



MEDICATION ADHERENCE IN CARDIOVASCULAR HEALTH: UNDERSTANDING PATIENTS AND HEALTHCARE PROFESSIONALS' PERSPECTIVES, CHALLENGES, AND SUSTAINABLE STRATEGIES

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Abstract

Background: Medication non-adherence poses substantial risks, including disease progression, increased hospitalizations, and elevated healthcare costs. Understanding the importance of medication adherence and the unique challenges faced by individuals with CVD in Pakistan is essential for implementing targeted interventions and improving patient outcomes. This research aims to explore the understanding and challenges of medicine adherence in patients with coronary artery disease and healthcare professionals' perspectives on practical strategies for Pakistani patients.

Methods: Data were collected from 30 participants through in-depth, semi-structured interviews. The sample comprised 20 patients who had suffered a heart attack at least six months ago and 10 healthcare professionals, including cardiologists, nurses, and pharmacists. Data were analyzed using NVIVO software with a thematic analysis approach.

Results: There were total of eight themes emerged from the qualitative data shared by the participants: Patient Understanding and Acceptance of Medication for Cardiovascular Health, Financial, and Practical Challenges in Medication Adherence, Strategies for Sustainable Medication Adherence, Patient-Centered Medication Education and Engagement, Patient Motivation and Understanding in Medication Adherence, Empowering Patients in Long-Term Medication Management, Inconsistency in Patient Education Across Healthcare Providers, and Healthcare Accessibility and Affordability

Conclusion: The data from qualitative interviews provide valuable insights into the factors influencing medication adherence among Pakistani patients with cardiovascular conditions. While consistent adherence reflects patient acceptance and routine-based strategies, inconsistent adherence underscores financial constraints and medication-related challenges. Interventions tailored to address these barriers, including technology-based solutions and family support, could enhance medication adherence and improve cardiovascular health outcomes in the CVD population.

Key Words: Medicine Adherence Challenges, Strategies for Medicine Adherence, HCPs perspectives on Medicine Adherence, Practical Solutions for Medicine Adherence.

Introduction

Cardiovascular diseases (CVDs) are a leading cause of morbidity and mortality globally, with a particularly high burden in Pakistan. Effective management of CVD relies significantly on medication adherence, which remains a critical yet challenging aspect of treatment in the Pakistani population¹. Medication non-adherence poses substantial risks, including disease progression, increased hospitalizations, and elevated healthcare costs. Understanding the importance of medication adherence and the unique challenges faced by individuals with CVD in Pakistan is essential for implementing targeted interventions and improving patient outcomes.

In recent years, the prevalence of CVDs has risen alarmingly in Pakistan, driven by factors such as urbanization, lifestyle changes, and an aging population. Despite advancements in medical therapy, achieving optimal outcomes in CVD management necessitates adherence to prescribed medications. However, adherence rates in Pakistan, as in many low- and middle-income countries, remain suboptimal due to a complex interplay of socioeconomic, cultural, and healthcare system-related factors².

This manuscript seeks to explore the critical importance of medication adherence in the context of CVDs among the Pakistani population. It sheds light on the multifaceted challenges that impede adherence and proposes potential solutions to bridge these gaps. By synthesizing existing knowledge and identifying key areas for improvement, this work aims to inform healthcare providers, policymakers, and researchers on strategies to enhance medication adherence and ultimately improve cardiovascular health outcomes in Pakistan.

Research Questions

- What is the understanding of CVD patients about the importance of medicines after a heart attack?
- What challenges do CVD patients face in adhering to prescribed medicines?
- What are healthcare professionals' perspectives on medicine adherence among CVD patients in Pakistan?

Methods

Study Design: A qualitative descriptive approach was used to answer the study questions.

Sampling Strategy: A purposive sampling technique was employed to invite patients and healthcare professionals for in-depth-semi-structured interviews. Purposive sampling aims to include participants from different sociodemographic backgrounds and ensure a sample's heterogeneity.

Ethical Issues about Human Subjects: The study was approved by the Aga Khan University's Ethical Review Committee. Before the interviews were conducted, written informed consent was obtained from all the participants.

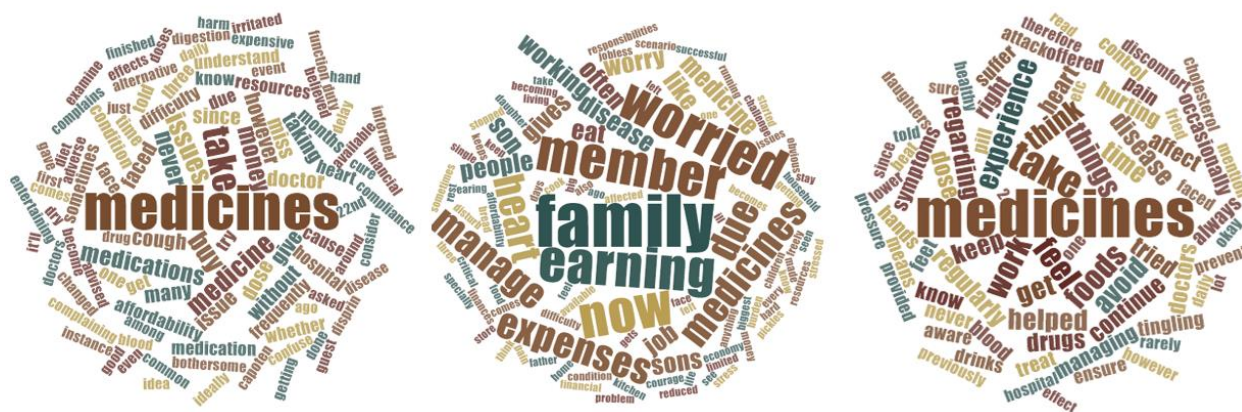
Data Collection Methods: The researcher collected the data through face-to-face, in-depth, semi-structured interviews. The interviews lasted 30-50 minutes and were audio-taped and recorded. Participants' comfort and privacy were ensured during the interviews. The rigor of qualitative data

was ensured using Lincoln and Guba’s criteria to ensure trustworthiness, i.e., credibility, transferability, dependability, and confirmability.

