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Lipid-lowering agent preferences among patients with hypercholesterolemia: a focus group study

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ABSTRACT

Background: Non-adherence to lipid-lowering agents poses significant risks to patients and diminishes treatment effectiveness. Current understanding of patients' preferences regarding the characteristics of these agents is limited. This study aims to qualitatively identify the barriers to lipid-lowering medication adherence and the factors considered by patients with hypercholesterolemia when choosing lipid-lowering agents, and to inform the design of a medication preference study.

Methods: Face-to-face focus group interviews were conducted with Cantonese-speaking patients diagnosed with hypercholesterolemia in Hong Kong. Patients were recruited by cardiologists at a university-affiliated hospital using convenience sampling. The interviews consisted of three parts: gathering patients' perceptions of disease and medication, identifying

important factors in selecting lipid-lowering agents, and completing the medication preference tasks designed using the Discrete Choice Experiment (DCE) method. Thematic analysis was used to categorise the codes derived from the transcripts into higher-order themes.

Results: Twenty patients completed the focus group interviews on the university campus between January and March 2023. Four main themes emerged: medication management issues, patients' medication preferences, structure, and comprehension of preference tasks. Barriers to medication adherence included lack of knowledge, a high pill burden, poor communication with healthcare providers, minimal treatment decision involvement, limited access to medication information, side effects, and forgetfulness. Factors influencing medication choice were treatment regimen (i.e. the route and frequency of administration), effectiveness, side effects, doctors' opinions, drug interactions, and out-of-pocket costs. Despite suggestions for modifying attributes and levels, the medication preference tasks effectively reflected patients' trade-offs.

Conclusions: The identified barriers to medication adherence and the factors influencing medication choice highlight the importance of considering patients' perspectives. These insights could assist decision-makers in selecting medications that align with patient preferences, thereby promoting medication adherence. A large-scale DCE preference study will be conducted in Hong Kong to quantify the relative importance of the attributes of lipid-lowering agents.

1. Introduction

Cardiovascular disease (CVD) affects over 523 million people globally. Hypercholesterolemia, defined as elevated blood cholesterol, especially low-density lipoprotein (LDL) cholesterol, is an important cause of athero-sclerotic cardiovascular disease (ASCVD) and a primary mediator of the burden of CVD (Ference et al., 2017; Roth et al., 2020). Its clinical manifestations, such as myocardial infarction (MI) and ischaemic stroke, are leading causes of morbidity and mortality (Ference et al., 2017; Kassebaum et al., 2016). From 1990 to 2019, CVD cases increased by 77% worldwide (Li et al., 2023). In Hong Kong, heart diseases, including ASCVD, were the third most common cause of death in 2020 (The Centre for Health Protection of the Department of Health, 2023).

Over the decades, considerable progress has been achieved in managing hypercholesterolemia with various lipid-lowering agents like statins, which are highly effective in preventing cardiovascular disease and are widely pre-scribed in Hong Kong (Banach & Penson, 2020; Blais et al., 2019). The Hospital Authority (HA) has also incorporated other lipid-lowering agents, including ezetimibe, fibrates, proprotein convertase subtilisin-kexin type 9 (PCSK9)

inhibitors, and inclisiran, which feature diverse efficacy profiles, routes of administration, and costs (Hospital Authority, 2023; Mach et al., 2020; Ray et al., 2020).

Despite the benefits of lipid-lowering agents, medication non-adherence, defined as patients not taking medication as prescribed, remains a major challenge for hypercholesterolemia management (Centers for Disease Control and Prevention, 2023; Nelson et al., 2024; Gomez Sandoval et al., 2011). Among new statin users, 48.2% did not adhere to their regimen, and 23.9% discontinued treatment within the first year (Ofori-Asenso et al., 2018). Low adherence to statin therapy has been associated with a greater risk of mortality (Deshpande et al., 2017; Rodriguez et al., 2019). Importantly, full adherence to guideline-recommended therapies not only lowers the incidence of major adverse cardiovascular events (MACE) but also leads to financial savings (Bansilal et al., 2016).

Studies indicate that patients' beliefs and attitudes towards medication significantly influence treatment adherence (Horne & Weinman, 1999). However, there is a lack of research on Chinese patients' views towards lipid-lowering agents. Cultural factors, health belief models, and the patient-physician dynamic may uniquely shape these perspectives, thus necessitating focused research in this population.

