ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1602

Mobile Health, Pharmacist-Led Interventions and Home Medication Management: A Comprehensive Review of the Literature

Mitanshu Modhia[1]; Dr. Indermeet Singh Anand[2]; Paridhi Vyas[3]; Dr. Dhiren L. Chaudhary[4]

[1,2,3,4] Shri Sarvajanik Pharmacy College, Mehsana

Publication Date: 2026/02/09

Abstract: Medication adherence remains a central determinant of treatment success in chronic diseases. In recent years, the integration of pharmacist-led services, home-based reviews and mobile health (mHealth) technologies has gained increasing attention as innovative mechanisms to improve adherence, quality of life (QOL) and clinical outcomes. This review synthesizes evidence from 17 studies spanning pharmacist interventions, mHealth applications, home medication reviews, telehealth strategies and caregiver-oriented digital learning. The findings show consistent short-term improvements in adherence and patient engagement across many digital and pharmacist-driven programs, however evidence on long-term clinical effectiveness, scalability and sustainability remains limited. Substantial gaps persist around user engagement, privacy concerns, contextual adaptability and healthcare provider integration. The review highlights the need for large, theory-driven and community-based trials to validate and optimize these evolving models of care.

Keywords: *Medication Adherence, Pharmacist-Led Interventions, Mobile Health (mHealth), Home Medication Review, Digital Health, Chronic Disease Management, Quality of Life, Telehealth.*

How to Cite: Mitanshu Modhia; Dr. Indermeet Singh Anand; Paridhi Vyas; Dr. Dhiren L. Chaudhary (2026) Mobile Health, Pharmacist-Led Interventions and Home Medication Management: A Comprehensive Review of the Literature. *International Journal of Innovative Science and Research Technology*, 11(1), 3287-3290. https://doi.org/10.38124/ijisrt/26jan1602

I. INTRODUCTION

Chronic diseases such as diabetes, hypertension, kidney disease and heart failure demand long-term pharmacotherapy, yet non-adherence affects nearly half of patients worldwide, contributing to poor disease control, increased hospitalizations and higher healthcare costs. Growing interest in pharmacist-led interventions and digital health technologies reflects a global shift toward patient-centered, accessible and scalable adherence solutions.

This review integrates findings from studies covering:

- Pharmacist-led medication reviews.
- Home-based and telehealth interventions.
- Mobile health applications and QR-based adherence tools.
- Digital learning platforms for caregivers.
- Effects of interventions on quality of life.

II. PHARMACIST-LED INTERVENTIONS TO IMPROVE MEDICATION ADHERENCE

➢ *Low-Health Literacy Tools: Flashcards and QR-Linked Videos*

A pharmacist-led intervention using low-literacy flashcards and video reinforcement significantly improved adherence in patients with diabetes, heart failure and hypertension (71% vs. 44% at 180 days).

This highlights the importance of simplifying educational content for populations with limited health literacy.

➢ *Home Medication Reviews (HMR)*

Home-based reviews revealed numerous medication-related problems, such as ADRs, illegible labels and poor storage practices. Most patients lacked prior awareness of HMR services but reported high acceptability, demonstrating the feasibility of pharmacist involvement at home.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1602

➢ *Limitations of Home Medication Reviews: The HOMER Trial*

Contrary to expectations, the HOMER randomized trial found increased hospital readmissions among older adults receiving pharmacist-led home reviews (rate ratio 1.30; P=0.009) with no improvements in quality of life or mortality.

This raises concerns about intervention timing, patient selection and clinical coordination.

➢ *Pharmacist Comprehensive Medication Reviews (CMR) in Primary Care*

Remote CMRs identified extensive polypharmacy and inappropriate prescribing, though only one-third of recommendations were accepted by clinicians.

The limited uptake underscores challenges in integrating pharmacists within interdisciplinary teams.

➢ *Pharmacist-Led Telehealth Medication Management*

Tele-visits allow direct visualization of home medication storage and actual usage. Although feasible, robust evidence on long-term outcomes is lacking, justifying the need for larger cluster trials.

III. MHEALTH INTERVENTIONS FOR MEDICATION ADHERENCE

➢ *QR-Based Self-Reporting Systems*

The APOLLO-QR study showed high pill-count adherence (~98%) but lower adherence recorded via QR-based self-reporting (approx. 90% accuracy)

Patients expressed strong interest in more interactive and engaging features.

➢ *Mobile Health Apps for Adherence*

Several studies highlight the variable but promising effects of mHealth tools:

- *Systematic Evaluations of Adherence Apps*

Of over 2,000 apps screened, only seven met eligibility criteria, none with strong scientific evidence or adequate privacy safeguards. Even widely used apps lacked regulatory certification and long-term validation.

