**Short Communication**

# Analysis of specialist doctors' behavior towards SGLT2 inhibitors prescription in Indonesia: A qualitative study

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## Abstract

Sodium-glucose cotransporter-2 inhibitors (SGLT2is) have a broad range of clinical indications and are recommended by various guidelines for the management of diabetes, heart failure, and chronic kidney disease. However, prescribing rates for these agents are suboptimal towards various intended indications in many countries, including Indonesia. The aim of this study was to analyze the prescribing practices of SGLT2is among endocrinologists, cardiologists, and nephrologists in Indonesia. A qualitative method was utilized to provide a comprehensive understanding of this phenomenon. Semi-structured online interviews were performed with 18 participants, comprising seven specialized doctors as primary informants; eight key informants representing pharmacies, governmental bodies, and pharmaceutical marketing representatives; and three patients as supplementary informants. Furthermore, closed observations of two specialist doctors were undertaken as an additional data collection method. Informants were recruited using criterion and snowball sampling methods. The Theoretical Domains Framework was used as an interview guide; all interviews were audio visual-recorded, transcribed verbatim, and subsequently analyzed for thematic content with NVivo version 12. Seven themes emerged concerning the prescribing behavior of SGLT2is: socioeconomic status, therapeutic rationality, utilization barriers, utilization optimization, the urge to prescribe, therapeutic expectations and targets, and aspects of the health system and ethical considerations. Most informants possessed favorable perspectives regarding using SGLT2is when prescribed appropriately, yet specific elements necessitate enhancement to refine therapeutic justification, including initiatives to incorporate SGLT2is into the national formulary.

**Keywords**: Cardiovascular diseases, diabetes mellitus type 2, qualitative research, chronic renal insufficiency, sodium-glucose cotransporter-2 inhibitors

## Introduction

$S$odium-glucose cotransporter-2 inhibitors (SGLT2is) are oral antidiabetic agents that enhance glucose excretion in urine by inhibiting glucose reabsorption in the renal tubules [1]. Beyond their glycemic control benefits, recent systematic reviews and meta-analyses have demonstrated the

efficacy of SGLT2is on the cardiorenal protective effects in both type 2 diabetes mellitus and non-diabetic patients [2-8]. Consequently, several international and national treatment guidelines have been revised to incorporate recommendations for the utilization of SGLT2is based on the cardiorenal benefits demonstrated in several prior research. These recommendations pertain to the utilization of SGLT2is as first-line therapy in diabetic patients with heart failure (HF), chronic kidney disease (CKD), and those with a history of or at elevated risk for atherosclerotic cardiovascular disease (ASCVD) [1,9-11].

The presence of recommendations from multiple treatment guidelines does not result in elevated prescription and utilization of SGLT2is. The DISCOVERing Treatment Reality of Type 2 Diabetes in Real World Settings (DISCOVER) project, a prospective observational investigation involving patients with type 2 diabetes, indicated that the global utilization of SGLT2is, including in Indonesia, remains comparatively low, particularly among the patients who require it. This research suggested that there is diversity in prescribing trends across nations, attributable to structural constraints associated with SGLT2is prescriptions, complicating the prescribing process for SGLT2is [12]. Numerous targeted research in Asia and other regions corroborated the underutilization of SGLT2I among patients with type 2 diabetes mellitus, including those with ASCVD risk [13-17], HF [18,19], and CKD [18].

These data indicated a divergence between therapeutic guidelines and the application of SGLT2is across different nations despite the cardiorenal advantages demonstrated by several randomized controlled trials (RCTs) [20-23]. Moreover, prior research suggested that prescribing behavior is shaped by multiple factors including the patient characteristics, the influence of pharmaceutical marketing, the doctor's characteristics, patient's preferences, clinical guidelines, healthcare system policies, and treatment expenses [24-26]. Physician-related factors and treatment expenses are the predominant factors affecting doctors' prescribing decisions, as identified in a review. The quality of care diminishes with heightened clinical experience, potentially contradicting medical guidelines. Simultaneously, insurance was determined to affect the choice and volume of healthcare consumption, as well as enhance health outcomes [24].

