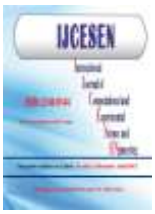
International Journal of Computational and Experimental Science and ENgineering (IJCESEN)

Vol. 10-No.4 (2024) pp. 3273-3279
http://www.ijcesen.com



ISSN: 2149-9144

Research Article

Role of Pharmacists in Optimizing Medication Adherence Through Patient Education and Counseling in Chronic Disease Management

Huzaym Noman Alanazı[1]*, Aqayl Ayed Alhazmi[2], Abdulrahman Sabah Ali Alanazi[3], Helal Awad Alenazi[4], Waleed Farhan J Alhazmi[5], Abdulmejed Hemdan N Alanazi[6], Anoud Maseer A Alshammari[7], Mohammed Awad M Alrashidi[8], Alenezi Monawer Dakhail B[9], Jaber Awwad Alruwaili[10], Abdulsalam Dhahawi Mohammed Alshammari[11]

[1]Pharmacy Technician – Northern Medical Tower, Northern Borders Health Cluster – Arar – Northern Borders Province – Saudi Arabia
* **Corresponding Author Email:** hazeem_ksa@hotmail.com- **ORCID:** 0000-0002-0247-3350

[2]Pharmacy Technician – Northern Medical Tower, Northern Borders Health Cluster – Arar – Northern Borders Province – Saudi Arabia
Email: aqalhazmi@moh.gov.sa- **ORCID:** 0000-0002-1047-9660

[3]Nursing Technician – Northern Medical Tower, Northern Borders Health Cluster – Arar – Northern Borders Province – Saudi Arabia
Email: A1000r@hotmail.com- **ORCID:** 0000-0002-2047-9950

[4]Pharmacy Technician – Northern Medical Tower, Northern Borders Health Cluster – Arar – Northern Borders Province – Saudi Arabia
Email: helal5811@gmail.com - **ORCID:** 0000-0002-3047-9940

[5]Pharmacy Technician – Northern Medical Tower, Northern Borders Health Cluster – Arar – Northern Borders Province – Saudi Arabia
Email: wfalhazmi@moh.gov.sa- **ORCID:** 0000-0002-4047-9960

[6]Pharmacy Technician – Turaif General Hospital, Northern Borders Health Cluster – Turaif – Northern Borders Province – Saudi Arabia
Email: amgad.2015@icloud.com- **ORCID:** 0000-0002-5047-9930

[7]Clinical Pharmacy Specialist – Maternity and Children Hospital, Rafha, Northern Borders Health Cluster – Rafha – Northern Borders Province – Saudi Arabia
Email: anoudma@moh.gov.sa- **ORCID:** 0000-0002-6047-9970

[8]Pharmacy Technician – Hafr Al-Batin Central Hospital, Hafr Al-Batin Health Cluster – Hafr Al-Batin – Eastern Province – Saudi Arabia
Email: Moh143780@gmail.com- **ORCID:** 0000-0002-7047-9920

[9]Pharmacist – Northern Borders Health Cluster – Arar – Northern Borders Province – Saudi Arabia
Email: Mnawer2000@gmail.com- **ORCID:** 0000-0002-8047-9980

[10]Pharmacy Technician – Turaif General Hospital, Ministry of Health – Turaif – Northern Borders Province – Saudi Arabia
Email: jaaalruwaili@moh.gov.sa - **ORCID:** 0000-0002-9047-9910

[11]Pharmacy Technician – Maternity and Children Hospital, Hail Health Cluster – Hail – Hail Province – Saudi Arabia
Email: gala1163@hotmail.com - **ORCID:** 0000-0002-1147-9990

Article Info:

DOI: 10.22399/ijcesen.4567
Received : 01 November 2024
Accepted : 30 December 2024

Keywords

Pharmacists,
medication adherence,
patient education,
counseling,
chronic disease management,
diabetes

Abstract:

