlighting that contraindications can be easily identified at this level. They emphasized that SGLT2 inhibitors are effective, safe, and well-tolerated, with their efficacy and safety conveniently monitored in the primary care setting, where the necessary medication counseling can also be readily provided.

Further, the discussion from the advisory board panel revealed that 100% of doctors favored that contraindications against SGLT2 inhibitors usage can be easily ruled out at the primary care level, while 91.67% doctors agreed that SGLT2 inhibitors are effective, safe, and well-tolerated and agreed that their efficacy and safety can be conveniently monitored in the primary care setting, and that the necessary medication counseling for SGLT2 inhibitor therapy can be readily provided at the primary care level.

Primary care providers are central to supporting people with T2DM in achieving glycemic control and lowering their risk of complications such as atherosclerotic CVD, heart failure, and CKD[24]. Despite this, variation in licensed indications for SGLT2 inhibitors has created uncertainty in prescribing and contributed to their slow adoption.

A shift in practice is needed—moving toward a holistic approach that addresses the full cardiorenal-metabolic spectrum[25]. This means looking beyond glycated hemoglobin (HbA1c) to consider diabetes status, cardiovascular risk, kidney function, heart failure, and individual patient preferences. Rather than asking, *"Is there an indication for an SGLT2 inhibitor in this patient?"*,

clinicians should begin to ask, *"Why is this patient with cardiorenal-metabolic disease not on an SGLT2 inhibitor?"*

Several studies have supported the use of empagliflozin as a preferred SGLT2 inhibitor to initiate therapy because of its consistent cardiovascular and renal benefits across a broad range of patient populations, including those with and without diabetes.

The EMPULSE trial enrolled 530 patients hospitalized with acute heart failure (*de novo* or chronic decompensated) and randomized them once clinically stable (median 3 days). Early in-hospital initiation of empagliflozin significantly improved the 90-day hierarchical composite endpoint (death, heart failure events, time to first heart failure event, and symptom score improvement), with a win ratio 1.36 (p = 0.005). Benefits were consistent across all left ventricular ejection fraction (LVEF) ranges, diabetes status, and heart failure types, supporting early empagliflozin use to improve short-term outcomes in acute heart failure[26,27].

The EMPA-RESPONSE-AHF trial enrolled 80 patients with acute decompensated heart failure (47% *de novo*) and randomized them to empagliflozin 10 mg/day or placebo within 24 hours of admission. Empagliflozin significantly reduced the combined endpoint of in-hospital worsening heart failure, rehospitalization for heart failure, or death at 60 days compared with placebo (10% vs. 33%; p = 0.014), demonstrating early clinical benefits when initiated during hospitalization[28].

Thus, early initiation of empagliflozin in patients hospitalized with acute heart failure provided significant short-term benefits, including reduced heart failure events, rehospitalizations, and improved symptoms, supporting its use across diverse patient groups.

Additionally, another recent study further, revealed that in rural India, SGLT2 inhibitors (such as dapagliflozin) were prescribed to only 3.22% of patients with T2DM. Factors contributing to this low use included high cost, limited awareness among health care providers, and inadequate infrastructure for monitoring therapy[10]. But still there is a lack of specific, peer-reviewed studies focusing on the use of SGLT2 inhibitors in primary care settings in Jharkhand, India. The high cost and lack of infrastructure for advanced diabetes care contribute to this underuse. In rural regions like Jharkhand, where health care resources are limited, there is a lack of specific, peer-reviewed studies focusing on the use of SGLT2 inhibitors in primary care settings. The adoption of SGLT2 inhibitors is likely even lower, due to factors such as high cost, limited awareness among health care providers, and reluctance within health care systems to initiate the therapy.

Since most people with cardiorenal-metabolic disease are managed in primary care, it is essential that health care professionals in this setting understand the role of SGLT2 inhibitors as an outcomes-focused treatment with the potential to lower disease burden and reduce health care costs across the cardiorenal-metabolic spectrum[11,24]. Based on the above evidences and supportive data. The panel reached the consensus statement.

Consensus Statement 2

Contraindications to SGLT2 inhibitor use can be easily ruled out at the primary care level, as they are effective, safe, and well-tolerated, with efficacy and safety conveniently monitored and necessary counseling readily provided in this setting.