To bridge this gap, a more in-depth exploration of the prescribing practices of SGLT2is in Indonesia is necessary to formulate strategies to enhance the rationality of treatment in patients with type 2 diabetes and optimize safeguarding the cardiorenal system. The Theoretical Domains Framework (TDF) is a widely recognized model for assessing behavioral changes associated with adopting new practices, hence facilitating the identification of implementation challenges [27]. Thus, using the TDF model, this study aimed to analyze the prescribing behavior of SGLT2is among endocrinologists, cardiologists, and nephrologists in Indonesia to identify key determinants influencing SGLT2is prescription and informing strategies to enhance rational prescribing practices.

## Methods

### Study design
The present study employed qualitative data collective methods, specifically semi-structured in-depth interviews and closed observation, with a qualitative phenomenological design focused on the phenomena of low SGLT2is prescriptions. This research followed the Consolidated Criteria for Reporting Qualitative Research (COREQ) guideline [28] (see **Underlying data**).

### Research team
The team comprised of five researchers. F.C. is a female clinical pharmacist and PhD candidate at the Faculty of Pharmacy, Universitas Indonesia. The subsequent researcher, R.S., is a female pharmacist and a professor at the Faculty of Pharmacy, Universitas Indonesia. The third researcher, D.L.T., is a male endocrinologist at Dr. Cipto Mangunkusumo Hospital and a faculty member at the Faculty of Medicine, Universitas Indonesia. The fourth researcher, H.S., is a male pharmacist who teaches at the same institution as R.S. The fifth researcher, E.M., is a female professor specializing in qualitative research within the health sector and a lecturer in the Faculty of Public Health, Universitas Indonesia. All interviews were conducted by F.C.

### Setting

Interviews with informants were conducted from August to October 2024. Comprehensive online interviews via Zoom® meeting platform with informants were conducted, lasting around 30 minutes each, or until the informant addressed all inquiries. The online interviews were carried out to facilitate the participation of informants from diverse backgrounds, consequently optimizing the number of target informants. The observations were conducted in one general hospital and one cardiovascular hospital in Jakarta, Indonesia.

### Sampling methods

This qualitative study employed criterion and snowball sampling approaches. Criterion sampling was used to choose individuals based on established inclusion criteria [29]. This sampling method was employed to examine SGLT2is prescribing behavior from the viewpoint of several stakeholders. Simultaneously, snowball sampling was used to get additional informants or participants based on referrals from previous participants until data saturation was reached. This study utilized doctors as primary informants or main participants, providing core data about the research topic, and key informants possessing specialized knowledge who were eager to contribute their insights [30], and patients as supplementary informants. The eligibility criteria for the primary informant in this study were a practicing endocrinologist, cardiologist, or nephrologist, aligned with the prescribing indications outlined by various therapeutic guidelines, regardless of prior administrative experience in the pertinent medical association. Key informants were selected as they had expertise in medicine or policy-making roles. The criteria for key informants included practicing pharmacists affiliated with a professional association; representatives from the Indonesian Ministry of Health, Directorate of Pharmaceutical Management and Services; representatives from the Indonesian Food and Drug Monitoring Agency (*Badan Pengawas Obat dan Makanan*/BPOM); and marketing representatives from pharmaceutical manufacturers. Additionally, there were supplementary informants, specifically patients prescribed SGLT2is. The first engagement with primary, key, and supplementary informants was conducted by electronic mail or telephone. Informants who did not complete the interview or who failed to respond to all inquiries were eliminated from this study. Comprehensive interviews were performed with informants until data saturation was achieved. Closed observations were conducted twice based on the criteria established by the primary informant to comprehend behavior in real contexts.

