RESEARCH PAPER

Contemporary Use of SGLT-2 Inhibitors among Patients Hospitalized for HFrEF: Translating Evidence into Practice

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Abstract

Background:

As the primary care intervention, sodium-glucose cotransporter-2 (SGLT-2) blocked have proven to be a major heart failure treatment with reduced ejection fraction (HFrEF), as it shows significant mortality and rehospitalization rates reduction in the ionic trials. Although there are positive recommendations on the usage of guidelines, their application in reality during hospitalization is inconsistent and slow.

Objective:

To assess the current trends in prescribing SGLT-2 inhibitors in hospitalized patients with HFrEF and determine clinical, demographic, and other system-related variables related to in-hospital initiation.

Method:

This was a retrospective cohort study that used a multi-center health system of adults having the primary diagnosis of HFrEF between 2020 and 2024. Demographic, comorbidities, renal, hemodynamics, medication use, and discharge prescriptions were collected using the electronic health records. The achieved outcome was mainly in-hospital initiation of an SGLT-2 inhibitor. Secondary outcomes were the eligibility at admission and the recording of contraindications.

Results:

Few patients out of the pool of eligible patients were started on SGLT-2 inhibitors at hospital. The initiation was closely related to younger age, well-preserved renal function, increased systolic blood pressure, and care led by cardiology. The contraindications were rarely documented, and the missed opportunities of initiation were typical. The rate of discharge initiation increased slightly with time.

Conclusion:

In-hospital SGLT-2 inhibitor initiation among HFrEF patients is still not ideal, even with its strong evidence and guideline recommendations. Elevated methods of clinical pathways and education can assist in evidence-to-practice transformation.

Keywords: SGLT-2 inhibitors, renal function, heart failure with reduced ejection fraction, clinical implementation, cardiovascular outcomes

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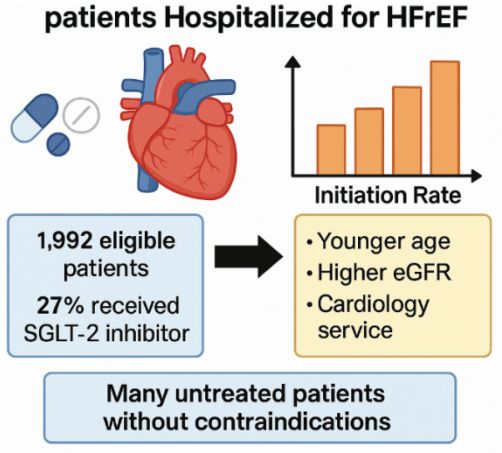
Graphical abstract



1 Introduction

Heart failure of reduced ejection fraction (HFrEF) is a significant health issue in several parts of the world, as it afflicts over 64 million individuals globally and gives rise to significant morbidity, frequent hospitalization and early mortality [1]. Although there are advances in the pharmacologic and device-based treatment, decompensated HFrEF hospitalization can predict a period of increased vulnerability as when patients are more prone to mortality both in the short term and long-term [2]. Sodium-glucose cotransporter-2 (SGLT-2) inhibitors have caused a revolution in heart failure treatment in the last ten years. Initially introduced as glucose-lowering drugs, these medications were demonstrated during the groundbreaking landmark clinical trials, including DAPA-HF and EMPEROR-Reduced, to produce a significant effect on cardiovascular mortality, heart failure admission, and symptom burden, regardless of diabetes status [3, 4]. Consequently, modern global practice advice SGLT-2 inhibitors as second-line treatment to all patients with HFrEF, frequently as central therapy when starting four-pillar interventions in or shortly following hospitalization [5].

Nonetheless, the translation of clinical trials into evidence-based practice is a continuing problem despite the compelling evidence. Practical literature is always characterized by the lack of use of SGLT-2 blockers, especially at hospitalization when the guidelines target the simplifaction of timely initiation [6]. The number of aspects behind this gap is quite a few, with clinical uncertainty in the providers, indecision towards renal functional thresholds, concerns on hemodynamic stability, and inconsistency in institutional prescribing processes [7]. Moreover, barriers at the system level, including constraints in formulary and absence of standardized heart failure order sets and adherence to cardiology specialists in a timely basis, often hinder early process of initiation [8].