Questionnaire Guide: The research team developed the questionnaire guide and included patient questions, such as: What do you understand about your medications? What do you feel? How do your medications help you? Do you have any concerns regarding your medicines? How did you ensure compliance with medications? 1) What difficulties did you face during this recovery from a heart attack? Any steps you took to cope with the difficulties? Have you adopted any strategy for medication adherence? Additionally, questions from HCPs included: How important is it that patients understand their medications? 2. What could be important steps for patients to adhere to medications? 3. What challenges they may face during this transition?

Data Analysis: Data were analyzed using NVIVO software. After the recorded audio tapes were transcribed and translated into English, transcriptions were uploaded on NVIVO, and nodes (codes) were created line by line. Once all nodes were created, similar nodes were merged into categories, and similar categories were combined to create themes. This thematic analysis was based on an inductive approach to explore insights shared by patients and HCPs (Figure 1).

Figure 1: Word Clouds for codes generated through NVIVO



Results

A total of 30 participants were interviewed in this study, of which 20 were heart patients, and 10 were healthcare professionals. The mean age of patients was 51.9 years. Out of 20 patients, 14 were males and 6 were females, 10 had diabetes mellitus, and ten were hypertensive. Out of 10 healthcare professionals (HCPs), 4 were cardiologists, 4 were cardiac nurses, and 2 were Pharmacists. 4 HCPs were males, while 6 were females; the mean age of HCPs was 36.6 years, with a mean experience of over one decade (Table 1).

Table 1: Demographic Characteristics of Participants

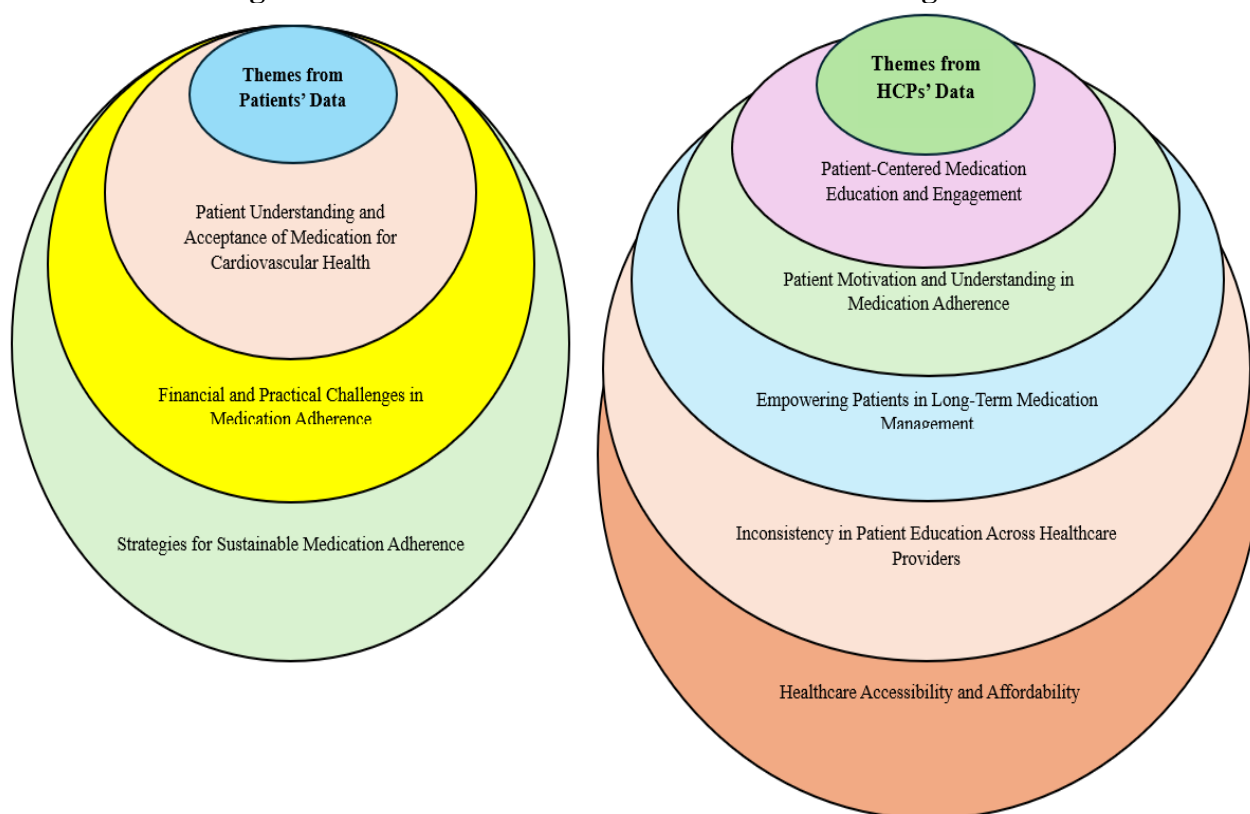
Variables		Participants n=30	
Patients (n=20)			
Mean Age		51.9 Years	
		<i>f</i>	<i>%</i>
Gender	Male	14	70%
	Female	06	30%
Co-morbidities	DM	10	50%
	HTN	10	50%
Diagnosis	STEMI	13	65%
	NSTEMI	07	35%
HCPs (n=10)			

Mean Age		36.6 years	
		<i>f</i>	%
Gender	Male	04	40%
	Female	06	60%
Mean Experience		10.2 years	

There were total of eight themes emerged from the qualitative data shared by the participants: Patient Understanding and Acceptance of Medication for Cardiovascular Health, Financial and Practical Challenges in Medication Adherence, Strategies for Sustainable Medication Adherence, Patient-Centered Medication Education and Engagement, Patient Motivation and Understanding in Medication Adherence, Empowering Patients in Long-Term Medication Management, Inconsistency in Patient Education Across Healthcare Providers, and Healthcare Accessibility and Affordability (Figure 2).