### Data collection

This study consisted of semi-structured, in-depth interviews and closed observations of the primary informants. During the closed observation phase, researchers observed the place, actors (patients and doctors' characteristics), and activities throughout the consultation process. Apart from that, this study also conducted interviews with key and supplementary informants. Data was gathered online. The TDF served as an interview guide, prompting questions, and informants were requested to explain several open-ended inquiries. Audio-visual recordings were conducted during the interview, and significant points were made as field notes. No repeat interviews were carried out. The data collection process exclusively engaged a team of researchers and informants, with no participation from additional parties.

### Instrument

The question guide was developed utilizing a literature review and the Theoretical Domains Framework (TDF). The TDF comprises 14 domains: (1) knowledge, (2) skills, (3) social/professional roles and identity, (4) beliefs about capabilities, (5) optimism, (6) beliefs about consequences, (7) nature of behaviors, (8) intention, (9) motivation and goals, (10) memory, attention, and decision-making processes, (11) environmental context and resources, (12) social influence, (13) emotions, and (14) behavioral regulation [31,32]. The questions provided were adapted and altered from the question guide by Ng *et al.*, 2022 [33]. The details of probing questions can be found in the **Underlying data**. Interview pilot testing was conducted with a non-informant who fulfilled the supplementary informant criteria and conducted before the commencement of the interviews with informants. No changes to the question guide were made after the pilot interview.

**Validation**
Validity is established by returning the interview transcripts to informants, who can then offer input on the transcripts. The integrity of qualitative data is guaranteed through the employment of two coders for analysis (investigator triangulation), the inclusion of many groups of sources or informants (data triangulation), and the utilization of various data collective methods (methodological triangulation) [34].

**Data analysis**
This research employed qualitative analysis utilizing the Editing Analysis model, wherein the researcher functioned as an interpreter, examining the data to identify significant segments. The segments were subsequently discovered, reviewed, and developed into suitable codes, followed by examining structures and patterns within the derived categories [30]. The analysis phase of this research aims to identify the code derived from the interview transcript data. Codes deemed analogous were consolidated into a theme. Two individuals independently determined codes and themes, and talks ensued until a consensus was achieved. The qualitative data analysis used the NVivo version 12 tool.

# Results

In-depth semi-structured interviews were performed with 18 informants, comprising seven primary informants, eight key informants, and three supplementary informants. One informant from a pharmaceutical marketing representative withdrew from the study before the interview due to a lack of confidence in responding to the questions. The characteristics of the informants are presented in **Table 1**. Furthermore, two informants, a cardiologist and an endocrinologist, engaged in closed observations. From the member-checking process, two informants contributed input from the interview transcript, incorporating this feedback into the coding process. The data analysis produced 155 codes and subcodes, categorized into seven themes (**Figure 1**): socioeconomic status (SES), therapeutic rationality, utilization barriers, utilization optimization, the urge to prescribe, expectations and targets of therapy, and aspects of the health system and prescribing ethics. All data obtained from closed observations confirmed the findings from semi-structured interviews, as no contradictory or new findings were found from these activities. Various codes that emerged from closed observation were incorporated into therapeutic rationality, utilization barriers, the urge to prescribe, and expectations and targets of therapy themes. The majority of informants possessed a favorable perception of the prescription of SGLT2 inhibitors when utilized according to clinical indications. A comprehensive overview of all codes, subcodes, and quotes can be seen in the **Underlying data**.

Table 1. Characteristics of informants

| Characteristic | Number of informants | | |
|---|---|---|---|
| | Primary (n=7) | Key (n=8) | Supplementary (n=3) |
| Age | | | |
| ≤30 years old | - | 1 | - |
| 31–40 years old | 1 | 3 | - |
| 41–50 years old | 3 | 3 | - |
| >50 years old | 3 | 1 | 3 |
| Sex | | | |
| Male | 5 | 3 | 1 |
| Female | 2 | 5 | 2 |
| Medical specialty | | | |
| Endocrinologist | 4 | - | - |
| Cardiologist | 1 | - | - |
| Nephrologist | 2 | - | - |
| History of medical association involvement | | | |
| Indonesian Endocrine Society (PERKENI) | 4 | - | - |
| Indonesian Cardiovascular Society (PERKI) | 1 | - | - |
| Indonesian Society of Nephrology (PERNEFRI) | 1 | - | - |
| Never served as an organizational administrator | 1 | - | - |
| Years of practice | | | |
| ≤5 years | - | - | - |
| 6–10 years | 2 | 2 | - |