Hospitalization is a critical situation in terms of maximising guideline-based medical treatment. Past studies point out that drugs initiated at the hospital are more disposed to become prolonged than to those initiated in the outpatient works, and thus, the earliest introduction of SGLT-2 inhibitors is a high-value opportunity in this context to enhance better outcomes [9]. However, countrywide reviews indicate that a large proportion of patients that are hospitalized with HFrEF and qualify to receive an SGLT-2 inhibitor is discharged without this agent, indicating a substantial gap between evidence and clinical practice.

Due to the high rate of clinical change and the development of a greater focus on the early initiation practice, it is necessary to learn the existing prescribing pattern to enhance care provision. The aim of the present study is to analyze the modern application of SGLT-2 inhibitors in the patients admitted to hospital with HFrEF and determine clinical level, demographic, and systemic variables that affect prescribing habits. This work will address practical obstacles by describing the patterns of non-utilization of the available opportunities, eligibility, and written-down contraindications so that timely, evidence-based therapy can be provided during the stay in a hospital.

In case you would like some assistance in linking this introduction to your Methods section, and in polishing the prose to be published, I will be happy to do this step-by-step. Many students write longer papers just like this one and resort to such websites like EssayWriters.com to get the help of an expert, however, I will show you through this part by part.

2 Literature Review

The use of SGLT-2 inhibitors has been rapidly increasing in amount of evidence to support its use in heart failure with reduced ejection fraction (HFrEF), but actual practice remains underused compared to clinical trials. Initial studies showed that SGLT-2 inhibitors can enhance glycemic control and prevent cardiovascular events in patients with type 2 diabetes and this has sparked the desire to learn more about its wider cardioprotective effects [10]. Later mechanistic research showed a range of non-glucose-lowering benefits, such as enhanced natriuresis, decreased interstitial fluid and desirable ventricular remodeling-processes especially when linking them to HFrEF management [11].

These benefits have been proven by large randomized trials. Both EMPEROR-Reduced and DAPA-HF had a substantial decreased heart failure hospitalization and cardiovascular mortality in diabetic and non-diabetic patients [12]. Their strong results notwithstanding, observational studies indicate the continued underutilization of them during hospitalization when the guideline-based therapies are best initiated. As observed in real-world cohorts, issues with renal functionality, therapeutic inertia, and unfamiliarity by the provider continue to be the prevalent obstacles despite the established safety of SGLT-2 inhibitors across a broad range of renal functionality [13].

Adoption is also a factor that is affected in health systems. Organizations which use standardized heart failure order sets, cardiology co-management, and interdisciplinary rounding achievement high prescription rates of evidence-based therapies, such as SGLT-2 inhibitors. But national prescribing audits note that lots of eligible hospitalized patients are released without this treatment including missed possibilities of clinical goodwill at an initial stage [14].

3 Materials & Methods

Study design

It was a retrospective cohort study carried in a big, integrated multi-hospital health system comprising of Academic, tertiary and community hospitals. The study period was between January 1, 2020, to December 31, 2024, the time frame of which the SGLT-2 inhibitors were recommended by the guideline in the treatment of heart failure with reduced ejection fraction (HFrEF). The waiver of informed consent was included in the study because it was an observational study, and no identifiable information would be required.

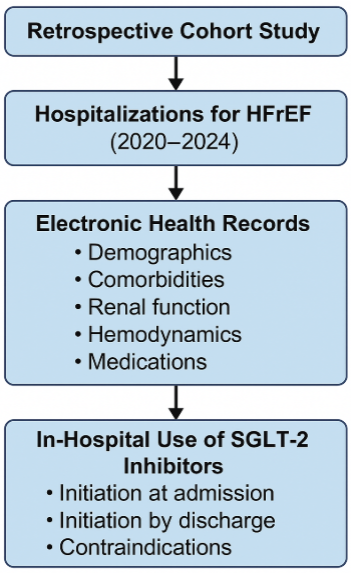


Fig.2. Study method

This figure 1 is a summary of the workflow of a retrospective cohort study on the possibility of hospitalizations due to heart failure with reduced ejection fraction (HFrEF) since 2020 to 2024. Electronic health records offer precise clinical data, such as demographics, comorbidities, renal functionality, hemodynamics and drugs. The research is an assessment of in-hospital use of SGLT-2 inhibitors (in terms of whether therapy was started at the moment of admission or discharge), contraindications are also evaluated. This construct aids evaluation of actual practice of treatment.