Place in Therapeutics: T2DM

The discussion then covered the topic related to place of SGLT2 inhibitors in therapeutics for T2DM, outlining their role as first-line monotherapy, as part of dual or triple therapy in those with high baseline HbA1c or severe hyperglycemia, as add-on therapy in patients with inadequate glycemic control, as first-line in those intolerant or contraindicated to other drugs (e.g., eGFR 25-45 mL/min), and for cardiovascular benefits even in patients with good glucose control.

Results of the adboard discussion further showed that a majority of participants (91.7%) agreed that SGLT2 inhibitors could be used as first-line monotherapy in patients intolerant to other drugs (eGFR 25-45 mL/min) and for cardiovascular benefits in patients with good glucose control. About 83.3% agreed that SGLT2 inhibitors could be added to existing therapy in patients with poor glycemic control and around 75% participants agreed that they could be used as first-line monotherapy in all patients with T2DM or as part of first-line dual/triple therapy in those with severe hyperglycemia.

A study at Seoul National University Hospital, South Korea, evaluated the efficacy and safety of SGLT2 inhibitors as add-on therapy in patients with T2DM receiving metformin alone or in combination with one other oral hypoglycemic agent, with baseline HbA1c between 7% and 10.5%. At week 26, patients receiving SGLT2 inhibitors as part of first-line dual or triple therapy showed significantly greater reductions in HbA1c compared to those not on SGLT2 inhibitors, with a higher proportion achieving HbA1c <7%. Overall adverse event rates were similar between groups, with minor differences in liver-related, pain, hypertensive, and metabolic events[29].

Consensus Statement 3

SGLT2 inhibitors may be used as first-line monotherapy in type 2 diabetes, including in individuals intolerant to other agents or with an eGFR of 25-45 mL/min. They may also be initiated or added in patients with good glycemic control to provide cardiovascular benefit, used as part of first-line dual or triple therapy in those with high baseline HbA1c or severe hyperglycemia, and added to existing regimens when glycemic control remains inadequate.

Place in Therapeutics: Diabetes, Heart Failure, CKD, and Emerging Indications

SGLT2 inhibitors are among the newer FDA-approved agents for managing hyperglycemia. As monotherapy or combined with drugs like metformin, sulfonylureas, pioglitazone, or insulin, they modestly lower HbA1c by 0.4-1.1% compared to placebo. Studies with dapagliflozin showed that, whether used alone or alongside other therapies, it significantly reduced body weight, waist circumference, fasting blood sugar, glucose tolerance, and uric acid levels. Long-term use has also been linked to appetite, hunger, and dietary preferences changes[30].

Evidences have shown that SGLT2 inhibitors help control blood sugar by lowering HbA1c, post-meal glucose, and fluctuations in glucose levels. They do not directly increase insulin release but protect pancreatic beta-cells, improve insulin sensitivity, and reduce insulin resistance. Besides controlling blood sugar, they also help reduce body weight, lower blood pressure, and improve cholesterol levels. Compared to metformin, they provide stronger heart and kidney protection, which is especially important in India, where T2DM often affects the heart and kidneys. The CANTATA-M trial by Polidori et al (2014) showed that canagliflozin also supported beta-cell insulin secretion, demonstrating multiple metabolic benefits[31,32].

SGLT2 inhibitors are crucial in modern treatments for conditions beyond T2DM, targeting shared disease mechanisms like oxidative stress, inflammation, and sodium retention. They can be tailored to individual needs, considering factors like kidney function, cardiovascular risk, and metabolic condition. These drugs provide patient-specific advantages across diverse populations and offer additional benefits like diuresis, weight reduction, anti-arrhythmic activity, antisteatotic benefits, and blood pressure reduction[33].

Additionally, SGLT2 inhibitors promote weight loss by targeting both body fat and water stores. Initial weight reduction is primarily due to fluid loss from increased urinary excretion, while long-term effects result from decreased fat mass. In a 12-week study, dapagliflozin reduced body water and lean body mass, with longer treatment associated with greater reductions in fat and fluid. These agents have also been shown to reduce perirenal fat, liver fat, and epicardial fat surrounding the heart[34,35].

On the same lines, discussion from the meeting showed that 83.3% of the participating doctors agreed that SGLT2 inhibitors may be considered as empirical therapy for metabolic dysfunction-associated fatty liver disease (MAFLD), obstructive sleep apnea (OSA), and as add-on therapy in cases of insulin resistance or polycystic ovary syndrome (PCOS). About 66.7% participants agreed they could be used in hyperuricemia and gout.