| Characteristic | Number of informants | | |
|---|---|---|---|
| | Primary (n=7) | Key (n=8) | Supplementary (n=3) |
|     11–20 years | 1 | 4 | - |
|     >20 years | 4 | 2 | - |
| Healthcare sector | | | |
|     Public | - | 6 | - |
|     Private | 3 | 2 | - |
|     Both (public and private) | 4 | - | - |
| Occupation | | | |
|     Pharmacist | - | 3 | - |
|     Ministry of Health | - | 2 | - |
|     Indonesian Food and Drug Monitoring Agency (BPOM) | - | 2 | - |
|     Pharmaceutical marketing | - | 1 | - |
| Education level | | | |
|     Diploma/bachelor's degree holder | - | - | 3 |
|     Master's degree holder | - | 6 | - |
|     Doctoral/subspecialist degree holder | 7 | 1 | - |
|     Profession degree holder | - | 1 | - |
| Income level | | | |
|     <Minimum regional wage | - | - | 3 |
|     ≥Minimum regional wage | 7 | 8 | - |

**Theme 1: Socioeconomic status (SES)**
Most informants indicated that SES is a critical doctor's consideration when prescribing SGLT2is. This encompasses restrictions on administering drugs outside the national formulary, cost considerations, private insurance coverage, payout of patients' pockets, and pharmaceutical prices in Indonesia exceeding those of neighboring countries.
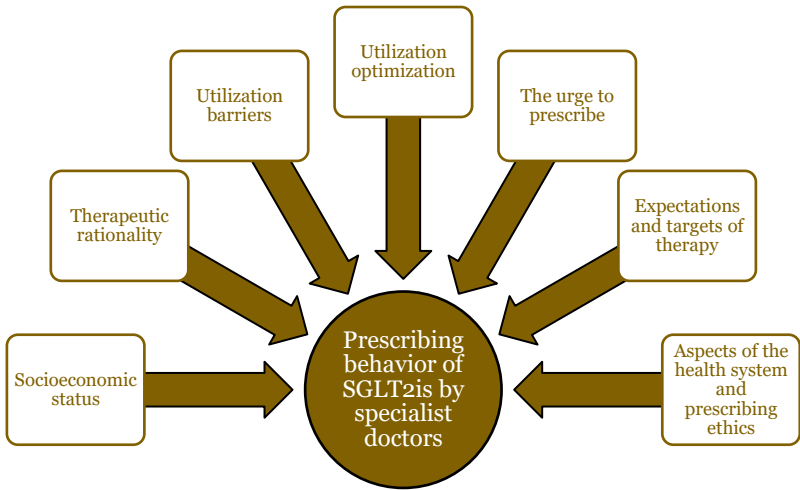


Figure 1. Themes related to the prescribing behavior of SGLT2is by specialist doctors.

"*Yes, that's right. Since National Health Insurance (Badan Penyelenggara Jaminan Sosial/BPJS) doesn't cover this medicine yet, it might not be available in all hospitals, especially those that use BPJS.*" (Informant 5: primary informant)

"*If it's efficacious, even though it's expensive, we (the patients) will buy it. It's just that the economy is difficult right now, so people are looking for something cheaper.*" (Informant 13: supplementary informant)

**Theme 2: Therapeutic rationality**
This theme arose from many perspectives offered by the informants, underscoring the significance of multiple aspects in supporting rational therapy. The factors encompass patient-centered treatment, weighing the risks and benefits, therapy monitoring, the oral route of administration, sustainability, treatment time appropriateness, the importance of doctor's idealism, the importance of a healthy lifestyle, Communication, Information, and Education

(CIE) to patients, dosage precision, doctor's competence, experience-based medicine, evidence-based medicine, Cost-Benefit Analysis (CBA), and role of various stakeholders.