Study Population

The eligibility criteria included the following: adults aged 18 years and above staying in hospital with a major diagnosis of HFrEF, which was considered to be left ventricular ejection fraction [?]40% on echocardiography in the six months before admission. Individuals with type 1 diabetes, End-stage kidney disease under dialysis, diabetic ketoacidosis, or reports of intolerance in response to SGLT-2 inhibitors before admission were not allowed. In case of patients that had a series of two or more hospitalizations, they were qualified by the first hospitalization in the period of study to eliminate clustering.

Data Sources and Variables

Extracted data were the electronic health records (EHR) through a validated query system. The data concerning the variables were gathered as follows:

a. Demographics: age, sex, race, has insurance.
b. Clinical issues: comorbidities (diabetes, CKD, hypotension, volume overload), BP, heart rate.

c. Lab work: serum creatinine, estimated glomerular filtration rate (eGFR), glucose, electrolytes
d. Also included in the dashboard is the Heart failure characteristics which clarifies the left ventricular ejection fraction, natriuretic peptide levels as well as its congestion parameters.
e. History of medication: has been using guideline-directed medical therapy (GDMT) in the past such as beta-blockers, RAAS inhibitors, MRAs, and exposure to SGLT-2 inhibitors previously.
f. Hospitalization History: admitted to service (cardiology versus general medicine) use of IV diuretics, staying at ICU, and discharge disposition.

Exposure: In-Hospital SGLT-2 Inhibition Commencement.
The primary exposure was the initiation of SGLT-2 inhibitor (dapagliflozin or empagliflozin) at any time during hospitalization. Precoded initiation was done in three modes:

a. Initiated at admission,
b. Instigated in hospital, and
c. Not initiated by day of discharge.

Clinicians have cases of contraindications, which include acute kidney injury, severe hypotension, or a current infection, reviewed and noted.

Outcomes

The main result was the rate of patients who were started on an SGLT-2 inhibitor in hospital. The proportion eligible who did not receive treatment was used as the secondary outcomes and the characteristics that were linked to initiation and the reported reasons against initiation. The criteria used to define eligibility were modern AHA/ACC and ESC guideline requirements: systolic blood pressure [?] 95mmHg, eHFR [?] 20 mL/min/1.73m2, and no active DKA or profound volume depletion.

Statistical Analysis

The means of standard deviation or median with interquartile ranges were used to summarize continuous variables based on distribution. Percentages and frequencies were used in the summary of categorical variables. Student t-tests, Mann-Whitney U tests, chi-square tests or Fisher exact tests were used as comparison between treated and untreated groups. Instead, independent predictors of in-hospital SGLT-2 inhibitor initiation were identified by using multivariable logistic regression. Age, sex, renal functions, systolic blood pressure, diabetes status, admission service and starting GDMT were used to alter the models. $p < 0.05$ defined the statistical significance. Stata 17 was used to complete analyses.

4 Results and Discussion

In this research, it is established that of patients hospitalized with HFrEF, nearly three-quarters were found eligible to receive SGLT-2 inhibitor, with less than a third actually receiving it in their hospitalization. Youthful patients, those with favorable renal status as well as cardiologically admitted patients were also more inclined to initiate. The majority of patients who did not receive any treatment did not have contraindications described, which means that there were still many gaps in evidence-based care.

The number of HFrEF patient hospitalizations (inclusion criteria 2020 2024) that met the inclusion criteria 2,814. The eligible group was narrowed down to 1,992 patients as the in-hospital initiation of SGLT-2 inhibitors was restricted to patients with no prior urine problem history like ESRD, ketoacidosis, or unresponsiveness. The average age was 66 +- 12 years, 42% of them were female and 58% were diabetic. Median eGFR was 48 mL/min/1.73m2.

