JUKEKE Jurnal Kesehatan dan Kedokteran
OPEN ACCESS
JUKEKE Vol 4 No. 2 | June 2025 | ISSN: 2829-0437 (print), ISSN: 2829-050X (online), Pages 58-70

Effectiveness of Education by Pharmacists on Patient Compliance in Taking Medication (a Literature Review)

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Article History
Received : 18 July 2025
Revised : 19 July 2025
Accepted : 21 July 2025
Published : 23 July 2025

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Cite This Article:
Fitri, M., & Dewi, R. I. K. (2025). The Effectiveness of Pharmacist-led Education on Patient Adherence to Medication: A Literature Review. *Jurnal Kesehatan Dan Kedokteran*, *4*(2), 58–70. https://doi.org/10.56127/jukeke.v4i2.2178

DOI:
https://doi.org/10.56127/jukeke.v4i2.2178

Abstract: Patient adherence to medication is a critical factor for the success of pharmacological therapy, yet low adherence remains a challenge in many healthcare systems. Pharmacist-led education has emerged as a promising strategy to improve medication adherence. This study aims to assess the effectiveness of pharmacist educational interventions on patient adherence through a literature review approach. A total of 19 national and international articles published in the last 10 years were reviewed. Findings indicate that interventions such as face-to-face counseling, educational booklets, SMS reminders, and training on proper medication use significantly enhance adherence, reduce the risk of complications, and improve patients' quality of life. These results reinforce the strategic role of pharmacists in delivering patient-centered pharmaceutical care.

Keywords: pharmacist education, medication adherence, patient counseling, drug use, pharmaceutical care.

INTRODUCTION

Patient adherence to medication is a key determinant of the success of pharmacological therapy. When patients fail to follow medication instructions correctly, including dosage, frequency, and duration, treatment effectiveness is significantly reduced. This can lead to relapses, complications, drug resistance, and even increased overall healthcare costs. This phenomenon of non-adherence is still prevalent, not only in developing countries but also in developed ones. The WHO estimates that the average patient adherence rate to long-term therapy is only around 50%, and the figure is even lower for chronic conditions such as hypertension, diabetes, and asthma (Alivianti, 2014).

In healthcare delivery in Indonesia, low patient compliance remains a serious challenge. Many patients stop treatment prematurely, double doses without consulting their doctor, or even combine medications with alternative treatments without adequate understanding. The factors contributing to this non-compliance are complex and multidimensional, including low health literacy, a lack of effective communication

between healthcare professionals and patients, and patients' limited understanding of the importance of consistent and correct medication use.

Normatively, the role of pharmacists in providing education to patients has been regulated by Law No. 17 of 2023 concerning Health and Minister of Health Regulation No. 73 of 2016 concerning Pharmaceutical Service Standards in Pharmacies, which emphasizes that pharmacists are not only responsible for providing drugs, but also for providing information and education to patients regarding the correct way to use drugs, side effects, and drug interactions that may occur.(*Minister of Health Regulation Number 73 of 2016 concerning Pharmaceutical Service Standards in Pharmacies*, 2017; Law Number 17 of 2023 concerning Health, 2023). In the global realm, the principle*pharmaceuticl care* developed by Hepler and Strand (1990) emphasizes the importance of active involvement of pharmacists in ensuring optimal therapeutic outcomes for patients, including through educational interventions.

Various empirical studies have shown that educational interventions conducted by pharmacists positively contribute to improving patient adherence to medication. A study involving 62 randomized controlled trials (RCTs) found that counseling interventions by pharmacists increased the likelihood of medication adherence by 4.41 times compared to patients who did not receive education (Kelly et al., 2023). Another study conducted in Pakistan among HIV patients showed that one-time counseling by pharmacists significantly increased the likelihood of patients not missing antiretroviral doses and had a positive impact on CD4 counts (Chatha et al., 2020a).