"*But still, according to my perspective, doctors have to make a diagnosis and determine what the right therapy is; they have to be precise because sometimes you have to look at the benefits and risks of using SGLT2 (inhibitors) for patients*" (Informant 16: key informant)

"*What we have to be careful about is sponsorship. Yes, even if, for example, we assume we are fair. Scientific meetings, for example, can be supported by pharmaceuticals. However, we still have to maintain our idealism as doctors, that if we use medicine, we must understand the right indications, when the patient should be given this medicine.*" (Informant 7: primary informant)

"*Well, it's a bit disheartening that sometimes people disregard the guidelines. We have clear instructions stating that the dosage should not exceed 10 (mg), as higher doses are ineffective and potentially harmful. Yet, we still encounter patients receiving doses as high as 25 (mg). It's quite saddening to see patients come to us with worsening estimated Glomerulus Filtration Rate (eGFR) after being prescribed such high doses.*" (Informant 4: primary informant)

### Theme 3: Utilization barriers
The interview process revealed various barriers to the utilization of SGLT2is, including indication restrictions, not known to the public, doctor's problems in updating information, patients' incompliance, lack of outreach to health workers, doctors' insufficient medical knowledge, drug availability problems, limitations of studies in Indonesia, a new class of anti-diabetic agents, financing problems, evidence vs practice, and risks of administering SGLT2is. Drug availability problems encompass distribution difficulties, stock shortages, budget limitations, internal hospital regulations, and taxation concerns. Simultaneously, financial problems arise from exclusion from the national formulary and certain private insurance coverage. Moreover, the risks of administering consist of the potential for drug interactions and adverse drug reactions.

"*Thirdly, are there any contraindications or special concerns for these patients to get SGLT2 inhibitors? Maybe there is an acute condition or acute illness because we know it can cause dehydration. Because it (SGLT2 inhibitors) increases diuresis, this also needs to be taken into consideration.*" (Informant 5: primary informant)

"*I agree that the problem is information, apart from prescribing, maybe because we don't know the information, not all doctors are always updated. But yes, the good thing is, I think if now it can be accessed with Pelataran Sehat (a learning digital platform built by the Ministry of Health), free courses can be given; maybe it will be beneficial, but again, considering that in the past I also worked in a very remote area, in the middle of nowhere, I wanted to join in, but there was no signal. So those doctors (in remote areas) must attend offline training.*" (Informant 3: primary informant)

"*Sometimes, regarding pharmaceutical distribution, it depends on whether or not a distributor branch office is available in that area or whether marketing staff or sales staff from the drug manufacturer is available. "So, there is a possibility that these are the reasons why the drug is not yet available.*" (Informant 16: key informant)

### Theme 4: Utilization optimization
Regarding barriers to utilization have prompted various strategies to optimize the application of SGLT2is based on indications, including a cost-sharing system, implementation of in-depth studies in the Indonesian population, hospital management systems optimization, domestic pharmaceutical production, all tiers of physicians possess the prescriptive authority, production of non-innovator medicines, production of generic medicines, inclusion in the national formulary, expanding the scope of indications, access to various regions, the importance of outreach to health workers, the importance of national therapeutic guidelines, organizing public seminars, collaboration between health workers, full reimbursement by the National Health

Insurance, and ability to update information, and drug promotional activities. The cost-sharing system is stated by a key informant, meaning that patients are only required to pay a certain number of additional costs based on their rights to access the medicine. The outreach to healthcare workers is the socialization concerning the utilization of SGLT2is that should be aimed at physicians, pharmacists, and other healthcare practitioners aiming at updating the knowledge based on evidence. The requirements and steps of the national formulary must be considered.

