

## Medication Adherence Unveiled: Understanding and overcoming challenges - A systematic review

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**ABSTRACT:** Medication adherence is essential for managing chronic illnesses. The WHO defines it as the extent to which an individual follows a healthcare practitioner's recommendation. Non-adherence is a serious problem, with rates as low as 50% in developed countries and potentially higher in resource-constrained settings like India due to economic instability, low literacy, and limited healthcare access. This systematic review, based on a literature search of PubMed, Google Scholar, and Research Gate for studies published between 2014 and 2024, contains 27 articles on medication adherence in chronic conditions. The publications addressed drug adherence issues in conditions such as hypertension, asthma/COPD, diabetes, chronic kidney diseases, cardiovascular diseases, and thyroid disorders. Common challenges observed were forgetfulness, high medication costs, and a lack of disease understanding. Some of the publications also discussed how to enhance adherence by enhancing patient education, providing medication reminders, and simplifying treatment regimens. This review aims to improve treatment effectiveness and health outcomes by highlighting challenges to medication adherence and researching solutions to address non-adherence.

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### INTRODUCTION:

Medication adherence often refers to whether individuals take their medications and whether they continue to take a prescribed medication. Medication adherence, according to the World Health Organization (WHO), is the extent to which a person's behavior - taking medication, following a diet, and/or executing lifestyle changes - concords with the agreed-upon recommendations from a healthcare provider [28].

One major issue healthcare professional's face in managing chronic illnesses is medication non-adherence, which often frustrates these providers [29]. Long-term medication adherence is crucial for maintaining health,

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preventing complications, and improving quality of life. However, the WHO reported in 2023 that adherence to long-term therapies in developed countries was only 50 % [1]. Factors like economic instability, low literacy, and limited healthcare access contribute to higher rates of non-adherence in resource-limited countries like India [6].

Medication non-adherence leads to severe consequences for both patients and the healthcare system. Patients who do not adhere to their regimens risk worsened illnesses, greater morbidity, and increased mortality, which often leads to more hospital admissions and higher healthcare expenses. Non-adherence also lowers patients' quality of life due to unmanaged symptoms. On a larger scale, it weakens healthcare efforts and drains available resources. Understanding the causes of non-adherence is crucial for creating effective therapies. Causes include patient-related problems such as forgetfulness, a lack of disease understanding, and concerns about side effects, as well as structural difficulties such as complex treatment regimens and insufficient healthcare access. Socioeconomic issues such as cost and insufficient health literacy also play an important role. Identifying these barriers allows healthcare practitioners to adapt interventions to improve patient adherence, results, cost effectiveness, and care quality.

The objective of this review is to provide insights into the reasons for nonadherence, discuss the interventions designed to enhance adherence, and examine the outcomes associated with failing to follow prescribed medication regimens.

#### METHODOLOGY:

A search was undertaken for papers across electronic databases, such as PubMed, Google Scholar, and ResearchGate. Relevant data from selected papers was collected systematically, including information on identified barriers to medication adherence, related factors, and reported solutions or interventions. The analysis comprises reviewed publications published in English in the last decade (2014-2024) that focus on medication adherence among populations with certain chronic health conditions. The review includes studies that focus on identifying barriers to medication non-adherence and offering solutions to alleviate them. Studies published in languages other than English have been eliminated. Studies involving pediatric populations (those under the age of 18) are omitted. Studies that did

not address adherence-related issues were removed from this analysis.

#### RESULTS:

This systematic review included 27 papers, 24 of which investigated barriers to medication adherence across different domains and 14 of which discussed strategies to improve adherence.