The qualitative findings highlight the multifaceted challenges and strategies associated with medication adherence for cardiovascular health. Patients exhibit a strong understanding and acceptance of lifelong medication regimens to manage their conditions, recognizing the importance of adherence in preventing adverse cardiovascular events. However, financial constraints pose significant challenges, leading to missed doses or delayed medication purchases. Patients employ various strategies, such as keeping extra medicine at home or relying on reminders from family members, to sustain adherence despite practical obstacles. There is a need for optimized patient-centered education to enhance motivation and understanding, empowering patients in long-term medication management. Inconsistencies in education across healthcare providers underscore the importance of standardized, accessible, and affordable healthcare services to support sustainable medication adherence and improve cardiovascular outcomes.

Figure 2: Thematic View of Patients and HCPs Insights



Theme 1: Patient Understanding and Acceptance of Medication for Cardiovascular Health

This theme concerns patients' understanding and acceptance of lifelong medications for managing cardiovascular conditions. Patients demonstrate a strong commitment to adhering to prescribed medications, driven by their awareness of the medications' importance in preventing adverse cardiovascular events (*for patients-related themes, please see Table 2*).

Subtheme 1.1: Recognition of Lifelong Need Participants acknowledge the lifelong nature of their medication regimen and express acceptance of this reality. They recognize the importance of consistent medication use to mitigate the risk of heart attacks and other cardiovascular complications: *"I will have to continue taking [these drugs] for the rest of my life, which I am okay with."* (P18)

Subtheme 1.2: Patient Education and Guidance Participants rely on guidance from family members or healthcare providers to ensure proper medication management. They prioritize following instructions to avoid discomfort or adverse events:

"I always ask my daughters what medicine to take at which time; I tried never to miss any dose." (P3). *"I take as prescribed by the doctors... The medicines are for my heart because I have had a heart attack."* (P11)

Subtheme 1.3: Association of Medication with Symptom Control Participants believe adherence to their medication regimen is directly linked to symptom control. They report feeling discomfort or chest pain when doses are missed, reinforcing the perceived effectiveness of their medications:

"If I miss medicines again, I feel discomfort." (P2); *"I do not have any other issue with taking medicines. I think it controls my heartbeat."* (P17)

Theme 2: Financial and Practical Challenges in Medication Adherence

This theme encompasses the numerous obstacles patients face in adhering to their medication regimens, particularly due to financial constraints and practical considerations. Patients encounter significant hurdles, from the struggle to afford prescribed medications to the communication barriers with healthcare providers regarding financial limitations. Additionally, medication side effects and tolerability issues pose further challenges, often leading patients to seek adjustments to their treatment plans. Concerns and misunderstandings about medications, compounded by confusion stemming from medication availability issues, further complicate adherence efforts. External events, such as medication shortages or disruptions, disrupt adherence patterns. Despite these challenges, patients demonstrate resilience and prefer collaborative approaches to address medication-related concerns. Patients strive to navigate these obstacles through effective communication, adjustments, and proactive strategies and maintain medication adherence for optimal health outcomes.

Themes		Subthemes	Codes
1	Patient Understanding and Acceptance of Medication for Cardiovascular Health	Recognition of Lifelong Need	"I will have to continue taking [these drugs] for the rest of my life, which I am okay with." (P15)
		Patient Education and Guidance	"I take as prescribed by the doctors... The medicines are for my heart because I have had a heart attack." (P11)
		Association of Medication with Symptom Control	"If I miss medicines again, I feel discomfort." (P2)
2	Financial and Practical Challenges in Medication Adherence	Financial Barriers Impacting Medication Access	"I often do not have money to buy medicines, so I miss the dose. When I get money from a pension, then I buy and spend money. The hospital wants us to purchase medicines from outside." (P2)
		Struggles with Affordability and Medication Adherence	"I have financial issues; doctors should understand our condition...they write so many medications without knowing that even if we have resources to buy it or not...due to unaffordability, I miss my doses frequently, and when I have money, I buy and take it..." (P4)
		Challenges Communicating Financial Constraints to Healthcare Providers	"I spoke to my doctor about it since I did not want to take medication, and she told me I had to. However, I do not understand why I should take it now...when I meet her again on the 16th, I will show it to her." (P12)
		Medication Side Effects and Tolerance	"My digestion is frequently irritated to the point that it threatens to become bothersome, among other minor reactions. Other than this, I do not have any other issue with taking medicines." (P7)
		Concerns and Misunderstandings About Medications	"Many common blood pressure medications cause a mild, unpleasant cough. When my doctor gave me one of these medications, I told him, 'I do not think that is a good idea...'we changed it." (P17)
		Impact of External Events on Medication Adherence	"I keep extra medicine at home for three to four days and bring medicines on time. If sometimes there is a delay in purchasing medicines for any reason, then the dose available at home serves the purpose." (P19)
3	Strategies for Sustainable Medication Adherence	Keeping Extra Medicine at Home	"I used to keep one dose of tablets in my pocket every time so that if I forget to take it at home, I can take it when I remember it. That helped me to prevent any misdose." (P1)
		Carrying Medication Doses	"I will have to continue taking [these drugs] for the rest of my life, which I am okay with. You know, I would take the pill if you offered it to me right now and said, 'Look, here is a pill that guarantees if you use this medicine daily, you will not suffer from a heart attack.'" (P18)
		Acceptance of Lifelong Medication	"My wife does it because she views it as her obligation to ensure I take it. I take a variety of medicines, including those for my blood pressure and other conditions that, luckily, do not appear to have any negative effects." (P18)
		Family Support and Accountability	"I have set an alarm on my mobile for the medicine, and it is rarely when it reminds me...all the time, I take it on my own, and after that, it rings (smiles). My daughter taught me something special, so it is beneficial..." (P9)
		Routine and Consistent Medication Habits	"I always remember to take my medications in the morning and take them at the breakfast table. I have been taking them faithfully for a long time." (P10)
		Utilization of Technology and Reminders	"I have set an alarm on my mobile for the medicine, and it is rarely when it reminds me...all the time, I take it on my own, and after that, it rings (smiles). My daughter taught me something special, so it is beneficial..." (P19)