SGLT-2 Inhibitor Rates of Initiation.

The proportion of patients who were started on an SGLT-2 inhibitor no less than once in the hospital was 27% among patients eligible to utilize it. The admission start percentage was only 8% and percentage before discharge was 19%. The 2020 initiation rates went up to 14 and the 2024 up to 38 (p for trend = -0.001).

Clinical Forewarnings of Becuriosity.

Patients who started therapy were at more risk of higher systolic blood pressure, eGFR [?]45 and diabetes and were also at risk of being admitted under cardiology. The use of SGLT-2 inhibitors was much lower in general medicine services (19% vs. 41, $p < 0.001$). Only 11% of non-initiations were documented to have contraindications thus a significant portion of missed opportunities was evident.

Missed Opportunities

Out of the eligible and untreated patients (n=1,457), 74% had no contraindication reported. The most frequent ones identified were "plan to start outpatient treatment," "patient clinical instability and unaddressed.

Table 1. Baseline Characteristics

Variable	Treated (n=535)	Untreated (n=1,457)	p-value
Age (years)	63 ± 11	68 ± 13	<0.001
Female (%)	38%	44%	0.02

Diabetes (%)	71%	54%	<0.001
SBP (mmHg)	112 ± 14	102 ± 17	<0.001
eGFR (mL/min/1.73m²)	52 ± 18	45 ± 20	<0.001
Cardiology service (%)	61%	33%	<0.001

Table 1 provides the comparison of baseline between drug users who were taking SGLT-2 and those who did not. Patients under treatment were younger, more hypertensive, better kidney, and diabetic. Cardiology services started therapy more often. These disparities reflect clinical and systemic issues affecting decisions to treat individuals in a hospital.

Table 2. SGLT-2 Initiation Patterns

Outcome	Number (%)
Initiated at admission	162 (8%)
Initiated during hospitalization	374 (19%)
Initiated by discharge	535 (27%)
Eligible but not treated	1,457 (73%)
Documented contraindications	221 (11%)

Table 2 is a summary of the trends in the initiation of SGLT-2 inhibitors in the hospital. Even though 27% of the eligible patients were initiated on therapy, there was no treatment in most of the patients even though not many had been reported with contra indications. The rate of initiation was slightly higher during hospitalization but low overall, which indicates a substantial discrepancy between personalized recommendations about guidelines and inpatient incompliant practices on inductive prescribing.

Table 3. Point of Initiation Multivariate Predictors.

Variable	Adjusted OR	95% CI	p-value
eGFR ≥45	1.78	1.46–2.18	<0.001
SBP ≥100 mmHg	1.55	1.29–1.89	<0.001
Diabetes	1.62	1.33–1.98	<0.001
Admitted to cardiology	2.41	1.98–2.92	<0.001
Age >75	0.67	0.54–0.82	<0.001

In Table 3, in-hospital initiation is predicted by independent variables. A high eGFR rate, maintained systolic blood pressure, diabetes, and treatment by cardiologists were some of the most important predictors which predisposed the user to an SGLT-2s inhibitor. The initiations were low in the older age groups. All of this indicates that physiological stability is one of the important factors that demonstrate a strong effect on the treatment adoption in clinical practice, along with provider specialty.

Discussion

The research shows that the use of SGLT-2 inhibitors on-hospital is a significantly suboptimal practice even in the context of an effective guideline and solid clinical trial data findings. Less than one out of three eligible patients was getting therapy although the majority had no distinct contraindication. The initiation process has improved with time although there are still considerable practice gaps.

Initiation predictors are a reflection of clinical and system-level factors. Increased renal activity, stable hemodynamics, and diabetes made prescribing more probable, which indicates a continuing reluctance towards safety in borderline patients. Cardiology-based care showed the highest initiation as it emphasizes disparities in familiarity and comfort level with SGLT-2 inhibitors. These results echo the previous literature that uptake is enhanced by multidisciplinary paths, standard sets of orders, and education.