Pharmacists play an essential role in optimizing medication adherence, especially in the context of managing chronic diseases such as diabetes, hypertension, and asthma. By acting as accessible healthcare providers, pharmacists can offer personalized education and counseling to patients at various points in their care journey. This includes explaining the importance of medication adherence, reviewing potential side effects, and clarifying dosing schedules. Such interventions not only empower patients with the knowledge to manage their conditions effectively but also foster a teamwork approach to health care, where pharmacists collaborate with physicians and other healthcare professionals to ensure a comprehensive management strategy that addresses patient needs and preferences. In addition to providing medication-related education, pharmacists are crucial in identifying barriers to adherence, such as cost issues, complex regimens, or misunderstandings about the therapeutic goals. Through one-on-one counseling sessions, they can tailor solutions like medication synchronization, blister packaging, or referral to financial assistance programs. The ongoing support provided by pharmacists can significantly enhance a patient's commitment to their treatment plan, leading to improved health outcomes and reduced healthcare costs associated with complications stemming from non-adherence. By fostering a supportive relationship and creating a safe space for patients to voice concerns, pharmacists effectively bridge the gap between medication prescriptions and real-world patient behaviors.

1. Introduction

The global burden of chronic non-communicable diseases, such as hypertension, diabetes mellitus, cardiovascular diseases, asthma, and mental health disorders, constitutes a defining public health challenge of the 21st century. These conditions are characterized by their prolonged duration, gradual progression, and the necessity for continuous medical management, often spanning decades of a patient's life. At the core of effective chronic disease management lies a deceptively simple yet persistently elusive principle: medication adherence. Defined as the extent to which a patient's behavior corresponds with the agreed-upon recommendations from their healthcare provider, adherence encompasses the correct timing, dosage, and frequency of medication intake [1]. The World Health Organization has underscored medication non-adherence as a multifaceted problem of striking magnitude, estimating that in developed nations, only about 50% of patients with chronic illnesses adhere to their prescribed therapies [2]. The consequences of this pervasive issue are profound, extending beyond individual patient suffering to impose unsustainable strains on healthcare systems worldwide. Poor adherence translates into suboptimal therapeutic outcomes, accelerated disease progression, increased frequency of hospitalizations and emergency department visits, heightened risks of morbidity and mortality, and a massive wastage of healthcare resources. In this complex landscape, the healthcare paradigm is progressively shifting from a paternalistic model to a patient-centered, collaborative approach. Within this evolved framework, pharmacists have emerged from their traditional dispensary roles to become indispensable frontline healthcare professionals. As the most accessible medication experts, pharmacists are uniquely positioned to spearhead interventions aimed at optimizing medication adherence through systematic, evidence-based patient education and counseling, thereby transforming the trajectory of chronic disease management and improving population health outcomes.

2. Understanding Medication Adherence: Definitions, Dimensions, and Measurement

To effectively address non-adherence, a clear conceptualization is essential. Medication adherence is often differentiated from the older term "compliance," which implies passive obedience to physician authority. Adherence, in contrast, emphasizes a more collaborative, active partnership between the informed patient and the healthcare provider, founded on mutual agreement and shared decision-making [3]. This paradigm shift acknowledges patient autonomy and the complex factors influencing their medication-taking behavior. The construct of adherence itself is not monolithic but consists of three distinct, sequential phases: initiation, implementation, and persistence. Initiation refers to the patient taking the first dose of a prescribed medication. Implementation is the extent to which a patient's actual dosing corresponds to the prescribed regimen from initiation until the last dose. Persistence denotes the length of time a patient continues the prescribed treatment [4]. A patient may fail at any of these stages; for instance, never filling a prescription

(failing initiation), missing occasional doses (poor implementation), or discontinuing therapy prematurely (lack of persistence).

Measuring adherence accurately remains a significant methodological challenge, as no single method is considered the gold standard. Approaches are generally categorized as direct or indirect. Direct methods, such as observed therapy or measurement of drug or biomarker levels in biological fluids, are highly accurate but often invasive, costly, and impractical for routine care [5]. Indirect methods are more commonly utilized and include patient self-reports (via questionnaires or diaries), pill counts, pharmacy refill records, and electronic monitoring devices like Medication Event Monitoring Systems (MEMS). Each method has limitations; self-reports are susceptible to recall bias and overestimation, while pill counts can be manipulated. Pharmacy refill data offer objective longitudinal insights but do not confirm actual ingestion. Electronic monitors provide detailed temporal dosing patterns but are expensive. Consequently, a combination of methods is frequently recommended to obtain a more reliable assessment of a patient's adherence behavior [6].