*"Maybe in the future, when the patent period has expired, there will be a generic drug or me-too drug*." (Informant 1: primary informant)

*"...but of course, to enter the formulary, many conditions must be met, not only related to effectiveness but also to cost-effectiveness. Does it have value for money? What is the budget impact analysis of this drug? Can the Indonesian health insurance fund guarantee this medicine and the sustainability of our health insurance? Under the National Health Insurance (Jaminan Kesehatan Nasional/JKN) financing regulations for anti-diabetes drugs, it is included in chronic medicines, which can be claimed separately by BPJS. So, this will affect the financing of the budget. The impact has to be seen.*" (Informant 17: key informant)

*"For me, the studies must be deepened, in-depth studies. We must be more courageous in reviewing our therapy management."* (Informant 9: key informant)

### Theme 5: The urge to prescribe
Multiple factors affecting clinicians' decisions to prescribe SGLT2is originate from diverse resources, including therapeutic guideline recommendations, academic gathering, information from medical representatives, medical education, and peer influence. Other factors influencing prescriptions encompass the continuation of prior patient medications, patient's preferences, doctor's clinical judgment and authority, business considerations, advantageous drug profiles, the benefits outweigh the risks, comparisons with other medications, various indications, various benefits, influence from superiors, doctor's confidence, frequent prescribing practices, trial and error, and therapeutic positioning, serving as a second-line therapy for diabetes, a first-line therapy for kidney and cardiovascular diseases, and diabetes patients with this medical history.

*"So, indeed, knowledge or information regarding indications or recommendations from international guidelines, or if there's already existing data, there might be guidelines in Indonesia perhaps, as a guide for doctors to prescribe. But I think those guidelines are only for blood sugar; for CKD, it's new, so information or knowledge regarding international guidelines is important. Therefore, doctors should also know the recommendations from international guidelines*." (Informant 5: primary informant)

*"Yes, the results of clinical trials in heart failure populations have been auspicious, with side effects that are still considered tolerable*." (Informant 2: primary informant)

*"I'm not saying other medications are inferior. Other drugs like metformin, insulin, sitagliptin, and vildagliptin are also excellent. However, this particular medication offers additional benefits that are quite remarkable. Unfortunately, these benefits haven't been adequately communicated to the public*." (Informant 1: primary informant)

### Theme 6: Expectations and targets of therapy
The objectives of SGLT2is utilization encompassed achievement of glycemic control, weight reduction, no occurrence of side effects, protection against diabetic complications, improvement of quality of life, and improvement of cardiac and renal function. This medicine is associated with several expectations, including patients' expectations, new hope for managing diabetes complications, expectation of reduced morbidity and mortality, and expectations for lowering patient expenses.

"*However, the advent of SGLT2 inhibitors and Glucagon-like peptide-1 (GLP-1) receptor agonists has brought new hope. Previously, we were somewhat dissatisfied with diabetes medications due to the lack of evidence supporting their ability to reduce cardiovascular and renal risks. We are now more optimistic about the emergence of GLP-1 receptor agonists and SGLT2 inhibitors, which have demonstrated such effects. After all, the primary goal of diabetes treatment is to prevent complications, particularly cardiovascular and renal diseases. Although other complications exist, these two are the most life-threatening, and we are hopeful for significant improvements.*" (Informant 6: primary informant)

### Theme 7: Aspects of the health system and prescribing ethics
This aspect encompasses BPOM approval, prescription drugs, referral to a specialist, integrated medical records, distinctions between public and private healthcare facilities, and adherence to the national formulary.