Several studies have shown that the potential of SGLT2 inhibitors as empirical therapy for MAFLD, OSA, and as add-on therapy in insulin resistance or PCOS.

In MAFLD patients, SGLT2 inhibitors have demonstrated efficacy in improving hepatic steatosis and fibrosis. A meta-analysis of randomized controlled trials revealed significant reductions in liver enzymes (alanine aminotransferase, aspartate aminotransferase), liver fat content, and visceral fat area with SGLT2 inhibitors use[36]. Additionally, SGLT2 inhibitors have shown benefits in reducing hyperglycemia and improving insulin resistance in MAFLD patients[37].

In patients with OSA and T2DM, SGLT2 inhibitors have been associated with improvements in glucose control and potential reductions in OSA severity. A research by Tanriover et al identified four studies which included a total of 475 OSA patients with T2DM, among which SGLT2 inhibitors were administered to 332 patients and 143 patients were in a control group. The SGLT2 inhibitor group showed positive impacts on OSA-related outcomes[38].

In women with PCOS, SGLT2 inhibitor has demonstrated potential in enhancing anthropometric and metabolic markers. According to a systematic review and meta-analysis of randomized controlled studies, SGLT2 inhibitor usage is linked to positive outcomes in metabolic indicators and anthropometric parameters in PCOS patients. Additionally, it has been noted that SGLT2 inhibitor improves hormonal profiles, including lowering levels of free testosterone[39].

Thus, it was observed that the therapeutic role of SGLT2 inhibitors has progressively expanded beyond glucose control, with multiple studies highlighting benefits across cardiovascular, renal, and metabolic conditions.

Building on these observations, clinical practice has evolved to explore their potential in broader settings. This growing body of evidence provides the basis for the below consensus statement:

Consensus Statement 4

SGLT2 inhibitors have an established role in type 2 diabetes, heart failure, and CKD. They may also be considered as empirical therapy in MAFLD and OSA, and as add-on therapy in insulin resistance, PCOS, hyperuricemia, and gout.

Health Care System Stewardship

The discussion further, emphasized on providing primary care doctors, the necessary resources to provide prompt, accurate, and patient-centered treatment which were essential to effective stewardship of the health care system. For the quick diagnosis and prompt treatment of common metabolic and renal disorders, primary care physicians should have access to point-of-care (POC) facilities for blood glucose, urine ketones, and basic urine analysis. To aid with the early identification and tracking of renal failure, these settings should ideally also incorporate POC testing for serum creatinine and eGFR. By providing primary care practices with these tools, the health care system's overall efficiency is strengthened, clinical decision-making is improved, patient outcomes are improved, and treatment delays are decreased.

The results from the meeting showed that 91.7% participating doctors agreed that primary care physicians should be equipped with POC facilities for glucose, urine ketones, and urine estimation. An equal proportion (91.7%) also supported the need for POC creatinine and eGFR testing.

The consensus that primary care physicians should be equipped with facilities for POC blood glucose, urine ketone, and urine estimation, and ideally POC serum creatinine testing is strongly supported by current evidence and international guidelines in the context of SGLT2 inhibitor therapy[40].

SGLT2 inhibitors are now widely used to protect the heart and kidneys in people with T2DM, CKD, and heart failure. Studies like CREDENCE, DAPA-CKD, and EMPA-KIDNEY showed that these drugs slow kidney damage and lower the risk of dialysis or kidney-related death. Because their use depends on kidney function, measuring serum creatinine to calculate eGFR is important. Small increases in creatinine are usually harmless, but sudden or large rises may signal kidney problems or dehydration. Point-of-care creatinine testing allows quick, on-site checks, helping doctors make safe treatment decisions during the same visit, detect issues early, and manage patients before surgery or illness. Guidelines from the UK Kidney Association and other bodies recommend regular creatinine monitoring. Using POC testing in clinics improves safety, ensures timely access to SGLT2 inhibitors, and supports better patient outcomes, especially in busy or resource-limited settings[40,41].

In primary care, creatinine POC testing can enhance CKD screening by providing rapid results and immediate feedback. It allows timely adjustment of medications cleared by the kidneys and enables patients to monitor renal function at home, supporting more frequent testing and earlier detection of deterioration[42]. A study by Corbett et al found that patients with low eGFRs are at higher risk of post-contrast acute kidney injury, highlighting the importance of POC devices[43].