Table 2: Summary of Themes, Subthemes and Quotes from Patients Data

Subtheme 2.1: Financial Barriers Impacting Medication Access Financial constraints were reported as a significant barrier to medication adherence. Limited income and the need to prioritize basic needs like food and shelter often lead to missed doses due to the inability to afford medications prescribed by the hospital:

"I often do not have money to buy medicines, so I miss the dose. When I get money from a pension, then I buy and spend money. The hospital wants us to purchase medicines from outside." (P2)

Subtheme 2.2: Struggles with Affordability and Medication Adherence Participants express frustration over the burden of multiple prescribed medications and emphasize the disconnect between doctors' prescriptions and patients' financial realities. Unaffordability frequently leads to non-adherence, with patients missing doses until they can purchase their medications:

"I have financial issues; doctors should understand our condition...they write so many medications without knowing that even if we have resources to buy it or not...due to unaffordability, I miss my doses frequently, and when I have money, I buy and take it..." (P4)

Subtheme 2.3: Challenges Communicating Financial Constraints to Healthcare Providers Participants describe the difficulty of communicating financial struggles to healthcare providers and the resulting confusion and dissatisfaction with medication adherence. Lack of understanding about the necessity of medications due to financial hardships leads to skepticism and delayed compliance:

"I spoke to my doctor about it since I did not want to take medication, and she told me I had to. However, I do not understand why I should take it now...when I meet her again on the 16th, I will show it to her." (P12)

Subtheme 2.4: Medication Side Effects and Tolerance Participants experience bothersome side effects from medications, such as gastrointestinal irritation, which may compromise adherence. Despite tolerating other minor reactions, persistent discomfort impacts medication adherence and overall treatment satisfaction:

“My digestion is frequently irritated to the point that it threatens to become bothersome, among other minor reactions. Other than this, I do not have any other issue with taking medicines.” (P7)

Furthermore, the Participant advocates for medication adjustments due to perceived adverse effects outweighing treatment benefits. Open communication with healthcare providers and collaborative decision-making regarding medication regimens is crucial for improving adherence and patient satisfaction:

“There were many medicines that I had to take daily, but I believed that in my instance, the one drug’s adverse effects were worse than the condition it was supposed to cure...so we changed it.” (P16)

Subtheme 2.5: Concerns and Misunderstandings about Medications Participants raised concerns about medication side effects, highlighting the importance of patient-provider dialogue and responsiveness to individual concerns to optimize treatment adherence and outcomes:

“Many common blood pressure medications cause a mild, unpleasant cough. When my doctor gave me one of these medications, I told him, ‘I do not think that is a good idea.’...we changed it.” (P17)

Similarly, Participants face confusion and uncertainty when prescribed alternative medications due to the unavailability of specific drugs. Inconsistent availability disrupts adherence and undermines patient confidence in treatment plans:

Sometimes the same medicine is unavailable, so they give alternatives, making me confused about whether I should take it.” (P15)

Subtheme 2.6: Impact of External Events on Medication Adherence Participants acknowledge the importance of consistent medication adherence for heart health but cite practical challenges such as medication shortages or interruptions due to unforeseen events:

“Ideally, we should not skip medicines as they can cause further problems to the heart. However, sometimes, medicines get finished, or the dose is skipped due to any event or entertaining the guest.” (P1)

Theme 3: Strategies for Sustainable Medication Adherence

This theme underscores patients’ multifaceted strategies to ensure sustained medication adherence over time. Patients demonstrate proactive behaviors, familial support, and technological integration to promote consistent medication habits and acceptance of lifelong treatment. By incorporating routine practices, leveraging family accountability, and utilizing modern tools like mobile reminders, patients establish a comprehensive framework for successful medication management. These adaptive strategies collectively enhance medication adherence and contribute to long-term health outcomes, emphasizing the importance of personalized approaches and supportive environments in fostering sustained treatment adherence.

Subtheme 3.1: Keeping Extra Medicine at Home Participants highlight a proactive approach to medication adherence by keeping extra doses at home as a buffer against potential delays in acquiring medications. This strategy ensures continuity of treatment and reduces the risk of missed doses due to unforeseen circumstances:

“I keep extra medicine at home for three to four days and bring medicines on time. If sometimes there is a delay in purchasing medicines for any reason, then the dose available at home serves the purpose.” (P1)

Subtheme 3.2: Carrying Medication Doses Participants employ a practical strategy of carrying medication doses in their pocket to prevent missed doses. This tactic enables them to take medication promptly, even if they forget to do so at home, enhancing medication adherence:

“I used to keep one dose of tablets in my pocket every time so that if I forget to take it at home, I can take it when I remember it. That helped me to prevent any misdose.” (P18)

Subtheme 3.3: Acceptance of Lifelong Medication Participants express a strong commitment to lifelong medication adherence, demonstrating a positive attitude toward continuous treatment to prevent adverse health outcomes like heart attacks:

"I will have to continue taking [these drugs] for the rest of my life, which I am okay with. You know, I would take the pill if you offered it to me right now and said, 'Look, here is a pill that guarantees if you use this medicine daily, you will not suffer from a heart attack.'" (P18)

Subtheme 3.4: Family Support and Accountability Participants attribute medication adherence to family support, particularly from their spouse, who actively ensures medication compliance. This highlights the importance of social support in maintaining adherence to complex medication regimens:

"My wife does it because she views it as her obligation to ensure I take it. I take a variety of medicines, including those for my blood pressure and other conditions that, luckily, do not appear to have any negative effects." (P9)

Subtheme 3.5: Routine and Consistent Medication Habits Participants demonstrate consistent medication habits by integrating medication administration into their daily routine. This adherence strategy reinforces the importance of habitual behaviors in sustaining long-term medication adherence:

"I always remember to take my medications in the morning and take them at the breakfast table. I have been taking them faithfully for a long time." (P10)

Subtheme 3.6: Utilization of Technology and Reminders Participants utilize technology, such as mobile alarms, to prompt medication intake and rely on family support to adopt effective adherence techniques. This approach showcases the integration of modern tools and familial assistance in enhancing medication adherence among patients:

"I have set the alarm on my mobile for the medicine, and it is rarely when it reminds me...all the time, I take it on my own, and after that, it rings (smiles). My daughter taught me something special, so it is beneficial..."(P19)

Theme 4: Patient-Centered Medication Education and Engagement

This theme encapsulates the multifaceted challenges and considerations of patient education, compliance, and engagement in healthcare settings. It emphasizes the importance of tailoring communication and education strategies to meet individual patient needs while addressing barriers to understanding and adherence. Healthcare professionals recognize the significance of comprehensive education on medication effects and benefits to empower patients to manage their health effectively and improve treatment outcomes. This theme underscores the necessity of patient-centered approaches that prioritize personalized education and communication to enhance patient engagement and optimize medication adherence and understanding (*for HCPs-related themes, please see Table 3*).

Subtheme 4.1: Concerns about Patient Compliance and Education Healthcare professionals express apprehension about informing patients of medication side effects due to poor compliance rates. This suggests a cautious approach to patient education considering adherence challenges:

"Ideally, we should tell the patient about the side effects of the medicine, but we do not tell in this country. The compliance of medicine is already very poor, and if you tell the patient, the compliance will be poorer." (Cardiologist 2)

Subtheme 4.2: Patient-Centric Communication Challenges Healthcare providers recognize the importance of patient understanding but highlight challenges in tailoring communication effectively to patients' comprehension levels within limited time frames:

“Understanding medicine is important; however, it needs to be evaluated whether patients can understand it or not because you would need to go to their level to make them understand, and it can be time-consuming.” (Cardiac Nurse 1)

Subtheme 4.3: Importance of Patient Education on Adverse Effects The qualitative data suggest an emphasis on educating patients about medication’s adverse effects to facilitate patient adjustment and adherence over time:

“Initially, patients face many adverse effects of newly started medicines, and the body starts to react with the dose to develop adaptability. However, later on, they adjust it. However, the patients should be taught about it.” (Cardiac Nurse 1)

Subtheme 4.4: Patient Disinterest in Medication Mechanisms Healthcare providers observe widespread reliance on physician recommendations without a keen interest in understanding the detailed functions of their medications.

“Mostly, I think 90% of patients are not interested to know the mechanism of action of the medicine. They just trust a doctor in this regard.” (Cardiologist 2)

Subtheme 4.5: Patient-Specific Health Focus and Knowledge HCPs shared that patients exhibit variability in health focus and medication knowledge, necessitating personalized approaches to education and treatment:

“But some of them are working on their blood pressure. Also, some of them are working for their sugar, like cholesterol. Also, that is for the heart and the sugars for blood pressure. So, it varies from patient to patient.” (Cardiologist 1)

Subtheme 4.6: Need for Comprehensive Medication Education Healthcare providers stress the importance of comprehensive medication education to empower patients with knowledge about treatment benefits and optimize therapeutic outcomes:

“It takes time to tell patients about the benefits of medicines they are taking. Knowing about medicine is very important, and if patients are aware of benefits, then they can benefit from them.” (Cardiologist 4)

Medication Adherence In Cardiovascular Health: Understanding Patients And Healthcare Professionals' Perspectives, Challenges, And Sustainable Strategies