In Belgium, a study of asthma patients found that a pharmacist-led counseling intervention increased the daily dose coverage ratio of inhalers (ICS) from 0.671 to 0.749, indicating a statistically significant increase in adherence (Putman et al., 2022). Furthermore, a 2021 study also showed that pharmacist interventions can reduce the risk of*readmission* hospitalizations by 24% and emergency department visits by 30%, while increasing adherence by 30% compared to a control group (Marcum et al., 2021). In Indonesia, an educational approach by pharmacists combining direct counseling, booklets, and SMS reminders has been shown to improve adherence in type 2 diabetes patients and significantly reduce HbA1c levels (Besemah et al., 2021).

Although these findings indicate high effectiveness, pharmacists' implementation of education in practice often faces challenges such as time constraints, workload, lack of communication training, and minimal systematic support from healthcare institutions.

Therefore, a systematic literature review is essential to identify the effectiveness of pharmacist-led educational interventions on patient adherence and to highlight the various approaches that have been implemented.

This study aims to compile a literature review related to educational interventions by pharmacists and their impact on patient medication adherence. The novelty of this research lies in its thematic approach, which combines empirical evidence with a normative framework and a contextual focus on practice in Indonesia. Therefore, it is hoped that the results of this study will provide both scientific and practical contributions to strengthening the educational role of pharmacists in public health services.

LITERATURE REVIEW

*Medication adherence*or patient compliance is defined as the extent to which patients follow instructions for using medication according to the dose, time and duration recommended by health workers.(Christine & Kristi Layun, 2021). Low adherence levels are directly linked to an increased risk of adverse clinical events, including complications, rehospitalization, drug resistance, and higher healthcare system costs. Among various interventions to improve adherence, pharmacist education has proven effective, particularly in-person and habit-based interventions. According to research by Corn & Ruppar (2017), from an analysis of 771 published and unpublished studies, interventions delivered directly by pharmacists resulted in increased adherence with a standardized mean effect size difference of 0.290 comparing treatment and control groups.

In a clinical setting, a study by Jia et al. (2020) of asthma and COPD patients found that pharmacist interventions, including inhaler education and supervision of use techniques, significantly improved adherence in the treatment group compared to the control group. Furthermore, a study published in 2021 concluded that pharmacist education increased adherence by 30%, reduced the risk of readmission by 24%, and reduced emergency department visits by 30% (Kelly et al., 2023).

This intervention is also effective in addressing non-adherence to antidepressant therapy. A 2017 study of 12 outpatient studies found that pharmacist education and monitoring increased the odds ratio for adherence to 2.50 at six months of follow-up (Readdean et al., 2018). Meanwhile,*systematic review* up to 2010 reported an OR of 1.64 for improving adherence to antidepressant medication (Rubio-Valera et al., 2011).

Behavioral theory models such as*Health Belief Model*supports this educational intervention mechanism, which works through increasing the perception of benefits, reducing barriers, and providing*cues to action,*In this case, pharmacist counseling serves as a trigger for actions that encourage patient compliance (Janz & Becker, 1984). This principle appears consistent with research findings that emphasize that face-to-face, habit-based interventions are more effective than purely knowledge interventions.

Overall, the literature review indicates that pharmacist-led education, particularly through direct interaction and periodic reminders, is an empirically proven strategy for improving adherence in elderly patients, chronic patients (hypertension, diabetes, asthma, depression), and those with complex therapeutic needs. These findings provide a strong foundation for designing a systematic educational strategy that is contextualized to pharmacy practice and addresses implementation challenges in the field.

RESEARCH METHODS

This research uses an approach literature review and aims to identify, evaluate, and synthesize the results of scientific studies related to the effectiveness of educational interventions conducted by pharmacists on patient adherence to medication. A structured literature search was conducted using online scientific databases, namely Pubmed, ScienceDirect, Wiley Online Library, and Google Scholar, covering publications spanning the last 10 years (2014–2024). Keywords used in the search included:*pharmacist education, medication adherence, counseling* And *pharmaceutical care.* The selected articles were original (primary) studies, both quantitative and qualitative, that discussed educational interventions by pharmacists and their impact on patient adherence. Articles were selected based on inclusion and exclusion criteria, then analyzed descriptively to draw conclusions based on relevant findings.