To address these gaps, this study employed focus group interviews to investigate patients' perspectives and preferences regarding lipid-lowering agents in Hong Kong. The focus group method is particularly advantageous for exploring the subjective nuances of patient experiences, revealing in-depth attitudes and behaviours that quantitative methods might overlook (Morgan et al., 1998). This study aims to qualitatively identify the barriers to medication adherence and the factors patients consider when choosing lipid-lowering agents, and to inform the design of a medication preference study.

2. Methods

Focus group interviews were conducted face-to-face on the university campus to gather patients' viewpoints on lipid-lowering agents. Individuals diagnosed with hypercholesterolemia, aged 18 years or above, were recruited by cardiologists from the Specialist Out-Patient Clinic (SOPC) at a university-affiliated hospital managed by the HA. The HA oversees public hospital services, specialist and general out-patient clinics in Hong Kong. It also administers the HA Drug Formulary. This formulary is designed to ensure that pharmaceuticals are prescribed with a balance of efficacy, safety, and cost-effectiveness, and is reviewed regularly. Hypercholesterolemia was diagnosed by cardiologists based on the European Society of Cardiology (ESC) lipid management guidelines (Mach et al., 2020). Individuals with a history of ASCVD, including coronary heart disease, stroke, and peripheral arterial

disease, were included in this study if their untreated LDL cholesterol levels were 1.4 mmol/L or higher. For individuals without clinical evidence of ASCVD, the threshold for untreated and high LDL cholesterol was set at 1.8 mmol/L or 2.6 mmol/L, contingent upon additional cardiovascular risk factors. The interviews were recorded. The number of focus group interviews conducted was determined by the principle of data saturation. Each participant received a supermarket coupon worth 100 HKD (12.82 USD) upon completion of the interview. The study design was reported according to the Consolidated Criteria for Reporting Qualitative Research (COREQ) (Tong et al., 2007). This study was approved by the Institutional Review Board of the University (UW 22-772).

2.1. Interview procedure

Participants were first introduced to the study's purpose, followed by signing a consent form. They then completed questions about their demographic characteristics, including age, gender, ethnicity, marital status, occupation, education level, income level, health status, and medication usage. The focus group interview was divided into three parts (Interview questions are documented in Supplemental Material). The key questions in the interview guides were compulsory and posed by the two facilitators (HHEY, LWYF) during the focus group interviews. These questions were open-ended to encourage broad discussion. The facilitators played an active role in ensuring that all participants were engaged in the conversation, encouraging them to respond respectfully to, or build upon, others' viewpoints, thereby fostering a collaborative dialogue. Whenever a participant shared a response, the facilitators encouraged the group to discuss their thoughts or feelings on that response. This strategy guided participants to listen actively to each other and engage deeply with their groupmates, thus moving beyond the mere expression of individual opinions. Moreover, specific strategies were used by the facilitators to prevent any individual from dominating the conversation and to ensure that the discussion reflected the collective views of all participants. Less vocal participants were directly invited to share their thoughts, and follow-up questions were used to further explore their viewpoints. The facilitators fostered a supportive and non-judgmental atmosphere by maintaining a friendly attitude and using non-verbal cues such as smiling and nodding to make participants feel comfortable and valued. The facilitators also occasionally rephrased or simplified questions to help participants express their thoughts. This approach aimed to reduce anxiety or hesitation during the discussion.

The first part of the interview required participants to discuss their understanding of hypercholesterolemia, atherosclerotic cardiovascular disease, and lipid-lowering agents. They were asked to share their

perceptions of hypercholesterolemia, personal diagnostic experiences, and knowledge of lipid-lowering agents. Second, they discussed and ranked the factors important to them when choosing a lipid-lowering agent. They were asked to discuss and verbally rank the important characteristics of an ideal lipid-lowering agent. Third, they completed three medication preference questions pre-designed using the discrete choice experiment (DCE) method. Each DCE question presented two options for hypothetical lipid-lowering agents, and participants were asked to choose their preferred one. Each option was described by seven attributes (factors) that patients typically consider when choosing a lipid-lowering agent, including treatment regimen, side effects, clinician recommendation, additional medication, risk reduction of major adverse cardiovascular events (heart attack, stroke, cardiovascular death) after taking medication (%), average reduction from baseline in LDL cholesterol levels when adhering to the medication for one year (%), and the annual out-of-pocket cost (HKD). These attributes were identified through literature review and consultations with clinicians, who evaluated and ranked the importance of all relevant factors. Upon completion of these three discrete-choice questions, participants discussed the format, content and effectiveness of these questions in capturing their preferences (DCE questions are documented in Supplemental Material) (Mulhern et al., 2019).