3. The Multifaceted Barriers to Medication Adherence in Chronic Diseases

The factors contributing to medication non-adherence are complex, interwoven, and multifactorial, broadly categorized into patient-related, condition-related, therapy-related, healthcare system-related, and socioeconomic factors. Patient-related barriers are numerous and deeply personal. A fundamental hurdle is lack of knowledge or understanding about the disease itself, the purpose of the medication, its expected benefits, and the long-term consequences of non-adherence [7]. Forgetting doses due to busy schedules or cognitive impairment is exceedingly common. Motivational factors play a critical role; if a patient does not perceive the illness as serious (low perceived severity) or does not believe the medication will be effective (low perceived benefit), their commitment to the regimen wanes. Conversely, excessive concern about potential adverse effects or the long-term consequences of taking medicines ("pill burden fear") can deter adherence [8]. Practical challenges, such as visual impairment making it difficult to read labels, arthritis complicating bottle opening, or illiteracy, are significant yet often overlooked obstacles.

Therapy-related barriers are inherently linked to the treatment regimen itself. Complexity is a major deterrent; regimens requiring multiple medications (polypharmacy) dosed several times a day drastically reduce adherence rates. The presence of bothersome side effects, whether real or anticipated, is one of the most common reasons for premature discontinuation of therapy [9]. High out-of-pocket medication costs can render treatments financially inaccessible, forcing patients to ration or forgo medications entirely. Furthermore, treatments that do not provide immediate symptomatic relief (e.g., statins for cholesterol, antihypertensives) struggle with adherence as patients do not experience tangible, reinforcing benefits. Healthcare system and provider-related barriers include fragmented care, poor continuity, short consultation times that preclude adequate education, and poor communication between healthcare providers leading to conflicting advice. A weak patient-provider relationship, characterized by lack of trust or empathy, further disengages the patient [10]. Finally, broader socioeconomic barriers such as cultural or health beliefs, inadequate social support, unstable living conditions, and transportation difficulties to pharmacies or clinics create an environment where consistent medication management becomes a low priority. Recognizing this intricate web of barriers is the first essential step for pharmacists in designing targeted, effective interventions.

4. The Pharmacist as an Educator: Building Knowledge and Health Literacy

Patient education forms the cornerstone of the pharmacist's adherence-enhancing strategy. Effective education transcends the mere transmission of information; it is a structured, personalized process aimed at improving health literacy—the capacity to obtain, process, and understand basic health information needed to make appropriate health decisions. A knowledgeable patient is an empowered partner. Pharmacist-led education must begin with the fundamentals: ensuring the patient understands their diagnosis in simple, clear terms. This is followed by detailed, jargon-free explanations of each medication's brand and generic name, its precise purpose (e.g., "this lisinopril relaxes your blood vessels to lower your blood pressure and reduce strain on your heart"), and the expected therapeutic goals (e.g., target blood pressure range, HbA1c level) [11].

Crucially, education must meticulously cover the practical aspects of the regimen: the exact dose, the timing (in relation to meals, time of day), the route of administration, and the intended duration of therapy. For patients on multiple medications, pharmacists can create a unified, simplified schedule that consolidates dosing times. Proactive

management of expectations regarding potential side effects is vital. Rather than waiting for side effects to cause alarm and lead to discontinuation, pharmacists should counsel on which reactions are common and transient, which require simple management strategies (e.g., taking metformin with food to reduce GI upset), and which are serious and necessitate immediate medical attention [12]. This proactive approach demystifies the experience, reduces anxiety, and provides the patient with a plan, thereby preventing panic-driven non-adherence.

Education also involves practical skill-building. For devices like inhalers for asthma/COPD, insulin pens, or auto-injectors, the pharmacist must provide physical demonstration using placebo devices, followed by observed "teach-back" technique from the patient to ensure competency. Studies consistently show that improper inhaler technique is a leading cause of poor asthma control, and pharmacist intervention significantly improves technique and outcomes [13]. Furthermore, pharmacists educate on safe storage of medications, the dangers of sharing prescriptions, and the importance of not discontinuing therapy even when feeling well, particularly for asymptomatic conditions like hypertension. By transforming complex medical information into actionable knowledge, pharmacists equip patients with the fundamental tools for self-management.