- *Randomized Controlled Trials of Mobile Apps*

Mobile app interventions improved short-term adherence and self-efficacy in underserved populations but showed no effect on knowledge or social support, suggesting technology alone is insufficient for behavioural change.

- *Mobile Applications in Chronic Kidney Disease*

A pharmacist-led mobile application “Kidney Health” significantly increased medication adherence and improved random blood glucose over 3 months in CKD patients.

- *Broader Systematic Reviews*

Meta-analysis of mHealth adherence interventions (14 RCTs) showed modest but significant improvements; however, evidence quality was low and long-term follow-up scarce.

- *Early mHealth Models: Electronic Blisters*

An early pilot using electronic blister packs showed feasibility and improved adherence only in diabetes medications, emphasizing the importance of disease-specific tailoring and provider engagement.

IV. MHEALTH USE AMONG PATIENTS, CAREGIVERS AND HEALTHCARE PROVIDERS

➢ *Mobile Health for Caregiver Learning*

A systematic review found high smartphone use (61–99%) among caregivers, especially women, but barriers included limited internet access and concerns about reliability of online information.

➢ *Adoption Barriers Among Primary Care Doctors*

Primary care doctors acknowledged the potential of mHealth but expressed concerns about:

- Lack of trustworthy apps
- Data privacy
- Patient suitability
- Integration into clinical workflow.

These insights underscore the need for clinician-friendly, validated digital resources

V. QUALITY OF LIFE OUTCOMES ASSOCIATED WITH PHARMACIST AND DIGITAL INTERVENTIONS

➢ *QOL Among Diabetic Patients*

A cross-sectional study in Delhi found diabetics had significantly compromised quality of life, particularly in general health and vitality. Socioeconomic status and gender disparities were strong determinants.

➢ *Effect of Pharmacist-Led Interventions on QOL*

Pharmacist-led education improved all EQ-5D domains, along with better glycaemic control; however, single-site design and short follow-up limited generalizability.

➢ *Digital Coaching and Lifestyle Outcomes*

A mobile app plus human coaching improved weight loss and sleep but—over a 12-week period—showed limited evaluation of clinical endpoints such as glucose or BP control.

VI. SYNTHESIS OF KEY FINDINGS

➢ *What Works*

Across the literature, the following strategies consistently improved medication adherence:

- Pharmacist-led education, particularly for patients with low health literacy
- Hybrid digital–human interventions (apps + coaching)
- Interactive mHealth tools
- Mobile apps tailored to specific diseases (e.g., CKD)
- Telehealth involving direct assessment of home medication use

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1602

➢ *What Remains Uncertain*

Despite promising short-term results, there remain crucial gaps:

- Limited long-term adherence data
- Few rigorous clinical outcome evaluations
- Poor integration of digital tools into clinical workflow
- Low clinician uptake of pharmacist recommendations
- Privacy and regulatory concerns for mobile apps

➢ *Mixed or Negative Findings*

- Home medication reviews may increase readmissions among frail elderly (HOMER trial).
- Apps often do not improve knowledge or social support.
- mHealth benefits vary by disease type and baseline adherence.

VII. FUTURE DIRECTIONS

Based on the reviewed evidence, future research should prioritize:

➢ *Long-Term, Large-Scale Trials:*

Evaluating sustained adherence, clinical outcomes, and cost-effectiveness.

➢ *Integration of Digital Tools with Healthcare Providers:*

Especially pharmacist–physician collaboration and real-time data sharing.

➢ *Human–Technology Hybrid Models:*

Combining automated digital tools with personalized coaching.

➢ *Privacy, Security, and Regulatory Frameworks:*

To improve trust among patients and clinicians.

➢ *Tailored Interventions for Underserved and Low-Literacy Populations:*

Especially in low- and middle-income countries.

VIII. CONCLUSION

Pharmacist-led interventions and mobile health innovations offer promising but incomplete solutions to longstanding problems of medication adherence and chronic disease management. Evidence indicates meaningful short-term improvements across various populations, particularly when interventions are simple, patient-centered, and supported by pharmacists or human coaches. However, long-term effectiveness, clinician acceptance, scalability, and integration into routine care remain significant challenges.

A coordinated approach combining digital tools, pharmacist expertise, caregiver engagement, and healthcare system support is essential for achieving sustainable improvements in adherence, quality of life, and clinical outcomes.

REFERENCES

[1]. Kristin S. Alvarez, Denise L. Yeung, et. al, "Low-health literacy flashcards & mobile video reinforcement to improve medication adherence in patients on oral diabetes, heart failure, and hypertension medication." *PMC*. 2018, 57(1), 30-37.