2.2. Data analysis

The interview audio recordings were transcribed verbatim and then translated into English for thematic analysis, capturing both the content and the dynamics of the discussion. Two independent raters (HHEY and KD) first performed open coding to summarise initial messages identified in each part of the interview at a semantic level based on the verbal discussion between participants. A third rater (LWYF) resolved discrepancies and discussed potential latent codes and themes derived from the open coding results with the first two raters. Following this, a coding tree was constructed to categorise and summarise the relationships between codes. A codebook was used to describe the meanings of codes, with examples of patients' quotes from the transcripts. Next, the developed coding framework was applied by the two raters (HHEY and KD) to code two informative transcripts independently. The coding results were then compared between the two raters to assess inter-rater reliability. The third rater facilitated the coding discussion when the two raters failed to reach a consensus on coding differences. A revised coding framework was subsequently established by adding, deleting, and amalgamating pertinent codes and themes. The first rater (HHEY) then employed this robust coding structure to code the remaining transcripts, with cross-checking by the second and third raters (KD and LWYF). A

descriptive account was finally produced to re-categorise the similarities and differences within this final set of codes, generating high-order themes. All coding analyses were performed using NVivo 14.

3. Results

Four focus group interviews involving a total of 20 patients were completed between 14 January 2023 and 5 March 2023. The sample size per focus group ranged from four to six participants. Table 1 presents the demographic characteristics of these patients.

Table 1. Demographics of the 20 participants with hypercholesterolemia.

Characteristics	Number of patients (%)
Age	
50–59	3 (15)
60–69	13 (86.67)
70–79	4 (26.67)
Median (IQR), years	66 (60–69)
Gender	
Male	12 (60)
Female	8 (40)
Body Mass Index	
<18.5	1 (5)
18.5-24.9	6 (30)
25-29.9	6 (30)
30 or higher	4 (20)
Not reported	3 (15)
Education level	
No formal education	2 (10)
Primary	6 (30)
Secondary	9 (45)
Tertiary or postgraduate	3 (15)
Marital status	
Single	5 (25)
Married	15 (75)
Employment status	
Unemployed	1 (5)
Housewife	3 (15)
Part-time	2 (10)
Full-time	5 (25)
Retired	9 (45)
Number of medications taken daily	
1–2	3 (15)
3–4	2 (10)
>5	15 (75)
Smoking status	
Non-smoker	15 (75)
Ex-smoker	3 (15)
Current smoker	2 (10)
Alcohol consumption	
Non-drinker	13 (65)
Occasional drinker (Drink 3 days or less a month)	6 (30)
Regular drinker (Drink at least once a week)	1 (5)

Note: IQR, interquartile range.

Four themes were derived from the discussion to document the barriers to medication adherence, patients' preference for lipid-lowering agents, and the design of DCE preference tasks (Table 2).

3.1. Theme 1: Medication management issues

This theme documents the barriers to medication adherence.

3.1.1. Lack of patient knowledge and education

Many patients lacked understanding of their disease status and the lipid-lowering medications prescribed. They were not sufficiently aware of the importance and benefits of the medication.

> When picking up the medication, they (doctors or pharmacists) just told me that it's for lowering the cholesterol. We didn't know how to take the medication. I don't even know how high my current cholesterol level is. (Group 1, participant 3)

The input from health professionals to educate patients about the benefits of medications was inadequate, leading patients to misinterpret their health conditions after medical consultations and underestimate the long-term benefits of adhering to medication.

> Sometimes I find there are many medications left unopened when I visit the elderly, and I ask them why. They say they don't need to take the medications because they will be fine after having the appointment with the doctor. (Group 2, participant 2)

Table 2. An overview of the themes and codes derived from the focus group interviews.