"*I think the availability of this medication is relative, depending on the healthcare facility. In private healthcare facilities, it's likely to be readily available. However, primary care facilities might not have it. This medication might be difficult to obtain in secondary healthcare facilities, especially public hospitals serving only JKN (National Health Insurance) patients. But there hasn't been any issue for private healthcare facilities.*" (Informant 2: primary informant)

## Discussion
SGLT2is is a novel class of oral antidiabetic medications that have been accessible in Indonesia for less than ten years [35,36]. Research examining the perception and prescribing behavior of SGLT2is remains scarce; nevertheless, this study underscores several factors that may affect prescribing patterns. The biggest concern that emerged from the patients' perspective was related to SES. A cross-sectional study in the United States indicated that patients in lower-income regions may exhibit distinct prescribing patterns relative to those in higher-income areas. Individuals with higher incomes are more frequently prescribed branded or costlier medicines. This dynamic is exacerbated by the reality that patients with lower SES often encounter limited access to healthcare resources, resulting in a heightened dependence on generic pharmaceuticals as a cost-saving strategy [37].

This study underscored the importance of therapeutic rationality. Rational prescribing involves a systematic analysis of the therapeutic context, patient needs, and drug characteristics. The primary informants emphasized that rational prescribing extends beyond the act of writing a prescription; it included ongoing monitoring and adjustments based on patient responses to therapy [38]. This comprehensive approach is crucial for achieving optimal therapeutic outcomes, which is parallel to the results of this study.

This research discovered multiple barriers to the prescription of SGLT2is. As a relatively novel oral anti-diabetic agent, there is a concern about insufficient medical knowledge, particularly among primary care doctors. A study by Ng *et al.* corroborates this finding, demonstrating a lack of knowledge that the cardiovascular and renal advantages of SGLT2is are independent of glucose regulation [33]. Another study indicated a comparable knowledge deficiency among cardiologists [39], emphasizing insufficient understanding as the principal obstacle to prescription SGLT2is. An observational study in Canada indicated that the prescription of SGLT2is was markedly lower among senior individuals, those with lower income, women, and patients with concomitant HF or CKD [17], probably due to concerns over adverse drug reactions, despite prior studies demonstrating the advantages of SGLT2 inhibitors for HF or CKD patients [21,22,40,41]. Another prominent obstacle is pharmaceutical non-adherence. The 2023 Indonesia Health Survey revealed that among the 6.5% of the Indonesian population diagnosed with diabetes, merely 5.46% complied with their treatment regimen, and only 4.12% attended follow-up appointments [42]. Fundamental health research in Indonesia identified the factors contributing to non-adherence to antidiabetic treatment as follows: feeling healthy (50.4%), irregular treatment-seeking behavior at health facilities (30.2%), reliance on traditional medicine (25.3%), frequent forgetfulness regarding medication (18.8%), inability to tolerate drug side effects (12.6%), financial constraints preventing regular purchase of medication (8.5%),

unavailability of medication in health facilities (2.1%), and other reasons (18.2%) [43]. Various strategies have been suggested to mitigate these prescribing barriers, as elaborated in theme 4. One strategy to enhance adherence is to lower prescription expenses, for instance, by encouraging the development of generic drugs since both dapagliflozin and empagliflozin's patented permission expires in 2025 [44,45]. Another strategy is creating collaboration among healthcare practitioners. Dascanio et al. conducted a study at a Malawian tertiary hospital, revealing that implementing clinical pharmacy services significantly enhanced rational prescription. Their research indicates that clinical pharmacy interventions can enhance prescribing quality, improve patient outcomes, and reduce adverse medication occurrences [46]. This supports the notion that rational prescribing enhances patient safety and optimizes healthcare resource utilization.