These findings outline the importance of creatinine POC testing and support the consensus that primary care physicians should be equipped with facilities for POC blood glucose, urine ketone, urine estimation, and renal function testing, forming the basis for a consensus statement guiding its use in primary care.

Consensus Statement 5

Primary care physicians should be equipped with POC facilities for blood glucose, urine ketone, urine analysis, and ideally serum creatinine and eGFR, to enable timely and accurate clinical decision-making.

Counseling

With the advancing developments in the field of diabetes management, doctors now have more options and combinations to manage the disease. In this setting, counseling plays an integral role in bridging the gap between medical treatment and patient self-management[44].

Results from the discussion stated that all participants (100%) agreed that diabetic patients on SGLT2 inhibitors should be counseled about maintaining hydration, optimal genital hygiene, and adherence to prescribed therapy. Around 91.7% participants also supported counseling on carbohydrate intake was essential.

The osmotic diuresis caused by SGLT2 inhibitors can increase the risk of volume depletion and hypotension. Patients should be counseled to maintain hydration with proper fluid and electrolyte intake, recognize signs of dyselectrolytemia, and avoid concomitant use of loop diuretics[45].

Additionally, SGLT2 inhibitors increase urinary glucose, predisposing patients to genital tract infections, usually fungal, though not necessarily caused by the drug alone. These infections are preventable and manageable, but require attention. Counseling on perineal hygiene is essential, should be proactive rather than reactive, and must be reinforced regularly for patients on SGLT2 inhibitors to minimize infection risk and improve outcomes[44].

Monitoring carbohydrate intake is crucial for glycemic control in T2DM. Counseling regarding consistent carbohydrate intake at meals helps stabilize blood glucose levels in T2DM. Carbohydrate counting or the exchange method can assist in aligning diet with glycemic goals[46].

Taken together, these considerations highlight the critical role of comprehensive, therapy-specific counseling in patients on SGLT2 inhibitors and with T2DM, forming the basis for a consensus statement below.

Consensus Statement 6

Patients on SGLT2 inhibitors should be counseled to maintain hydration, ensure genital hygiene, adhere to therapy, and follow prescribed carbohydrate intake to optimize safety and glycemic control.

Screening and Monitoring

Patients on SGLT2 inhibitor therapy should undergo regular interval screening to monitor clinical well-being, glycemic control, genitourinary hygiene, and cardiovascular and renal health, in alignment with contemporary diabetes care guidelines.

The panel discussion revealed unanimous agreement (100%) among doctors on the importance of monitoring genitourinary hygiene. Most participants (91.7%) highlighted the need to monitor overall clinical well-being, while 83.3% emphasized tracking glycemic control, cardiovascular, and renal health.

Patients on SGLT2 inhibitor therapy should undergo regular interval screening to monitor clinical well-being, glycemic control, genitourinary hygiene, and cardiovascular and renal health, in alignment with contemporary diabetes care guidelines. Periodic assessment of clinical well-being, including weight, hydration status, energy levels, and symptom review, helps detect early signs of adverse events such as volume depletion, infections, or ketoacidosis. Glycemic control should be monitored via HbA1c, fasting, and postprandial plasma glucose to ensure therapeutic targets are maintained and to guide the need for treatment adjustment; this remains important even when SGLT2 inhibitors are prescribed primarily for cardiorenal protection. Regular evaluation of genitourinary hygiene and screening for genital mycotic infections or urinary tract infections is recommended, as glycosuria predisposes to microbial overgrowth; patient education and preventive measures can substantially reduce recurrence[12,47].

Cardiovascular and renal health surveillance, including blood pressure measurement, lipid profile, eGFR, and urinary albumin-to-creatinine ratio, is essential to track the broader benefits of SGLT2 inhibition, detect early progression of CKD, and optimize co-prescribed cardioprotective agents. Large outcome trials have demonstrated that the cardiorenal benefits of SGLT2 inhibitors are maximized when therapy is continued with ongoing safety and efficacy monitoring[12].

Consensus Statement 7

Patients on SGLT2 inhibitors should be regularly screened and monitored for genitourinary hygiene, overall clinical well-being, glycemic control, and cardiovascular and renal health to ensure safe therapy and optimize outcomes.