Themes		Subthemes	Quotes
4	Patient-Centered Medication Education and Engagement	Concerns about Patient Compliance and Education	"Ideally, we should tell the patient about the side effects of the medicine, but we do not tell in this country. The compliance of medicine is already very poor, and if you tell the patient, the compliance will be poorer." (Cardiologist 2)
		Patient-Centric Communication Challenges	"Understanding about medicine is important; however, it needs to be evaluated whether patients have the capacity to understand it or not because you would need to go their level to make them understand, and it can be time-consuming." (Cardiac Nurse 1)
		Importance of Patient Education on Adverse Effects	"Initially, patients face many adverse effects of newly started medicines, and the body starts to react with the dose to develop adaptability. However, later on, they adjust it. But the patients should be taught about it." (Cardiac Nurse 1)
		Patient Disinterest in Medication Mechanisms	"Mostly, I think 90% of patients are not interested to know the mechanism of action of the medicine. They just trust a doctor in this regard." (Cardiologist 2)
		Patient-Specific Health Focus and Knowledge	"But some of them are working on their blood pressure. Also, some of them are working for their sugar, like cholesterol. Also, that is for the heart and the sugars for blood pressure. So, it varies from patient to patient." (Cardiologist 1)
		Need for Comprehensive Medication Education	"It takes time to tell patients about the benefits of medicines they are taking. Knowing about medicine is very important, and if patients are aware of benefits, then they can benefit from them." (Cardiologist 4)
5	Patient Motivation and Understanding in Medication Adherence	Medication Adherence Strategies	"I advise them to keep a box of medication with them, labeled with the day, the time, and the amount, which is readily available outside...So these are some strategies I tell them." (Cardiologist 1)
		Fear-Based Counseling for Medication Compliance	"I induce fear in them...I tell them if you do not take your medicines if you get the heart attack again, you may not be even able to be brought to the hospital." (Cardiologist 3)
		Utilization of Fear as a Motivational Tool	"Mostly we use the strategy of fear...People do not want to die. So that strategy mostly works." (Cardiologist 2)
		Communication of Medication Importance and Support	"For anxiety related to long-term medicines, we need to tell them that for heart support, these medicines are important similarly as the prosthetic limb is necessary for a person with amputation of limb...These medicines are not a burden but a support for their heart." (Pharmacist 2)
		Patient Empowerment through Consequence Awareness	"If we make them realize the consequences of missing the dose, then they would be compliant with the medicine more." (Cardiac Nurse 1)
6	Empowering Patients in Long-Term Medication Management	Patient Education on Chronic Conditions and Medication Understanding	"It is always good to tell them that, for example, if I am giving five medications to the patient and the patient is hypertensive and cardiac...they should know, and this should be taught about." (Cardiologist 1)
		Understanding Medication as a Lifelong Solution	"The day they take their medicine, diabetes will be controlled. On the days they do not take their medicines, diabetes will not be controlled...So most of them understand that this problem is for life." (Cardiologist 3)
		Addressing Patient Concerns and Side Effects	"Cardiac patients often get body aches due to the statin they are taking...patients also feel low after treatment for which the role of beta blockers and hypertension can be evaluated...it is important to tell patients about the interactions and side effects of medicines." (Cardiologist 4)
7	Inconsistency in Patient Education Across Healthcare Providers	Variability in Patient Education Practices	"So it varies from doctor to doctor who, like we're telling them. So, it goes from practice to practice. Most of the time, they are usually told that these are four to five cards, medication, and cardiac medication." (Cardiologist 1)
8	Healthcare Accessibility and Affordability	Challenges of Out-of-Pocket Healthcare Costs	"Unfortunately, 90% of our patients in Pakistan are out of pocket...these efforts should not be made at the institute level but at the health policy level by the ministry." (Cardiologist 1)
		Advocating for Government Healthcare Coverage	"Actually, the government should cover it to give proper funds for healthcare or cover it with insurance...I think there should be an insurance system which covers everything." (Cardiologist 2)
		Call for Government Provision of Cardiac Medications	"Cardiac medicine should be provided by the government...regarding continued medicines, counseling is important." (Cardiologist 4)
		Mechanisms to Address Affordability Issues	"For their affordability issues, hospitals can develop a mechanism for evaluation to see who cannot afford it and how they can help them get medicines for free. We tell them the difference between needs and comforts to manage their budget at home." (Pharmacist 2)
		Government Initiatives for Medication Accessibility	"Government should take initiatives for poor people who cannot afford medicines and health costs." (Cardiac Nurse 1)

Table 3: Summary of Themes, Subthemes, and Quotes from HCPs Data

Theme 5: Patient Motivation and Understanding in Medication Adherence

This overarching theme encompasses various strategies healthcare professionals employ to optimize patient adherence to medication regimens. It includes approaches such as practical medication organization strategies, fear-based counseling to emphasize the consequences of non-compliance, and using fear as a motivational tool to underscore the importance of medication for maintaining heart health. Furthermore, the theme highlights the significance of effective communication in conveying the importance and support provided by medications, akin to essential aids like prosthetic limbs. Patient empowerment through awareness of the consequences of missed doses is central to this theme, reflecting a holistic approach to foster patient motivation and understanding to improve long-term medication adherence and overall cardiovascular health.

Subtheme 5.1: Medication Adherence Strategies Healthcare providers employ practical strategies such as organizing medications visibly (e.g., in the kitchen or office) and using labeled boxes to improve patient adherence, particularly targeting individuals with busy lifestyles:

"I advise them to keep a box of medication with them, labeled with the day, the time, and the amount, which is readily available outside...So these are some strategies I tell them." (Cardiologist 1)

Subtheme 5.2: Fear-Based Counseling for Medication Compliance Cardiologists use fear-inducing tactics to emphasize the critical importance of medication adherence, especially for post-PCI patients, by highlighting potential life-threatening consequences of non-compliance:

"I induce fear in them...I tell them if you do not take your medicines if you get the heart attack again, you may not be even able to be brought to the hospital." (Cardiologist 3)

Subtheme 5.3: Utilization of Fear as a Motivational Tool Healthcare professionals recognize fear as a potent motivator for medication compliance, particularly effective for patients with casual attitudes towards their health, emphasizing the potential life-saving benefits of adherence. Cardiac nurses highlight the necessity of inducing fear in patients to promote medication compliance. Patients may be more likely to adhere to medication regimens when they understand the potential consequences of non-compliance, emphasizing the importance of fear as a motivational tool in healthcare education:

"Mostly we use the strategy of fear...People do not want to die. So that strategy mostly works." (Cardiologist 2); *"In our context, patients do not follow instructions until they are afraid of something and to make them compliant with medicines, we need to induce fear in them about the results of not taking medicines."* (Cardiac Nurse 1)

Subtheme 5.4: Communication of Medication Importance and Support Pharmacists emphasize the analogy of medication to essential support (like a prosthetic limb) to destigmatize long-term medication use, promoting a positive outlook and understanding of medication's role in maintaining heart health:

"For anxiety related to long-term medicines, we need to tell them that for the heart support these medicines are important similarly as the prosthetic limb is necessary for a person with amputation of limb...These medicines are not a burden but a support for their heart." (Pharmacist2)

Subtheme 5.5: Patient Empowerment through Consequence Awareness Cardiac nurses advocate for empowering patients by highlighting the direct consequences of medication non-compliance, aiming to increase patient motivation and understanding of the importance of adherence:

"If we make them realize the consequences of missing the dose, then they would compliant with the medicine more." (Cardiac Nurse 1)

Theme 6: Empowering Patients in Long-Term Medication Management

This theme encapsulates the strategies employed by healthcare professionals to empower patients to understand and manage chronic conditions through lifelong medication adherence. It emphasizes the importance of comprehensive patient education on chronic conditions and medication regimens, fostering an understanding that medications are integral to long-term disease management. Additionally, the theme highlights the significance of addressing patient concerns and side effects, ensuring that patients feel supported and informed about potential challenges associated with their treatment. By prioritizing patient education and addressing medication-related issues, healthcare professionals aim to enhance patient autonomy and improve treatment outcomes in chronic cardiovascular diseases.

Subtheme 6.1: Patient Education on Chronic Conditions and Medication Understanding Healthcare professionals emphasize the importance of educating patients about their medications and their role in managing chronic conditions like hypertension and heart disease, underscoring the necessity of patient understanding for optimal treatment outcomes:

"It is always good to tell them that, for example, if I am giving five medications to the patient and the patient is hypertensive and cardiac...they should know, and this should be taught about." (Cardiologist 1)

Subtheme 6.2: Understanding Medication as a Lifelong Solution Patients are educated on the concept of lifelong medication adherence for chronic conditions like diabetes and hypertension, emphasizing that medication is a permanent solution to manage these conditions and prevent associated complications like heart attacks:

“The day they take their medicine, diabetes will be controlled. On the days they do not take their medicines, diabetes will not be controlled...So most of them understand that this problem is for life.”
(Cardiologist 3)

Subtheme 6.3: Addressing Patient Concerns and Side Effects Healthcare providers highlight the importance of addressing patient concerns related to medication side effects, such as body aches from statins or erectile dysfunction from beta blockers, and emphasize the need for routine counseling to educate patients about medication interactions and potential adverse effects:

“Cardiac patients often get body aches due to the statin they are taking...patients also feel low after treatment for which the role of beta blockers and hypertension can be evaluated...it is important to tell patients about the interactions and side effects of medicines.” (Cardiologist 4)

Theme 7: Inconsistency in Patient Education Across Healthcare Providers

This theme highlights the importance of ensuring consistency in patient education practices among healthcare providers. While patient information about cardiac medications may vary, it is crucial to strive for uniformity in educating patients across healthcare settings and practitioners. By promoting standardized education practices, healthcare providers can ensure patients receive comprehensive and consistent medication information, empowering them to make informed decisions and adhere to treatment regimens effectively.

Subtheme 7.1: Variability in Patient Education Practices Healthcare professionals acknowledge the variability in patient education practices across different healthcare providers and settings. Patients may receive differing levels of information about their cardiac medications depending on the approach of their healthcare provider:

“So it varies from doctor to doctor who, like we are telling them. So, it goes from practice to practice. Most of the time, they are usually told that these are four to five cards, medication, and cardiac medication.”
(Cardiologist 1)

Theme 8: Healthcare Accessibility and Affordability

This theme underscores the urgent need to address the challenges of healthcare affordability, particularly concerning cardiac medications, through government interventions and systemic changes. Healthcare professionals advocate for expanded government healthcare coverage to alleviate the burden of out-of-pocket costs on patients. They emphasize the necessity of government provision of essential cardiac medications and the implementation of mechanisms to address affordability issues, such as hospital-based evaluation and education on budget management. Additionally, there is a call for government-led initiatives to ensure medication accessibility for poor individuals, reflecting a collective effort to enhance healthcare equity and support comprehensive medication access for all segments of society. This theme emphasizes the pivotal role of government policies and initiatives in improving healthcare accessibility and affordability for patients, particularly those with cardiovascular diseases.

Subtheme 8.1: Challenges of Out-of-Pocket Healthcare Costs Healthcare professionals highlight the predominant reliance on out-of-pocket payments for healthcare in Pakistan, emphasizing the need for systemic changes at the health policy level to alleviate financial burdens on patients and ensure equitable access to essential cardiac medications:

“Unfortunately, 90% of our patients in Pakistan are out of pocket...these efforts should not be made at the institute level but at the health policy level by the ministry.” (Cardiologist 1)

Subtheme 8.2: Advocating for Government Healthcare Coverage Cardiologists stress government intervention's importance in providing comprehensive healthcare coverage, including cardiac medications, through insurance systems or direct funding. They underscore the challenges faced by patients who receive limited treatment and subsequently face complications due to medication non-adherence:

“Actually, the government should cover it to give proper funds for healthcare or cover it with insurance...I think there should be an insurance system which covers everything.” (Cardiologist 2)

Subtheme 8.3: Call for Government Provision of Cardiac Medications Healthcare professionals advocate for government provision of cardiac medications to ensure continuity of care and reduce barriers to medication access for patients with cardiovascular diseases. They emphasize the importance of ongoing medication counseling to support patient adherence:

“The government should provide cardiac medicine...regarding continued medicines, counseling is important.” (Cardiologist 4)

Subtheme 8.4: Mechanisms to Address Affordability Issues Pharmacists and nurses propose practical solutions to address medication affordability issues, suggesting hospital-based evaluation mechanisms and education on budget management to assist patients in accessing essential medicines without financial strain:

“For their affordability issues, hospitals can develop a mechanism for evaluation to see who cannot afford it and how they can help them get medicines for free. We tell them the difference between needs and comforts to manage their budget at home.” (Pharmacist 2)

Subtheme 8.5: Government Initiatives for Medication Accessibility Cardiac nurses emphasize the need for government-led initiatives to support economically disadvantaged individuals in accessing essential medications and healthcare services, advocating for policies that prioritize medication accessibility for all segments of society:

“Government should take initiatives for poor people who cannot afford medicines and health costs.” (Cardiac Nurse 1)

Discussion

Medication adherence among patients with cardiovascular conditions presents a complex interplay of factors that influence treatment compliance. The quotations extracted from qualitative interviews underscore consistent and inconsistent patterns in medication adherence behaviors, reflecting diverse experiences and challenges patients encounter. This discussion compares these findings to the existing literature on medication adherence in cardiovascular health contexts.