Patient-related problems included forgetfulness [1-6,8,10,11,14,16-20,23,24], a lack of perceived need for medications [4,14,18,19,20,24], and distrust in healthcare providers [4,5,18,19,24]. Furthermore, lifestyle factors such as busy schedules [6,9,11,14,20] and travel obligations [2,4,9,14], as well as societal factors such as disease stigma and religious/cultural beliefs [2,9,10,21,22,24], influenced adherence behavior. Significant obstacles were socio-economic reasons such as expensive drugs [2-5,9,10,13,16-22] and a lack of support from family and peers. [5,18,19,20,23,24] Condition-related issues, such as lack of disease information [2-5,7,10,13,14,17-19] and discontinuing drugs after feeling better [1-3,20,23,24] also contributed to non-adherence. Patients from some studies who had multiple chronic diseases [5,13,24] or were asymptomatic [8,11,13,21] did not find it important to adhere to their prescription. Therapy-related problems included worries about adverse effects [1,4-6,8,14,16-21,23], complex treatment regimens [2,10,12,16-19,22,24], and polypharmacy [6,12,14,16,18,19,2,4]. A few studies found that some patients preferred alternative systems of medicine [2,9,18,19]. Other barriers included long treatment durations and a lack of knowledge about drug administration. [10,20,22] Furthermore, health-care system concerns like medication unavailability, distantly placed health facilities [2,5,6,9-11,13-15,20,21], poor patient-provider interactions and counseling [2,10,14,15,18,19,21], restricted consultation time, and multiple providers [2,15,22] were highlighted as obstacles.

Table 1 provides a detailed breakdown of these factors and their frequency among the reviewed studies.

Interventions like smartphone apps, educational tools, and family involvement can help address barriers like forgetfulness, lack of knowledge, stigma, and fear of side effects.

Table 2 discusses interventions to address medication non-adherence with respect to several identified barriers.

#### DISCUSSION:

##### Factors and barriers to drug adherence:

According to the WHO, medication adherence is

**Table 1. Factors and Barriers Contributing to Non-Adherence and Their Frequency Among 24 Articles Identified.**

Barriers to non-adherence		No. of studies (n)
Patient-related factors	Forgetfulness [1-6,8,10,11,14,16-20,23,24]	16
	Lack of need to take medicine [4,14,18,19,20,24]	6
	Not Trusting Provider [4,5,18,19,24]	5
	Busy Lifestyle [6,9,11,14,20]	5
	Travel [2,4,9,14]	4
	Stigma of Disease [2,21,22,24]	4
	Religious & Cultural beliefs [2,9,10,24]	4
	Opinions of non-HCP peers & family [2,18]	2
	Lack of Satisfaction [9,24]	2
Socio-economic factors	Fear of Drug Dependence [20,21]	2
	Costly Medicines [2-5,9,10,13,16-22]	14
	Lack of Support & motivation from family & peers [5,18,19,20,23,24]	6
Condition-related factors	Low Income/ Financial Burden [1,6,14,15,23]	5
	Lack of knowledge on disease & its complications and importance of adherence [2-5,7,10,13,14,17-19]	11
	Stopped medicines after feeling better [1-3,20,23,24]	6
	Asymptomatic [8,11,13,21]	4
Therapy-related factors	Comorbid conditions [5,13,24]	3
	Experienced or fear of S/E [1,4-6,8,14,16-21,23]	13
	Complex Regimen [2,10,12,16-19,22,24]	9
	Polypharmacy [6,12,14,16,18,19,2,4]	8
	Alternative system of Medicine [2,9,18,19]	4
	Packaging/ Dosage form of Medicine [2,17,21]	3
	Long duration of Treatment [10,22]	2
Health-care related factors	Lack of knowledge on how to administer the medicines [20-22]	2
	Non-availability of Medications [2,5,6,9-11,13-15,20,21]	11
	Distantly located Health facility [2-4,9,15,20,22]	7
	Provider gives no sufficient information & Poor counseling [2,14,15,21]	5
	Poor patient-provider relationship [10,15,18,19]	4
	Limited Time for Consultation [2,15,22]	3
Multiple Providers [2]	1	

**Table 2. Interventions to Overcome Medication Non-adherence.**

Barrier	Interventions
Forgetfulness/ Busy Lifestyle/Travel	Smartphone Apps, Smart Pill Dispensers, Electronic Pillboxes, Medication Reminder Watches, SMS Based Refill Reminders [17,25,26]
Lack of knowledge on disease, medications & importance of adherence	Use Educational Apps & Virtual Reality to simulate disease progression, treatment effects and helping patients to understand their disease and medications better. [27]
Stigma/ Religious or cultural beliefs	Empowering the patients with correct knowledge about the disease, its treatment and benefits can help overcome the misguided cultural beliefs and associated misconceptions. [13,17]
Lack of Satisfaction	Patient Satisfaction Surveys