Red Flag Symptoms and Signs

Patients on SGLT2 inhibitor therapy should be instructed to promptly contact their health care provider if they develop breathlessness, abdominal pain, reduced urine output, genitourinary itching/redness/pain, or sudden changes in blood pressure or glucose levels, as these may signal serious but potentially manageable complications. Breathlessness and abdominal pain could indicate rare but life-threatening conditions such as euglycemic diabetic ketoacidosis, which is a recognized adverse effect of SGLT2 inhibitors and requires urgent biochemical confirmation and treatment[44].

Reduced urine output may reflect acute kidney injury, volume depletion, or obstructive uropathy, all of which need rapid evaluation since SGLT2 inhibitors affect renal hemodynamics and may unmask underlying kidney disease, particularly in dehydrated or hypotensive patients. Genitourinary itching, redness, or pain often results from mycotic or bacterial infections due to drug-induced glycosuria; while usually mild, untreated cases may progress to severe infections such as balanitis, vulvovaginitis, or, rarely, Fournier's gangrene, making early medical assessment critical[48].

Sudden alterations in blood pressure or glucose can arise from volume contraction, intercurrent illness, or changes in diet/therapy, and may require adjustment of antihypertensive or glucose-lowering regimens.

Guidelines from diabetes and nephrology societies underscore the need for patients to be educated about these warning symptoms and to seek immediate professional advice rather than self-managing or discontinuing therapy, to optimize safety while preserving the proven cardiorenal benefits of SGLT2 inhibitors[49].

Consensus Statement 8

Patients on SGLT2 inhibitor therapy should be advised to promptly contact their health care professional if they experience breathlessness, abdominal pain, reduced urine output, genitourinary discomfort, or sudden changes in blood pressure or blood glucose levels.

Temporary Discontinuation

The recommendation that patients receiving SGLT2 inhibitors should temporarily withhold therapy during severe vomiting or diarrhea, marked reduction in urine output, major surgery or diagnostic procedures involving radiocontrast, and periods of prolonged fasting is well supported by clinical evidence, regulatory guidance, and specialist reviews. SGLT2 inhibitors therapy can increase the risk of volume depletion, acute kidney injury in the setting of dehydration, and critically euglycemic diabetic ketoacidosis when oral intake is poor or in the peri-operative/acute illness setting; therefore stopping the drug during these high-risk situations reduces these preventable harms[12].

Regulatory and professional bodies explicitly recommend temporary discontinuation around surgery and in situations predisposing to ketoacidosis: the US FDA and many national agencies advise holding SGLT2 inhibitor for several days prior to planned major surgery, and clinical guidance calls for withholding during prolonged fasting, acute severe illness, or when patients are at risk of volume depletion because a modest early creatinine rise is expected but abrupt or large rises require rapid evaluation[12].

Nephrology and diabetes guidelines further endorse rules for SGLT2 inhibitors, specifically instructing temporary cessation during acute gastroenteritis with poor intake, oliguria or suspected acute kidney injury, and before procedures with contrast or surgical stress, so that clinicians can monitor and manage renal function and ketone status promptly. These recommendations are intended to balance the substantial cardiorenal benefits of SGLT2 inhibitor with patient safety during transient high-risk states. Finally, contemporary reviews and practical guidance for primary care and perioperative teams stress the importance of patient education (to hold SGLT2 inhibitors during intercurrent illness or fasting), ketone/glycemic monitoring if symptomatic, and reassessment before restarting therapy, measures shown to reduce avoidable adverse events while preserving long-term benefits[50].

Consensus Statement 9

Patients receiving SGLT2 inhibitor therapy should be advised to temporarily withhold the medication during severe vomiting or diarrhea, reduced urine output, major surgery, procedures involving radiocontrast, or periods of fasting to minimize the risk of complications.

Reassurance

Patients on SGLT2 inhibitors should be clearly counseled not to discontinue their medication solely on the basis of positive urine sugar results, normal plasma glucose readings, mild genitourinary symptoms, or advice from non-qualified individuals. Positive urine glucose is an expected pharmacologic effect of SGLT2 inhibition due to blockade of glucose reabsorption in the proximal tubule; this glycosuria is the intended mechanism for glycemic and metabolic benefit, not an indicator of uncontrolled diabetes or treatment failure. Likewise, normal fasting or random plasma glucose values should be interpreted as a sign of adequate glycemic control rather than a reason to withdraw therapy, since SGLT2 inhibitors confer cardiovascular, renal, and metabolic protection independent of their glucose-lowering action[47,50].