The response, “I will have to continue taking [these drugs] for the rest of my life, which I am okay with” (P18), reflects a positive attitude towards lifelong medication adherence. This aligns with existing literature emphasizing the importance of patient acceptance and understanding of medication necessity for cardiovascular health management³.

Several participants mentioned strategies to maintain consistent adherence, such as setting alarms or keeping medication doses readily accessible. This aligns with studies highlighting the efficacy of routine-based adherence strategies, including alarm reminders and pill storage, in improving medication adherence rates⁴.

A significant barrier identified in the quotations is financial constraints impacting medication adherence. Patients reported missing doses due to unaffordability, reflecting a common challenge reported in the literature regarding medication access and affordability barriers in low-resource settings⁵.

Participants highlighted concerns about medication side effects, such as digestive issues or coughing, which led to non-adherence or medication changes. This inconsistency due to adverse effects is consistent with existing studies emphasizing the impact of side effects on patient adherence and treatment outcomes⁶.

Participants mentioned family members' involvement in medication adherence, highlighting the role of social support and familial relationships in sustaining adherence behaviors. This resonates with research emphasizing the positive impact of family support on patient adherence and health outcomes⁷.

The thoughts expressed by healthcare providers in the qualitative data reflect a complex relationship of factors influencing medication adherence among Pakistani patients. These perspectives are consistent with findings reported in existing literature while highlighting areas of divergence. The reluctance to disclose medication side effects resonates with existing literature⁸. While healthcare providers express concerns about exacerbating poor adherence, research suggests that transparent communication fosters patient trust and improves long-term adherence. This discrepancy underscores the need for tailored communication strategies to address patient concerns without undermining adherence.

Acknowledging patients' varying capacities to comprehend medication information aligns with existing literature emphasizing the importance of patient-centered communication. However, while time constraints are recognized, studies advocate investing in patient education to empower individuals to manage their health⁹.

Consistent with existing literature, most patients trust healthcare providers regarding medication mechanisms. However, this contrasts with the call for comprehensive medication education, highlighting discrepancies in patient preferences and healthcare practices.

Fear-based counseling strategies align with literature emphasizing the role of fear in behavior change. While effective for some patients, this approach may not resonate with all individuals, necessitating a personalized approach to motivational interventions¹⁰.

The discussion on out-of-pocket expenses and the need for government interventions mirrors existing literature highlighting financial barriers to medication adherence¹¹. Calls for government coverage and insurance schemes align with recommendations for policy-level interventions to address healthcare disparities¹².

Recommendations

Based on the study's findings, we propose the following recommendations for prospective studies:

- Assess patients' capacity to comprehend medication information and explore tailored educational approaches to enhance understanding, potentially improving adherence and health outcomes.
- Conduct a study to assess the effectiveness of targeted financial interventions, such as government-provided subsidies or insurance coverage, in improving medication adherence among patients facing financial barriers. Investigate strategies to alleviate medication costs and evaluate their impact on adherence rates and health outcomes.
- Study healthcare provider communication strategies regarding medication side effects and benefits, focusing on patient engagement and empowerment. Evaluate the impact of transparent communication about medication mechanisms and adverse effects on patient understanding, motivation, and long-term adherence behaviors.
- Explore the feasibility and efficacy of technology-driven adherence interventions, such as mobile applications or SMS reminders, among Pakistani patients with cardiovascular conditions.

Conclusion

In summary, while the qualitative data reflect consistent findings with existing literature on medication adherence challenges in Pakistan, disparities in patient education, communication strategies, and healthcare policies underscore the need for tailored interventions to improve adherence and promote cardiovascular health outcomes. The data from qualitative interviews provide valuable

insights into the factors influencing medication adherence among Pakistani patients with cardiovascular conditions. While consistent adherence reflects patient acceptance and routine-based strategies, inconsistent adherence underscores financial constraints and medication-related challenges. Interventions tailored to address these barriers, including technology-based solutions and family support, could enhance medication adherence and improve cardiovascular health outcomes in the CVD population.

Strengths and Limitations

- The study delves deeply into patient attitudes and behaviors regarding medication adherence, capturing a broad spectrum of challenges faced in the Pakistani context.
- By identifying various themes and subthemes, the data highlights the diverse barriers impacting medication adherence, including financial, practical, educational, and motivational factors.
- Findings offer practical insights for healthcare providers to develop targeted interventions and patient-centered strategies tailored to the unique challenges within the Pakistani healthcare system.
- Themes emphasize the importance of patient education, empowerment, and engagement in promoting sustained medication adherence, underscoring the need for holistic healthcare approaches.
- The manuscript discusses policy recommendations to enhance healthcare accessibility and affordability, advocating for government initiatives to support medication provision and coverage.
- The study's findings may not fully represent all demographic groups within the Pakistani population.

Ethical Statement: This study was approved by the Ethics Review Committee at Aga Khan University. Written informed consent was obtained from all participants before enrollment in the study.

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