5. The Pharmacist as a Counselor: Applying Behavioral Science and Motivational Interviewing

While education addresses the knowledge gap, counseling targets the behavioral and motivational components of adherence. This is where the pharmacist's role evolves from instructor to coach and counselor. One of the most effective frameworks employed is Motivational Interviewing (MI), a collaborative, person-centered form of guiding to elicit and strengthen motivation for change [14]. MI is predicated on the understanding that ambivalence about change is normal. Instead of confronting or lecturing the non-adherent patient, the pharmacist using MI employs techniques such as open-ended questioning, reflective listening, affirmation, and summarizing to explore the patient's own values and goals.

For example, a pharmacist might ask, "What do you know about how this medication helps you?" or "What are some things you enjoy that managing your diabetes better might allow you to do for longer?" This helps the patient articulate their intrinsic motivations (e.g., "I want to be healthy enough to play with my grandchildren"). The pharmacist then explores the discrepancy between the patient's current behavior (missing doses) and their stated life goals, allowing the patient to voice the arguments for change themselves. When a patient expresses concerns about side effects, an MI-consistent response would be, "It sounds like you're worried these headaches might be from the new medicine, and that's making you hesitant to take it. What do you know about how we might manage that?" This approach reduces defensiveness, builds rapport, and empowers the patient to become an active participant in problem-solving [15].

Cognitive-behavioral strategies are also integral to counseling. Pharmacists can work with patients to identify specific adherence barriers and co-create practical solutions. For forgetfulness, they might suggest linking medication intake to daily routines like brushing teeth or using visual cues. For complex regimens, they can simplify schedules or recommend adherence aids. They assist patients in setting specific, measurable, achievable, relevant, and time-bound (SMART) goals, such as "I will take my morning medications before breakfast every day this week" rather than a vague "I will try to be better." Regular follow-up, either in person or via telephone, allows the pharmacist to review progress, troubleshoot new challenges, and provide ongoing encouragement, creating a sustained support system that is often missing in traditional episodic care [16].

6. Utilizing Tools and Technology to Support Adherence

In the modern healthcare environment, pharmacists leverage a variety of tools and technologies to augment their educational and counseling efforts. Adherence aids serve as tangible reminders and organizers. Simple pillboxes, organized by day of the week and time of day, are profoundly effective for patients on multiple medications, particularly the elderly. For more advanced needs, automated dispensers with auditory or visual alarms can be recommended. Blister packs (unit-dose packaging), prepared by the pharmacy, provide a clear, date-sequenced supply of medications, reducing confusion and simplifying medication administration for patients and caregivers alike [17].

Digital health technologies offer transformative potential. Smartphone applications can send dosage reminders, provide educational information, track refills, and even log side effects or biometric data like blood glucose readings. Some apps allow for data sharing with pharmacists or family members to create a support network. Electronic adherence

monitors, while often used in research, are increasingly being integrated into clinical care to provide objective, real-time data that pharmacists can use to identify patterns of non-adherence (e.g., consistently missing weekend doses) and intervene precisely [18]. Telepharmacy and secure video consultation platforms have expanded the reach of pharmacist services, allowing for remote medication therapy management (MTM) sessions, counseling, and follow-up for patients in rural areas or with mobility limitations. These technologies do not replace the human interaction of counseling but rather enhance the pharmacist's ability to monitor, remind, and engage with patients consistently.

7. Integration into Collaborative Care Models and Medication Therapy Management

The impact of pharmacist-led adherence interventions is maximized when pharmacists are fully integrated into interprofessional healthcare teams. Collaborative Drug Therapy Management (CDTM) agreements allow pharmacists, under protocol with physicians, to assume responsibility for managing specific aspects of a patient's drug therapy, including initiating, modifying, and monitoring adherence-focused interventions [19]. In primary care clinics, community pharmacies, and specialized ambulatory care settings, pharmacists function as medication experts within patient-centered medical homes or accountable care organizations.