Mild itching, redness, or discomfort in the genital or urinary area are common, usually self-limiting adverse effects related to glycosuria-induced fungal or bacterial colonization; they can often be managed symptomatically without drug discontinuation, as supported by clinical trial safety data and post-marketing surveillance reports. Stopping therapy without medical oversight, particularly based on anecdotal advice from nonqualified sources, risks depriving the patient of proven cardiorenal protection and metabolic benefits. Contemporary diabetes and kidney guidelines emphasize that discontinuation decisions should be made by qualified health care professionals, based on structured assessment of benefit-risk, not isolated laboratory or symptom triggers[44,51].

Consensus Statement 10

Individuals receiving SGLT2 inhibitors should be counseled and advised not to discontinue therapy

on the basis of positive urine glucose reports, normal plasma glucose values, advice from nonqualified persons, or mild genitourinary itching, redness, or discomfort ensuring adherence while maintaining safety and therapeutic benefits.

Education

The panel discussion demonstrated 100% agreement on the statement that patients should be educated that SGLT2 inhibitors provide glucose control, well-being, cardiorenal and metabolic benefits, and prevention of long-term complications. Around 83.3% also supported SGLT2 inhibitors' role in improving fatty liver.

SGLT2 inhibitor use can sometimes lead to urinary tract infections, genital infections, or irritation in the perineal area. Patients should be educated about the importance of daily perineal hygiene, staying well-hydrated by drinking sufficient water, and seeking medical advice without delay if they notice itching, burning, or discomfort in the genital region[52].

Patients receiving SGLT2 inhibitors should be counseled that these agents are prescribed not only for lowering blood glucose and improving symptomatic well-being, but also for their broad cardiorenal and metabolic advantages, for reducing the risk of long-term diabetes-related complications, and for beneficial effects on hepatic steatosis. Evidence from mechanistic summaries and guideline reviews establishes that SGLT2 inhibition lowers plasma glucose by promoting glycosuria and improves metabolic parameters (weight, blood pressure, lipids, and insulin resistance), which explains part of the symptomatic and glycemic benefits patients will experience[11].

Large randomized outcome trials and pooled analyses have consistently demonstrated reductions in heart-failure hospitalizations and cardiovascular events in patients treated with SGLT2 inhibitors, Robust kidney outcome data and contemporary guidelines further indicate that SGLT2 inhibitors slow eGFR decline and lower the risk of progression to end-stage kidney disease, positioning them as agents that prevent or delay serious renal complications when used appropriately. Finally, a growing body of clinical studies and systematic reviews reports improvement in hepatic fat content and liver-related biomarkers in patients with fatty liver disease and diabetes, supporting counseling that SGLT2 therapy may favorably influence NAFLD/MAFLD in addition to its cardiometabolic benefits[21,23].

In practice, this counseling should be framed so patients understand that the drug is intended to improve glucose control and overall well-being while also lowering their risks of heart- and kidney-related complications and potentially improving fatty liver; clinicians should pair this discussion with guidance on monitoring, sick-day rules, and when to temporarily withhold therapy to maximize benefit and safety[51].

Based on this practical approach, the following consensus statement was outlined.

Consensus Statement 11

Patients initiated on SGLT2 inhibitors should be counseled that the therapy is prescribed not only for glucose control and overall well-being, but also for its proven cardiorenal and metabolic benefits, its role in preventing long-term diabetes-related complications, and its potential to improve fatty liver outcomes.

CONCLUSION

SGLT2 inhibitors have emerged as a cornerstone therapy in T2DM, offering glycemic, cardiovascular, renal, and metabolic benefits. In primary care, their safe and effective use requires a structured, proactive approach. Clinics should be equipped with POC tools for rapid kidney function assessment to allow safe initiation and timely dose adjustments. Patient counseling must emphasize adherence, recognition of side effects, and guidance on temporarily withholding therapy during acute illness, dehydration, or before surgery, ensuring both safety and optimal treatment outcomes. Regular monitoring should address overall clinical well-being, glycemic control, cardiovascular and renal health, and genitourinary hygiene to prevent complications such as infections or volume depletion. By combining safe initiation, close follow-up, patient education, and vigilant monitoring, health care providers in primary setting can maximize the long-term benefits of SGLT2 inhibitors, minimize risks, and improve outcomes for patients with T2DM, heart failure, and CKD.

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