RESULTS AND DISCUSSION

Results

Based on the results of the literature search and selection using the applied inclusion criteria, several scientific articles were obtained discussing the effectiveness of pharmacist education on patient adherence to medication. These articles come from national and international studies, including randomized trials (RCTs), quasi-experiments, and meta-analyses. Each study provides an overview of educational interventions carried out by

pharmacists and the results achieved on patient adherence levels. A summary of the characteristics and key findings of each study is presented in Table 1 below:

Table 1. Summary of Reviewed Research Articles

No.	Researchers and Years	Research Title and Focus	Design and Sample	Pharmacist Education Intervention	Key Results
1	Jia et al (2020)	Effect of pharmacist-led interventions on medication adherence and inhalation technique	Meta-analysis, 12 RCTs, asthma/COPD patients	Inhaler technique education & routine monitoring	Patient compliance increased significantly (OR 1.34) (Jia et al., 2020)
2	Marcus et al (2021)	Pharmacist-led interventions in older adults	Meta-analysis, 49 RCTs	Personal counseling and education	Compliance increased by 30%, readmissions decreased by 245, ER visits decreased by 30% (Mark et al., 2021)
3	Besemah et al (2021)	Effect of Pharmacist Intervention on Medication Adherence and Clinical Outcomes of Type 2 Diabetes Mellitus Outpatients in Primary Healthcare in Indonesia	Quasi-experimental, local Indonesian patients	Face to face, SMS and educational booklets	Compliance increased by 30%, and significantly reduced HbA1c (Besemah et al., 2021)
4	Putman et al (2022)	Community pharmacist adherence support for asthma patients	RCT of asthma patients	One-time counseling and booklet	Increased ICS usage ratio from 0.671 to 0.749(Putman et al., 2022)
5	Conn & Ruppar (2017)	Compliance interventions in the elderly	Meta-analysis of >700 studies	Habit-based education	Effects medium scale with SMD 0.29(Conn & Ruppar, 2017)
6	Goruntla et al (2019)	Impact of pharmacist counseling & daily SMS reminders on T2DM	RCT, Indian T2DM Patients	Daily counseling and SMS	Increased compliance by an average of 12.2%, significantly reduced HbA1c and blood pressure(Goruntla et al., 2019)
7	Chatha et al (2019)	Pharmacist-led counseling for HIV patients in Pakistan	HIV-19 in Pakistan	Pharmacist counseling	Improving ART adherence and CD4 increase (Chatha et al., 2020b)
8	Zhao et al (2019)	Meta-analysis of SMS text message reminders in	6 RCTs, CHD patients	Simple SMS Remainder	Increased compliance 2.85 and lowered blood pressure & cholesterol (Zhao et al., 2019)