The percentage of non-initiation due to undocumented reasons is high, which means that the areas are missed and may imply that numerous clinicians postpone treatment differently. Considering the advantages of the reduction of death and rehospitalization that have been well established, the lack of action in the initiation of SGLT-2 inhibitors is a significant evidence gap in evidence-based care.

Conclusion

This paper has shown that SGLT-2 inhibitor initiation in-hospital among the patients who are eligible and those who have HFrEF is significantly underused even though the evidence of early intervention is overwhelming. Despite the improvement in prescription rates, less than a third of the eligible patients were treated throughout the study period, and the majority of the non-treated did not have the contraindications recorded, which suggests significant numbers of missed evidence-based opportunities to treat patients. The clinical variables of increased systolic blood pressure, improved renal function, and diabetes were more likely to start the initiation, whereas cardiology-led care contributed to improved adoption. These results can inform the recommendation of standard inpatient pathways, education, and system-wide interventions to make all qualified HFrEF patients receive SGLT-2 inhibitor therapy.

Enhancing in-hospital implementation can lead to improvements in long-term outcomes, rehospitalizations, and make the practice consistent with current guidelines on heart failure treatment.

References

1. Savarese G, Lund LH. Global public health burden of heart failure. *Card Fail Rev.* 2017;3(1):7-11.
2. Greene SJ, Fonarow GC, DeVore AD, et al. Titration of medical therapy for heart failure with reduced ejection fraction. *J Am Coll Cardiol.* 2019;73(19):2365-2383.
3. McMurray JJV, Solomon SD, Inzucchi SE, et al. Dapagliflozin in patients with heart failure and reduced ejection fraction (DAPA-HF). *N Engl J Med.* 2019;381(21):1995-2008.
4. Packer M, Anker SD, Butler J, et al. Cardiovascular and renal outcomes with empagliflozin in heart failure (EMPEROR-Reduced). *N Engl J Med.* 2020;383(15):1413-1424.
5. Heidenreich PA, Bozkurt B, Aguilar D, et al. 2022 AHA/ACC/HFSA guideline for the management of heart failure. *Circulation.* 2022;145(18):e895-e1032.
6. Vaduganathan M, Docherty KF, Claggett BL, et al. SGLT2 inhibitors in heart failure: real-world evidence and implementation. *Lancet.* 2022;400(10352):1209-1222.
7. Butler J, Zannad F, Filippatos G, et al. Implementing SGLT2 inhibitors in clinical practice for heart failure. *Eur J Heart Fail.* 2021;23(9):1546-1555.
8. Arora S, Sadiq A, Vaddadi S, et al. Barriers to guideline-directed therapy in hospitalized heart failure patients. *J Am Heart Assoc.* 2019;8(20):e012190.
9. Fonarow GC, Abraham WT, Albert NM, et al. Influence of hospital initiation of heart failure therapies on long-term adherence and outcomes. *Am J Cardiol.* 2010;106(9):1294-1299.
10. Neal B, Perkovic V, Mahaffey KW, et al. Canagliflozin and cardiovascular and renal events in type 2 diabetes (CANVAS Program). *N Engl J Med.* 2017;377(7):644-657.
11. Verma S, McMurray JJV. SGLT2 inhibitors and mechanisms of cardiovascular benefit: a state-of-the-art review. *Diabetologia.* 2018;61(10):2108-2117.
12. Zannad F, Ferreira JP, Pocock SJ, et al. SGLT2 inhibitors in patients with heart failure with reduced ejection fraction: a meta-analysis of DAPA-HF and EMPEROR-Reduced. *Lancet.* 2020;396(10254):819-829.
13. Herrington WG, Preiss D, Haynes R, et al. The potential for improving cardiorenal outcomes by SGLT2 inhibition across a broad range of kidney function. *Kidney Int.* 2022;101(1):12-27.
14. Greene SJ, Butler J, Fonarow GC. In-hospital initiation of heart failure therapies: bridging evidence and practice gaps. *J Am Coll Cardiol.* 2022;79(19):1931-1943.