Themes	Codes
Medication management issues	• Lack of patient knowledge and education • Pill burden • Poor communication with doctors • Lack of involvement with patients • Access to medication information • Side effects • Forgetfulness
Patients' medication preferences	• Treatment regimen • Effectiveness • Side effects • Doctors' opinions • Drug interactions • Out-of-pocket costs
Structure of preference tasks	• Trade-off nature • Instruction of tasks • Number of attributes and levels
Comprehension of preference tasks	• Priority of attributes • Preference heterogeneity • Clarification of wordings or phrases • Description refinement of attributes and levels • Completion manageability

3.1.2. Pill burden

Patients expressed concern about using multiple medications to manage hypercholesterolemia and comorbidities.

> After that (Percutaneous Coronary Intervention), I was prescribed two more kinds of medications. One was aspirin, and the other was used to lower cholesterol … The doctor also suggested adding aspirin when I was diagnosed with hypertension. That would hurt my stomach, so the doctor asked me to take another tablet for it … I was resistant because I didn't like taking medicine. (Group 1, participant 4)

3.1.3. Poor communication with doctors

Patients commonly reported a perceived lack of personal attention from doctors, along with their reluctance to provide medication information in detail. This was attributed to appointment time constraints and the challenge of conveying terminology or other complex information to patients with little medication knowledge.

> When you go to the follow-up appointment after taking the medicine and doing the blood test, the doctor may not discuss it in detail with you. They will ask, 'Is there anything wrong? If not, continue to take the medications. (Group 2, participant 1)

3.1.4. Lack of involvement with patients

Patients were less satisfied when they were not included in the decision-making process.

> I think sometimes doctors can ask for the patients' opinion or tell us if there is a better drug, even if we need to buy and pay for it ourselves … I think they can ask for our opinion since we have the right. But if you just give me the medicine that the doctor prescribes, I will be confused, and I won't know what I am taking. (Group 3, participant 5)

3.1.5. Access to medication information

The small font size on consumer medicines information leaflets and the inability to utilise digital technology were hurdles for patients to obtain medication information.

> But you know, the words (in the medication package) are too tiny to read. (Group 2, participant 2)

> It is easy for you to get information on the internet now, of course, it is more troublesome for the elderly to get information on their mobile phones. (Group 2, participant 4)

3.1.6. Side effects

Patients' perceptions of the medication's short-term or long-term adverse effects contribute to non-adherence. Alternative methods to medication

were preferred, such as lifestyle modification, to avoid unwanted effects such as organ impairment.

> You should try your best to avoid taking lipid-lowering agents. Since the medications have many side effects, you may need to balance the risks and benefits. (Group 3, participant 6)

3.1.7. Forgetfulness
Patients might unintentionally miss their medication despite being aware of the importance of adherence.

> I sometimes forget to take medication, but I feel like nothing happens for the time being. I would just take the medication the next day as usual. (Group 4, participant 3)

3.2. Theme 2: Patients' medication preferences

This theme documents the factors considered by patients in choosing lipid-lowering agents.

3.2.1. Treatment regimen
Patients valued medication with a lower dosage and less frequent dosing interval. For convenience, long-acting injection with increased dosing interval can serve as an alternative to conventional oral medications.

> If you need to take the drug twice a day, then it is inconvenient. Convenience is the most important (factor). (Group 1, participant 4)

3.2.2. Effectiveness
Patients preferred medication that is highly effective and long-lasting for reducing their cholesterol levels while simultaneously treating other conditions, such as hypertension and diabetes.

> There are now new drugs that can extend the duration of the effect a bit longer, like lasting for an average of 12 hours a day, or even lasting a little while longer. (Group 3, participant 2)

Some patients also considered the potential benefits of integrating Chinese medicines.

> … how to cure cholesterol? Maybe (treating it) from the perspective of Western medicine or integrating the two (with Chinese medicines)? This may lead to some improvements (compared to Western medicine only). I think they both have their advantages. Can they be integrated? (Group 3, participant 1)

3.2.3. Side effects

All patients preferred medication with minimal side effects, discussing the degree of potential harm from medications and its impact on daily activities.

> We hope to take the drugs with fewer side effects to help us, the patients, as well as reduce our fears. (Group 3, participant 6)

> After taking cholesterol-lowering drugs, sexual performance worsens … If I don't take it, at least I have sexual desire. If you take these drugs … You could lose your husband, and your family could be impacted. (Group 3, participant 4)

3.2.4. Doctors' opinions

The doctors' recommendation influenced patients' choice and trust in the medication.