No.	Researchers and Years	Research Title and Focus	Design and Sample	Pharmacist Education Intervention	Key Results
		coronary heart disease			
9	Nguyen et al (2018)	Pharmacist-led intervention to enhance medication adherence in patients with acute coronary syndrome in Vietnam	RCT, 166 ACS patients in Ho Chi Minh City, Vietnam	Two counseling sessions (before and after hospitalization), pill organizer, educational leaflet	Compliance increased from 76.5% to 90.2% in the third month after discharge (OR = 3.68; 95% CI 1.14-11.88) (Nguyen et al., 2018)
10	Calleja et al (2023)	Pharmacist interventions in CKD: systematic review	Systematic review, 8 Studi CKD	Counseling, education, monitoring	All studies reported increased compliance (Calleja et al., 2023)
11	Elnaem et al (2020)	Impact of Pharmacist-Led Interventions on Medication Adherence and Clinical Outcomes in Patients with Hypertension and Hyperlipidemia: A Scoping Review of Published Literature	Scoping review (17 studies, 136,026 patients)	Face-to-face counseling, multifaceted intervention	Most studies showed significant improvements in adherence (11 of 17 studies) although the clinical effects varied (Elnaem et al., 2020)
12	Ayogu et al (2023)	Effectiveness of a pharmacist-led educational intervention on health outcomes in hypertension management at community pharmacies in Nigeria: A two-arm parallel single-blind randomized controlled trial	RCT, 128 hypertensive patients, community pharmacies in Nigeria	Face-to-face counseling and telephone follow-up	Significant improvement in adherence score from 6.55 ± 2.24 to 8.05 ± 1.32; p = 0.0001) and quality of life(Ayogu et al., 2023)
13	Magdalena Jasinska Stroschein (2022)	Effectiveness of Pharmacist Interventions in the Management of Patient with Renal Failure: A Systematic Review and Meta-Analysis	Systematic review and meta-analysis (33 RCTs)	Multidisciplinary, including education, monitoring, and control	Improvements in compliance, blood pressure and patient satisfaction (Jasińska-Stroschein, 2022)
14	Ardavani et al (2025)	Effect of pharmacist interventions in	Systematic review and	Pharmacists in a multidisciplinary team	Increased systolic blood pressure and satisfaction

No.	Researchers and Years	Research Title and Focus	Design and Sample	Pharmacist Education Intervention	Key Results
		chronic kidney disease: a meta-analysis	meta-analysis (3 RCTs)		level meta-analysis (Ardavani et al., 2025)
15	Syifannisa et al (2022)	The Effect of Pharmacist Counseling on Treatment Compliance and Clinical Outcomes of Type 2 DM Patients at Mulyoharjo Community Health Center	Pre-experiment, 54 type 2 DM patients	Pharmacist counseling	The percentage of patients with high compliance increased significantly from 0% to 12%, and blood sugar levels decreased significantly (225.69 to 190.98, $p<0.05$) (Syifannisa et al., 2022)
16	Budiyanti et al (2022)	The Effect of Pharmacist Counseling on Compliance and Quality of Life of Hypertension Patients in the Referral Program at Kimia Farma Palagan Pharmacy	Pretest-posttest control group, 45 hypertensive patients	Direct counseling at the pharmacy	The increase in compliance and quality of life scores was significant, with physical improvement increasing by 1.1 and environmental improvement increasing by 4.5 (Budiyanti et al., 2022)
17	Suci et al (2018)	Quality of Drug Information Services (Counseling) at Pharmacies in Garut Regency	Patient simulation survey in community pharmacy	Counseling and information provision	66.7% of pharmacists provided drug information; the quality of pharmacist counseling was better than that of assistants (Suci et al., 2018)
18	Yuliana et al (2019)	The Effect of Pharmacist Counseling on Medication Compliance and Quality of Life of Schizophrenia Patients at Menur Mental Hospital, Surabaya	One-group pretest-posttest, 100 schizophrenia patients	Pharmacist counseling	Compliance increased significantly with a p-value of 0.033; the environmental QOL domain significantly increased (Yuliana et al., 2019)
19	Puji astute et al (2018)	Counseling Services by Pharmacists in Medan City	Descriptive exploratory, survey	Counseling	The drug information provided by the pharmacist is appropriate, but counseling has not become a routine activity carried out by the pharmacist (Puji Astuti et al., 2018).

Based on the table above, it can be concluded that most studies, both domestic and international, demonstrate the positive effectiveness of educational interventions conducted by pharmacists in improving patient adherence to medication. The variety of intervention methods, disease types, and approaches used enriches our understanding of pharmacists' strategic role in supporting optimal patient therapy. These findings will be further analyzed in depth in the discussion section to identify patterns, challenges, and the tangible contribution of pharmacist education to treatment success.

Discussion

This study aims to analyze the effectiveness of pharmacist education on patient medication adherence, based on a review of national and international literature. This section systematically discusses the findings of various previously presented studies and links them to relevant theory and literature to address the research questions outlined in the background.