A formalized framework for this integration is Medication Therapy Management (MTM). In comprehensive MTM services, pharmacists conduct systematic medication reviews to identify adherence problems, drug-related problems, and opportunities for regimen simplification. They create personalized medication action plans (MAPs) for the patient and provide detailed case summaries to other providers [20]. For instance, a pharmacist managing a patient with heart failure might identify non-adherence to a diuretic, counsel the patient on its critical role in preventing fluid overload, simplify the regimen, provide a pillbox, and schedule a follow-up call in one week to check weight and symptoms. They would then communicate their intervention and the patient's updated plan to the cardiologist and primary care physician. This seamless collaboration ensures all providers are aligned, messages are consistent, and the patient receives coordinated, continuous care. Evidence from numerous studies demonstrates that such integrated pharmacist services lead to significant improvements in adherence rates, clinical outcomes (e.g., better blood pressure, glycemic, and lipid control), and reductions in healthcare utilization and costs [21].

8. Special Considerations in Specific Chronic Disease States

The principles of pharmacist-led adherence support are universally applicable but require disease-specific tailoring. In diabetes management, adherence is not only to oral agents or insulin but also to self-monitoring of blood glucose. Pharmacists educate on the correlation between medication, diet, activity, and glucose readings, turning data into actionable insights. They provide intensive counseling on insulin injection technique, dose adjustment, and hypoglycemia prevention, which are critical for safe and effective therapy [22]. For cardiovascular diseases, adherence to medications like antiplatelets (e.g., clopidogrel) statins, and antihypertensives is paramount for preventing catastrophic events like myocardial infarction or stroke. Pharmacists emphasize the preventive, long-term nature of these therapies, often using analogies like "a statin is like a daily cleaning crew for your arteries" to make the intangible benefit more concrete [23].

In respiratory diseases like asthma and COPD, as previously noted, device technique is paramount. Pharmacists spend considerable time on inhaler mastery and the critical difference between reliever and controller medications. Adherence to controller inhalers, which patients often neglect when asymptomatic, is a major focus. For mental health conditions such as depression and schizophrenia, stigma and the delayed onset of action of antidepressants or the side-effect profile of antipsychotics are major adherence barriers. Pharmacists provide empathetic counseling to normalize the condition, manage side effects (e.g., selecting appropriate laxatives for opioid-induced constipation), and reinforce the importance of persistence through the initial weeks of therapy [24]. In each case, the pharmacist's deep therapeutic knowledge allows them to address disease-specific concerns and fears authoritatively.

9. Conclusion:

The challenge of medication non-adherence in chronic disease management is a formidable one, with deep roots in behavioral, social, economic, and systemic factors. It cannot be solved by a single intervention or by any healthcare professional working in isolation. Pharmacists, positioned at the critical nexus between the prescription and the patient, have demonstrated their indispensable value in meeting this challenge. Through their dual

role as expert educators and skilled counselors, they address both the informational and motivational drivers of patient behavior. By building health literacy, they empower patients to understand their conditions and therapies. By applying principles of motivational interviewing and behavioral science, they help patients navigate ambivalence and build sustainable habits. Through the judicious use of tools, technology, and integration into collaborative care models, they provide the continuous, supportive infrastructure necessary for long-term adherence.

The evidence is compelling: systematic reviews and meta-analyses consistently confirm that interventions led by pharmacists result in statistically and clinically significant improvements in medication adherence across a spectrum of chronic diseases [25]. These improvements translate into the ultimate goals of healthcare: better patient outcomes, enhanced quality of life, and more efficient use of resources. Therefore, optimizing medication adherence through patient education and counseling is not merely a clinical task for pharmacists; it is a professional imperative and a public health necessity. Healthcare systems worldwide must continue to evolve, recognizing and formally integrating pharmacists as essential providers in chronic disease management teams, ensuring reimbursement for their cognitive services, and empowering them to practice to the full extent of their training. In doing so, we move closer to a model of care where every patient is supported, educated, and motivated to participate fully in their health journey, transforming the management of chronic disease from a struggle of persistence into a sustainable partnership for health.

Author Statements:

- **Ethical approval:** The conducted research is not related to either human or animal use.
- **Conflict of interest:** The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper
- **Acknowledgement:** The authors declare that they have nobody or no-company to acknowledge.
- **Author contributions:** The authors declare that they have equal right on this paper.
- **Funding information:** The authors declare that there is no funding to be acknowledged.
- **Data availability statement:** The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

References

[1] DuBard CA. Savings impact of Community Care of North Carolina: a review of the evidence. Community Care of North Carolina. Data Brief. Issue no. 11. July 27, 2017.