> If a doctor suggests that you take a drug, that means s/he thinks it suits you. If you say that it is not suitable, that means you don't trust the doctor. If you don't trust the doctor, why do you see him/her? (Group 1, participant 4)

> We are not clear about what is considered good or bad. If the doctor says it's okay, then we will trust them. (Group 4, participant 4)

3.2.5. Drug interactions

Patients considered whether a specific medication would cause a negative effect through interaction with other medications.

> When you take the medication for Covid, you can't take your cholesterol tablet at the same time. (Group 2, participant 2)

3.2.6. Out-of-pocket costs

Medication price and patients' income level determined willingness and ability to pay. Patients acknowledged the various expensive self-financed medications with potentially improved effectiveness, fewer side effects, and a better route of administration compared to existing government-financed medications.

> If I am very rich, it does not matter to me. But for some people, especially those who rely on public hospitals, not everyone can afford these expensive medications. (Group 3, participant 2)

3.3. Theme 3: Structure of preference tasks

This theme documented the layout and face validity of the sample DCE preference tasks completed by patients during the third part of the interview.

Given that no medication possesses ideal characteristics for all attributes considered by patients, the design of the DCE tasks served as a medium for gathering patients' preferences by facilitating trade-offs between levels of attributes between medication choices. Patients understood the purpose of this exercise setting.

> I feel that each option has its advantages. For example, this option may have a better cost, but the other option may require taking additional medication. (Group 2, participant 5)

Patients agreed that the DCE instruction clearly defined the purpose for selecting hypothetical treatment options based on preference and accurately included the attributes and levels relevant to real-life choices.

3.4. Theme 4: Comprehension of preference tasks

This theme refers to patients' interpretation of the DCE attributes and levels.

Priority of attributes was the most common decision strategy used by the participants. They weighted the importance of attributes and their corresponding levels to derive the overall impression of a medication choice. Also, they expressed preference heterogeneity with various demographic and clinical backgrounds during the completion of DCE tasks.

> The importance of each factor in everyone's mind varies, and that's why you can choose the scenario that fits your needs most. (Group 3, participant 2)

Although patients found the tasks manageable, they needed clarification on some wordings or phrases for the attributes and levels. They also suggested improvements for the description of attributes and levels and discussed the limitations of this preference task.

Some participants were confused about the attribute 'additional medication', not realising that combining different lipid-lowering agents could more effectively reduce cholesterol levels. Also, some participants questioned the levels of the 'clinical recommendation' attribute. They struggled to envision a medication that clinicians would 'unlikely' recommend, and expressed that they would not select such a medication as an alternative if clinicians were unlikely to recommend it. While some medications may not be first-line treatments or commonly prescribed according to local guidelines, this does not imply they are inferior or ineffective. Clarification on this point would have been useful.

> If it's not too likely (that the doctor) would recommend it to you, then it's not something you would consider. As I said, you go to see a doctor because you trust the doctor. If the doctor doesn't recommend it to you, what would you do? (Group 1, participant 4)

Some participants stated it was inappropriate to base medication choices purely on monetary terms, as financial capability varies. They suggested

that representing the real quality of medication would be better than a nominal monetary value. Additionally, a more comprehensive description of the side effects was suggested for the DCE tasks, including potential organ damage and gastrointestinal tract symptoms.

4. Discussion

This qualitative study investigated the barriers to adherence and key factors (attributes) considered by patients with hypercholesterolemia when choosing lipid-lowering agents in Hong Kong. Four major themes emerged from the focus group discussions: 1) Medication management issues, 2) Patients' medication preferences, 3) Structure of preference tasks, and 4) Comprehension of preference tasks. The main barriers to adherence identified were side effects, insufficient knowledge and education, poor communication with healthcare professionals, pill burden, and lack of involvement in decision-making processes. The main attributes considered by patients when choosing lipid-lowering agents included side effects, treatment regimen, effectiveness, doctors' opinions, out-of-pocket costs, and potential drug interactions.

Side effects were frequently discussed as a major barrier to adherence and a critical factor in choosing a lipid-lowering agent, corroborating previous studies on their significant impact on patient adherence (Casula et al., 2012; Tarn et al., 2021). Our findings suggest that patients were most concerned about potential muscle-related symptoms from statins, such as muscle aches and cramps. This aligns with the findings from a previous meta-analysis, which indicates that statins cause a small excess of such adverse events (Reith et al., 2022). Additionally, some patients mentioned that lipid-lowering agents might potentially be linked to organ damage, particularly kidney and liver injury, as well as gastrointestinal side effects and other general tolerability issues.