Lack of Support and Motivation	Health education sessions targeting family. Caregivers should be explained about the importance of regular medication, about the use of medication, and side effects to improve the medication adherence. <sup>[17]</sup>
Low Income/ Financial Burden/Costly Medicines	Health Insurance Policies (Individual or Government-led), Measures to provide free or subsidized medicines to poor patients need to be considered, prescribe pocket-friendly <sup>[17,18,22,23]</sup>
Asymptomatic	Educational and Smartphone Apps, Regular Follow-ups. <sup>[17,26,27]</sup>
Fear of Side Effects	Convincing patients that benefit of treatment outweigh risk of adverse effect. Misconceptions about side effects of medications should be corrected by awareness programs. <sup>[4,18]</sup>
Complex Regimen/ Polypharmacy	Simpler and less frequent dosing regimens. Polypills to reduce number of tablets. <sup>[10,17]</sup>
Packaging/Dosage form of Medications	Patients should be allowed to choose devices/ dosage form of meds based on their ease of use. <sup>[21,22]</sup>
Lack of Knowledge on How to Administer Medications	Use Educational Apps & Virtual Reality to give detailed instructions on how to administer and use medications. <sup>[27]</sup>
Non-availability of Medications	Providing Home delivery services, Online Pharmacy Apps
Distantly located Health facility	Providing Home delivery services, Telephone based Patient Counselling, E-prescribing <sup>[26]</sup>
Limited Time for Consultation	Tele-health Services, Online Patient Counselling

influenced by five kinds of factors: patient-related factors, drug-related factors, condition-related factors, healthcare provider/system-related factors, and socioeconomic factors <sup>[28]</sup>.

#### **Patient-related barriers and interventions:**

Forgetfulness appears as a key hurdle, with the majority of the research indicating it as a primary cause of drug non-adherence. These findings indicate the need for interventions, such as reminder-based devices, to address this widespread issue. Furthermore, a significant proportion of patients express a lack of perceived need for medicines, indicating poor patient understanding of the recommended regimen or a lack of confidence in their efficacy. Strategies to improve patient education through adequate counseling may aid in overcoming this hurdle. Distrust in healthcare practitioners is also identified as a significant factor impacting adherence. Addressing patient concerns and establishing their trust through enhanced communication may boost adherence rates. Additional problems, such as a hectic lifestyle and travel obligations, can be handled by creating a flexible treatment plan and utilizing reminder technology such as medication reminder watches and SMS-based text reminders. Stigma linked to certain diseases (most commonly found in asthmatic patients), as well as

religious and cultural views, all contribute to non-adherence. Patients must be motivated enough through education programs to properly adhere to their medications. Family and community members can join health education initiatives to learn more about non-communicable diseases. Correct information regarding the diseases, their treatment, and their benefits can assist patients in overcoming incorrect cultural ideas and related misconceptions <sup>[13,16,17]</sup>. Two studies indicated fear of drug dependence and dissatisfaction with therapy as barriers to adherence. Obtaining regular treatment feedback from patients and correcting misconceptions regarding drugs and their side effects may help facilitate drug adherence.

#### **Socioeconomic-related barriers and interventions:**

The high cost of medicines was the second most prevalent barrier after forgetfulness. This emphasizes the need for initiatives aimed at increasing medication affordability, such as health insurance policies or steps to provide free or subsidized medicines to low-income individuals. Lack of support from family and peers also contributed to non-compliance. This stresses the need to incorporate family members into adherence programs, as their aid and encouragement can play a critical role in increasing adherence. Health education seminars

targeting family and community members might be held to discuss non-communicable diseases <sup>[7]</sup>.

#### ***Condition-related factors and Interventions:***

Among these barriers, another most common obstacle is a lack of understanding about the conditions and their related problems. The extensive evidence of inadequate understanding highlights the critical need for focused educational programs that try to raise patient awareness of their disease and the consequences of drug non-adherence. Addressing this knowledge gap is crucial for providing individuals with the information they need to make informed decisions about their health and enabling health professionals to provide optimal treatment. Another significant barrier connected with this issue is people's tendency to stop taking medications once they notice an improvement in their symptoms. This behavior was observed in six of the articles, emphasizing the difficulty of medication adherence in non-communicable disease therapy. Four research papers reported that individuals with various chronic diseases had difficulties adhering to prescriptions due to complex treatment regimens or multiple pills. Strategies for maintaining sustained adherence, such as patient education, counseling on the importance of treatment compliance, simplifying the treatment, and regular follow-up, are critical for ensuring treatment effectiveness and reducing the risk of illness recurrence or exacerbation <sup>[7,10,16,17]</sup>.