[2] Centers for Medicare & Medicaid Services. How MIPS eligibility is determined.

[3] American College of Physicians. ACO or PCMH: making a crucial decision for your practice. Medical Economics. February 4, 2015.

[4] Ifeanyi Chiazor E, Evans M, van Woerden H, Oparah AC. A systematic review of community pharmacists' interventions in reducing major risk factors for cardiovascular disease. Value Health Reg Issues. 2015;7:9-21.

[5] Farris KB, Ashwood D, McIntosh J, et al. Preventing unintended pregnancy: pharmacists' roles in practice and policy via partnerships. J Am Pharm Assoc (2003). 2010;50(5):604-12.

[6] Watanabe JH, McInnis T, Hirsch JD. Cost of prescription drug-related morbidity and mortality. Ann Pharmacother. 2018;52(9):829-37.

[7] Brown TJ, Todd A, O'Malley C, et al. Community pharmacy-delivered interventions for public health priorities: a systematic review of interventions for alcohol reduction, smoking cessation and weight management, including meta-analysis for smoking cessation. BMJ Open. 2016;6(2):e009828.

[8] Luder HR, Shannon P, Kirby J, Frede SM. Community pharmacist collaboration with a patient-centered medical home: establishment of a patient-centered medical neighborhood and payment model. J Am Pharm Assoc (2003). 2018;58(1):44-50.

[9] Gomez A. Availability of pharmacist-prescribed contraception in California, 2017. JAMA. 2017;318(22):2253-54.

[10] Centers for Medicare & Medicaid Services. 2017 star ratings. Fact sheet. October 12, 2016.

[11] San-Juan-Rodriguez A, Newman TV, Hernandez I, et al. Impact of community pharmacist-provided preventive services on clinical, utilization, and economic outcomes: an umbrella review. Prev Med. 2018;115:145-55.

[12] Avalere Health. Developing trends in delivery and reimbursement of pharmacist services. November 2015.

[13] Rosenbaum L, Shrank WH. Taking our medicine—improving adherence in the accountability era. N Engl J Med. 2013;369(8):694-95.

[14] Centers for Medicare & Medicaid Services. MACRA. Updated June 14, 2019.

[15] Altowaijri A, Phillips CJ, Fitzsimmons D. A systematic review of the clinical and economic effectiveness of clinical pharmacist intervention in secondary prevention of cardiovascular disease. J Manag Care Pharm. 2013;19(5):408-16.

[16] Isetts BJ, Schondelmeyer SW, Artz MB, et al. Clinical and economic outcomes of medication therapy management services: the Minnesota experience. J Am Pharm Assoc (2003). 2008;48(2):203-14.
[17] Mossialos E, Courtin E, Naci H, et al. From "retailers" to health care providers: transforming the role of community pharmacists in chronic disease management. Health Policy. 2015;119(5):628-39.
[18] Bonner L. A whirlwind tour of value-based payment models—with pharmacists as your guide. Pharmacy Today. 2018;24(6):38-39.
[19] Abrams K, Balan-Cohen A, Durbha P. Growth in outpatient care: the role of quality and value incentives. Deloitte Insights. August 15, 2018.
[20] Prudencio J, Cutler T, Roberts S, Marin S, Wilson M. The effect of clinical pharmacist-led comprehensive medication management on chronic disease state goal attainment in a patient-centered medical home. J Manag Care Spec Pharm. 2018;24(5):423-29.
[21] Blalock SJ, Roberts AW, Lauffenburger JC, Thompson T, O'Connor SK. The effect of community pharmacy-based interventions on patient health outcomes: a systematic review. Med Care Res Rev. 2013;70(3):235-66.
[22] Burton D, Haughom J. What is an accountable care organization (ACO)? Health Catalyst. April 17, 2014.
[23] Doucette WR, McDonough RP, Klepser D, McCarthy R. Comprehensive medication therapy management: identifying and resolving drug-related issues in a community pharmacy. Clin Ther. 2005;27(7):1104-11.
[24] Duff BL. Pharmacists can help reduce repeat MIs. Drug Topics. September 12, 2017.