While participants did not directly compare the side effects of different classes of lipid-lowering agents, most expressed a general belief that all lipid-lowering agents carry significant risks of adverse events. This perception seemed to be influenced by personal experiences as well as information received from healthcare providers, other patients, and the media. Participants desired medications with fewer side effects and shared concerns about discomfort and potential long-term effects of these drugs. Methods like dosage adjustments were discussed to manage side effects, yet few had communicated these concerns to their doctors. Moreover, the discrepancy between patients' perceived and actual side effects highlights the need for improved patient education. Without effective communication with health professionals, patients may overestimate side effects, increasing anxiety and reducing adherence to medications. Therefore, effective risk communication and collaborative strategies by healthcare professionals to

proactively discuss the potential risks of lipid-lowering agents are crucial to address these concerns.

Some participants mentioned that limited access to medication information contributed to non-adherence to lipid-lowering agents, as patients often lacked an understanding of the medication's purpose, importance, administration, and management of side effects. A participant shared his experience with using online resources for information, which may not be feasible for populations with limited digital literacy, such as the elderly or those with lower socioeconomic status (Choi & DiNitto, 2013). Given the variable quality of medication information across sources, health professionals should identify reliable sources of medication information, recommend patient-friendly educational materials, and provide individualised counselling to enhance patients' understanding of hypercholesterolemia and lipid-lowering agents.

While most participants valued their doctors' expertise, a recurring concern emerged around poor doctor-patient communication, which could lead to medication non-adherence. In line with previous studies, this poor communication was particularly evident when initiating new medications (Tarn et al., 2006a). We also found that concerns were raised when there were dosage changes in lipid-lowering agents. One participant, for example, expressed uncertainty when the doctor increased the dosage without explanation, despite her normal blood cholesterol level, demonstrating how poor communication can cause significant concern among patients.

Several underlying factors contribute to suboptimal doctor-patient communication. From the patient's perspective, poor health literacy can affect their ability to understand complex medical information and treatment decisions, leading to confusion and mistrust about the management of hypercholesterolemia. Additionally, the high patient-to-provider ratio and short appointment time in the public sector significantly limit effective communication. Furthermore, the lack of communication skills training for health professionals can exacerbate this issue, as they may struggle to explain the complex terminology to patients (Zolnierek & DiMatteo, 2009). Therefore, improving communication and strengthening trust in their physician is crucial for patient acceptance and compliance. Strategies to improve interactions include fostering an open and non-judgmental environment, encouraging questions, and supplementing discussions with clear written information, which have been linked to better health outcomes (Kiortsis et al., 2000; Simpson et al., 1991; Stewart, 1995; Tan et al., 2019).

Several participants indicated that their adherence to lipid-lowering agents was primarily influenced by their doctors' opinions, reflecting previous findings on the importance of physician advice (Jacobson et al., 2019). However, decision-making primarily based on doctors' opinion often limited patient involvement, which was a concern for those seeking tailored

consideration of their health and financial situations. A US survey found that 95% of participants valued tailored statin choices, and about 73% and 76% reported little to no involvement in the decision-making process (Brinton, 2018). Implementing shared decision-making could enhance care by integrating evidence-based information, clinicians' expertise, and patient preferences, thereby improving adherence through respected patient autonomy and trust (Sandman et al., 2012). Furthermore, enhancing interprofessional collaboration among healthcare professionals, including pharmacists and nurses, could further improve hypercholesterolemia management.

Out-of-pocket cost emerged as a crucial consideration for many participants. Although the public healthcare system heavily subsidies many drugs in Hong Kong, newer treatments like inclisiran are not fully covered, imposing financial burdens, particularly on those with comorbidities or lower incomes. Moreover, a previous study has shown that the cost of medication was discussed in few consultations (Tarn et al., 2006b). This highlighted the need for more open discussion between doctors and patients regarding medication costs. Such conversations could explore potential solutions, for example, using generic medications or cost-effective alternatives to alleviate financial strain on patients, an essential component of comprehensive healthcare.