Most primary and key informants compared the benefits of SGLT2is with those of other antidiabetic medications. A network meta-analysis indicated that SGLT2is is superior to Glucagon-Like Peptide-1 (GLP-1) agonists in decreasing Hospitalization for Heart Failure (HHF) (OR: 0.74; 95%CI: 0.65–0.85). However, they are less effective in reducing the incidence of non-fatal stroke [47]. In comparison to Dipeptidyl peptidase-4 (DPP-4) inhibitors, SGLT2is diminished the risk of Major Adverse Cardiovascular Events or MACE (HR: 0.85; 95%CI: 0.75–0.95), HHF (HR: 0.46; 95%CI: 0.35–0.57), and acute kidney injury (HR: 0.73; 95%CI: 0.66–0.81), while presenting an elevated risk of genital infections (HR: 2.17; 95%CI: 1.98–2.36) [48]. Furthermore, a meta-analysis of the Asian population indicated that SGLT2is exhibits comparable effects on glycemic control, blood pressure improvement, enhancement of anthropometric measures, elevation of High-Density Lipoprotein (HDL) cholesterol, and a diminished risk of hypoglycemia relative to sulfonylureas [8]. While research throughout Asia has demonstrated favorable outcomes, there is a paucity of studies focused on the Indonesian population since the authors could not find related publications; thus, additional investigations are required to assess the efficacy and safety of SGLT2is compared to other anti-diabetic medications.

The various benefits of using SGLT2is are shown in previous studies [2,8,49], which raises expectations for achieving glucocentric and cardiorenal protection targets, as stated in theme 6. On the other hand, business considerations significantly influence prescribing practices, as demonstrated by a systematic review indicating that interactions between doctors and pharmaceutical sales representatives, including offering gifts or incentives, affect prescribing behavior [50]. Therefore, maintaining doctors' idealism is crucial to ensure that drug prescribing remains patient-centered, as highlighted by the insights derived from this study.

The health system aspect dramatically influences the prescription of SGLT2is. As indicated, all primary and key informants underscored the necessity of including the medicine in the national formulary for broader patient utilization. A literature review revealed an average prescription adherence to the national formulary of 71.02% [51], underscoring the necessity of performing health technology assessment, including cost-effectiveness and budget impact analyses for SGLT2 to ascertain the drug's value and advocating for its inclusion in the national formulary. A qualitative study identified deficiencies in the national formulary drug selection process, including a lack of transparency and the inadequate implementation of evidence-based medicine in formulating the drug list [52]. Therefore, both of these issues must be addressed to promote rational prescribing.

This study has a drawback, specifically not including family physicians or other doctor specialists prescribing the same drug. However, it has incorporated experts in alignment with the therapeutic guidelines, including endocrinologists, cardiologists, and nephrologists. Some informants were acquainted with the researchers as professional colleagues; however, the researchers employed multiple triangulation and member-checking to mitigate potential bias arising from this relationship. Despite the drawbacks, this study presents diverse viewpoints on prescribing SGLT2is, novel medications characterized by relatively high costs and lack of endorsement by the National Formulary.

## Conclusion

Seven themes emerged concerning the prescribing behavior of SGLT2is by specialist doctors: SES, therapeutic rationality, utilization barriers, utilization optimization, the urge to prescribe,

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expectations and targets of therapy, and aspects of the health system and prescribing ethics. Most informants have positive insights about using SGLT2is when prescribed as indicated; however, certain elements require optimization to improve therapeutic rationale, including efforts to integrate SGLT2is into the national formulary. Thus, health technology assessment is highly needed to evaluate the cost-effectiveness of SGLT2is' and their value for healthcare investment. If deemed cost-effective, the inclusion of SGLT2is into the national formulary could increase accessibility and ensure broader availability for eligible patients.

### Ethics approval

Before the commencement of this research, the research design obtained ethical approval from the Ethics Committee of the School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia, reference number 04/08/KEP-FKIKUAJ/2024. Potential informants were apprised of the research's objectives and assured of the confidentiality of their identities, in addition to completing a consent form for participation in the study.

### Competing interests

All the authors declare that there are no conflicts of interest.

### Underlying data

Derived data supporting the findings of this study are available from: https://figshare.com/s/20f23f5eb557f9371a39.

### Declaration of artificial intelligence use

This study used Quillbot for manuscript writing support to help refine the language. We confirm that the authors critically reviewed all AI-assisted processes to ensure the integrity and reliability of the results. The authors solely made the final decisions and interpretations presented in this article.

## How to cite

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