#### ***Therapy-related barriers and interventions:***

The most common therapy-related concern was the experience or fear of side effects, as observed in 13 studies. Convincing the patients that the value of the treatment outweighs the danger of adverse effects, as well as dispelling myths about drugs, can help overcome this barrier. <sup>[4,18]</sup> Complexity of the treatment regimen, polypharmacy, frequent medication changes, and lengthy treatment regimens were identified as barriers in 12, 8, and 6 studies, respectively. To improve drug adherence, physicians might implement simpler and less frequent dose regimens. Polypills can be prescribed to reduce the number of tablets <sup>[10]</sup>. If the number of medications required by the patients cannot be reduced, long-acting medications can be used to lessen the frequency of the drug administration. One can also reduce the frequency of insulin administration by employing long-acting insulin in diabetes and by prescribing drug combinations for hypertensive patients. <sup>[17]</sup> Other less common issues included the use of alternative medical systems (4 studies). For example,

while insulin remains the principal treatment for diabetes, recent studies have shown the great potential of plants in disease management <sup>[34]</sup> and this may eventually make the patients shift to different systems of medicines. The dosage form or packaging of the medications (3 studies) and a lack of understanding about how to consume the medications (2 studies) are the most common adherence issues reported among asthmatic patients. To address this issue, physicians must provide regular instructions and supervision, as well as ensure that patients use their inhalers correctly. Patients should be able to select their devices based on convenience of use in general and during an exacerbation, the feel of the device in the hand, ease of opening the cap, and the ability to take the medication quickly in the event of an impending exacerbation <sup>[21,22]</sup>.

#### ***Healthcare provider/ system-related barrier and interventions:***

Several healthcare-related parameters were identified as major impediments to drug adherence. The most common of these were medicine non-availability, which was noted in 14 studies, and concerns about distance to health services, which were recognized in 7 studies. These problems can be overcome using telehealth and online pharmacy services, which enable online patient counseling and door-step medicine delivery. <sup>[26]</sup> Poor patient-provider relationships, limited counseling or information supplied to patients, and restricted consultation time were all highlighted. According to the qualitative findings, the reasons for these barriers also included discontent with healthcare practitioners who gave confusing or imprecise instructions. Providers may employ educational apps or virtual reality to help patients understand their disease and drugs better <sup>[27]</sup>.

#### ***Outcomes of medication non-adherence:***

Medication non-adherence in non-communicable diseases has profound implications for health outcomes. Various studies have found that low adherence is linked to higher morbidity and mortality rates, as well as higher healthcare consumption and expenses. When patients do not follow their recommended treatment regimens, their health can deteriorate, raising the risk of disease progression. For example, failure to adhere to therapy in hypertension and diabetes can result in uncontrolled blood pressure and glucose levels, respectively, increasing the risk of consequences such as heart failure, kidney disease, stroke, and blindness.

Similarly, failure to adhere to maintenance drugs in asthma and COPD can lead to exacerbations and impaired lung function, lowering quality of life. Patients' health conditions often worsen as a result of non-adherence, necessitating more frequent trips to doctors or emergency departments, resulting in increased healthcare utilization. Non-adherence complications can lead to increased disease loads and longer hospital admissions as symptoms become difficult to manage<sup>[30,31]</sup>.

Non-adherence not only increases morbidity and mortality rates, but it also raises healthcare costs. The financial strain on the healthcare system grows as care demand expands, hospital visits become more frequent, and medications are wasted, affecting the stability of patients, especially those who cannot afford medicines<sup>[32]</sup>.

Finally, non-adherence affects the efficacy of the therapy and disease management measures, jeopardizing long-term health outcomes.

#### CONCLUSION:

Managing drug adherence in patients with chronic NCDs is tricky due to various factors influencing patient behavior, health care system dynamics, and socioeconomic conditions. By promoting the use of technology, education, and support from family and healthcare providers, it can help the patients take their medications regularly, thereby making a positive impact on their health. However, future research and implementation efforts are required to tailor interventions to specific patient populations and contexts, thereby maximizing their impact on medication adherence and overall health.

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