Some participants considered Traditional Chinese Medicine (TCM) as an alternative to Western lipid-lowering agents due to side effects or ineffectiveness. TCM is gaining wider global acceptance and recognition for its therapeutic benefits. Yet, TCM integration faces challenges from limited safety and efficacy evidence, and potential interactions with Western medications that could reduce effectiveness and increase toxicity (Fung & Linn, 2015; Shaikh et al., 2020). While TCM might offer additional options for hypercholesterolemia management, they should not generally replace the use of lipid-lowering agents.

Regarding the pre-designed DCE tasks, this study explored how well participants understood the instructions, the attributes and levels used to describe the hypothetical drugs, any difficulties in completing the tasks, and the overall effectiveness of these choice tasks in capturing patients' medication preferences. The selected options between Drug A and Drug B in each scenario were not intended to be analysed for correctness or to draw broad conclusions in this study. Participants actively engaged with the DCE tasks, valuing the clear instruction and adeptly assessing trade-offs among attributes, reflecting the axiom of continuity in preference (Ryan et al., 2009). Participants agreed that the tasks accurately represent the real-life factors in choosing a lipid-lowering agent, indicating our DCE tasks' real-world relevance. Moreover, the observed diversity in how patients prioritised these attributes demonstrated the preference heterogeneity in healthcare decisions. This diversity suggested that future preference studies should integrate this variability into patient priorities (Karim et al., 2022). In addition,

participants identified areas of confusion such as potential drug and food interactions, suggesting the inclusion of 'drug interaction' as a new attribute in the upcoming DCE study. Moreover, the attributes 'doctors' opinion' and 'additional medication' were suggested for removal due to their potential to cause confusion concerning the legitimacy and necessity of the medications. Future DCE tasks will presume that drugs presented are doctor-endorsed to eliminate bias related to drug legitimacy, enhancing clarity and applicability in preference assessments.

This study provided profound qualitative insights into the barriers to medication adherence and the decision-making process for choosing lipid-lowering agents, which may be overlooked in quantitative studies. The group setting encouraged open sharing among participants who may be hesitant in one-on-one interviews, and informed the refinement of our DCE design (Laimputtong, 2011). However, this study has several limitations. Firstly, since the interviews were conducted in Cantonese, there is the potential for loss of meaning during translation. To mitigate this, three bilingual raters fluent in Cantonese and English checked the original Chinese transcripts and ensured an accurate interpretation of the patient's expressions. Moreover, while focus groups could sometimes lead to peer pressure influencing responses, the moderator actively worked to minimise this effect by fostering respectful dialogue and free expression during each focus group discussion (Sim & Waterfield, 2019). The findings provide preliminary insights into patient preferences, informing future investigations and the design of preference tasks using methods like DCE. These insights are crucial for addressing medication non-adherence and improving clinical decision-making in lipid-lowering therapy. The collection of drug choices made by participants for each DCE task in a future large-scale quantitative study can be used to model and quantify the relative importance of attributes considered by patients with hypercholesterolemia when choosing lipid-lowering agents.

5. Conclusion

This study identified barriers to medication adherence and factors influencing the choice of lipid-lowering agents among patients with hypercholesterolemia in Hong Kong. Key factors influencing adherence include concerns about side effects and poor communication with doctors. The main attributes considered by patients when choosing a lipid-lowering agent were out-of-pocket costs, side effects, and doctors' opinion. These insights can aid clinical decision-making and enhance adherence. Future research can expand on these insights through large-scale DCE preference studies to enhance patient-centred care and clinical outcomes in hypercholesterolemia management.

Acknowledgments

Authors' contributions

HHEY, KD: Conceptualisation, Methodology, Formal analysis, Investigation, Data Curation, Writing – Original Draft, Writing – Review & Editing, Project administration. **LWYF**: Methodology, Formal analysis, Investigation, Writing – Review & Editing, Project administration. **XY**: Conceptualisation, Methodology, Investigation, Writing – Review & Editing. **JEB, HFT, MCSW, BPY, WCWW, XL, CKHW, CKW**: Investigation, Writing – Review & Editing. **EWC**: Conceptualisation, Methodology, Investigation, Resources, Writing – Review & Editing, Supervision, Funding acquisition. All authors read and approved the final manuscript.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Consent for publication

Written informed consent for the publication of anonymized verbatim quotations was obtained from the participants. A copy of the consent form is available for review by the editor of this journal.

Disclosure statement

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