[2]. Bruno Francaviglia, Luca Lombardo, Bianca Pellizzeri, Federica Agnello et. al, "Clinical feasibility of a quick response code-based digital self-reporting of medication adherence: results in patients on ticagrelor therapy from the APOLLO-QR observational study." *Eur Heart J Digit Health*. 2025, 6(4), 733-741.

[3]. Dilip Chandrasekhar, Hridya Mary Thomas, Elizabeth Joseph and Farzana Abdul Ghaffoor., "The role of pharmacist-led home medication review in a community setting and the preparation of a medication list." *Clin. Epidemiol. Glob. Health.* 2019, *7*(1), 66-70.

[4]. Richard Holland, Elizabeth Lenaghan, Ian Harvey, Richard Smith, et al., "Does home-based medication review keeps older people out of hospital? The HOMER randomised controlled trial." *BMJ*. 2005, *330*, 293.

[5]. Michele Monzon-Kenneke, Paul Chiang, Nengliang (Aaron) Yao and Mark Greg., "Pharmacist medication review: An integrated team approach to serve home-based primary care patients." *PLoS One*. 2021, *16*(5), e0252151.

[6]. Sheikh Rubana Hossain, Akanksha N Samant, Briana C Balsamo, Chelsea E Hawley and Michael C Zanchelli., "Effect of Medication Management at Home via Pharmacist-Led Home Tele visits: Protocol for a Cluster Randomized Controlled Trial." *JMIR Res. Protoc.* 2025, *14*, e65141.

[7]. Yogesh Gautam, AK Sharma1, AK Agarwal, MK Bhatnagar and Roochika Ranjan Trehan., "A Cross-sectional Study of QOL of Diabetic Patients at Tertiary Care Hospitals in Delhi." *Indian J Community Med.* 2009, *34*(4), 346-350.

[8]. Muhammad Zahid Iqbal and Saad S. Alqahtani., "Effect of pharmacist led intervention on health-related quality of life in diabetic patients assessed using EQ5D domains and visual analogue scale." *Sci. Rep*. 2025, *15*, 21222.

[9]. HyoRim Ju, EunKyo Kang, YoungIn Kim, HyunYoung Ko and Belong Cho., "The Effectiveness of a Mobile Health Care App and Human Coaching Program in Primary Care Clinics: Pilot Multicentered Real-World Study." *JMIR Mhealth Uhealth.* 2022, *10*(5), e34531.

[10]. Dauster Souza Pereira and Priscilla Perez da Silva Pereira., "Self-directed learning of informal caregivers using mobile health: a systematic review." *BMC Health Serv. Res*. 2025, *25*, 911.

[11]. Backes C, Moyano C, Rimaud C, Bienvenu C and Schneider MP., "Digital Medication Adherence Support: Could Healthcare Providers Recommend Mobile Health Apps?" *Front. Med. Technol.* 2021, *2*, 616242.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26jan1602

[12]. Christa E. Hartch, Mary S. Dietrich, B. Jeanette Lancaster, Deonni P. Stolldorf and Shelagh A. Mulvaney., "Effects of a medication adherence app among medically underserved adults with chronic illness: a randomized controlled trial." *J. Behav. Med.* 2024, *47*, 389-404.

[13]. Yihang Peng, Han Wang, Qin Fang, Liling Xie, Lingzhi Shu, Wenjing Sun and Qin Liu., "Effectiveness of Mobile Applications on Medication Adherence in Adults with Chronic Diseases: A Systematic Review and Meta-Analysis." *JMCP.* 2020, *26*(4), 550-561.

[14]. Shaza Gamal, Ahmad Mohamad Abbas Elseasi, Nirmeen Ahmed Sabry and Samar Farghali Farid., "Impact of pharmacist led mobile application on medication adherence and efficacy in chronic kidney disease." *NPJ Digit. Med.* 2025, *8*, 325.

[15]. H. Anglada-Martinez, G. Riu-Viladoms, M. Martin-Conde, M. Rovira-Illamola, et al., "Does mHealth increase adherence to medication? Results of a systematic review." *Int. J. Clin. Pract.* 2014, *64*(1).

[16]. Indra Gayatri Valliyappan, Hooi Min Lim, YewKong Lee and Chirk Jenn Ng., "Exploring primary care doctors' perceptions and experiences in adopting mHealth with patients: A qualitative study." *Digital Health.* 2025, *11*, 1-9.

[17]. Helmut Brath, Jurgen Morak, Thomas Kastenbauer, Robert Modre-Osprian et. al., "Mobile health (mHealth) based medication adherence measurement a pilot trial using electronic blisters in diabetes patients." *Br. J. Clin. Pharmacol.* 2013, *76*(1), 47-55.