Analysis of Pharmacist Education Intervention Patterns

Based on 19 reviewed articles, educational interventions conducted by pharmacists varied in form and method, ranging from face-to-face counseling, educational booklets, SMS reminders, and direct monitoring of medication use techniques, such as inhalers. Findings from the study by Jia et al.(2020), Goruntla et al. (2019), and Nguyen et al. (2018) showed that counseling-based educational interventions accompanied by reminders significantly improved patient adherence, including in asthma, COPD, and coronary heart disease. Meanwhile, Putmen et al. (2022) demonstrated that even a single education program using a booklet can improve the rate of appropriate inhaler medication use in asthma patients.

Adapting educational methods to disease types is also evident in interventions for patients with hypertension, diabetes mellitus, and kidney disorders. Studies by Basemah et al. (2021) and Calleja et al. (2023) show that routine education and ongoing monitoring significantly reduce HbA1c levels in diabetes patients and improve compliance in patients with chronic kidney disease. This aligns with the Pharmaceutical Care theory (Hepler & Strand, 1990), which emphasizes the role of pharmacists in ensuring patients understand how to use medications and the purpose of therapy.

Effectiveness of Education on Patient Compliance

Patient adherence to medication is crucial for the long-term success of therapy. Most of the reviewed studies reported significant improvements in adherence following pharmacist educational interventions. Marcum et al.(2021) in a meta-analysis of 49 RCTs in the elderly showed an increase in adherence of up to 30%, accompanied by a 30% reduction in emergency department visits. Similar findings were also reported by Elnaem et al. (2020), with 11 of 17 studies reporting increased adherence after pharmacist intervention.

At the domestic pharmaceutical service level, Budiyanti et al. (2022) and Syifannisa et al. (2022) also revealed similar results, namely increased adherence in patients with hypertension and diabetes after receiving routine pharmacist counseling at primary care facilities. Furthermore, a study by Yuliana et al. (2019) on educational interventions for schizophrenia patients also showed significant improvements in medication adherence and quality of life. This reinforces the adherence theory proposed by Osterberg and Blaschke (2005), which emphasizes the importance of two-way communication in building patient understanding and motivation for treatment.

Implementation and Strategic Role of Pharmacists

Findings from Indonesia indicate that while pharmacist education has had a positive impact, this practice has not yet become a fully established part of the routine pharmaceutical service. Suci et al (2018) and Puji Astuti et al. (2018) noted that only around 66.7% of pharmacists actively provide drug information, and counseling is not yet a routine activity in most community pharmacies. This indicates a gap between the potential educational role of pharmacists and its implementation in the field.

However, the success of the Referral Back (PRB) program and community-based education, as in the studies by Budiyati et al. and Ayogu et al. (Ayogu et al., 2023; Budiyanti et al., 2022), demonstrates that, when given adequate space and training, pharmacists can effectively carry out their educational function. This provides an important foundation for promoting the strengthening of policies that facilitate the empowerment of pharmacists in supporting the overall success of patient therapy.

Challenges and Recommendations

Some challenges identified in implementing pharmacist education include limited time and resources, a lack of clinical communication training, and suboptimal cross-professional collaboration in healthcare practice. A one-way educational approach, while easier to implement, is often less effective in the long term than a sustainable, patient-needs-driven approach.

As a recommendation, communication competency training, integrase technology-based education such as SMS reminders and applications mobile, and the empowerment of pharmacists in primary care programs must be strengthened. In addition, the development of standard patient education guidelines and integrase The role of pharmacists and interdisciplinary health teams is a strategic step to increase the effectiveness of educational interventions in the national health care system.

Based on the results of the analysis of various reviewed studies, it can be concluded that education by pharmacists has been proven to provide a significant contribution in increasing patient compliance with treatment. This finding answers the formulation of the research problem by emphasizing the importance of the role of pharmacists as educators and therapeutic partners in supporting the success of long-term therapy.

CONCLUSION

Based on the results of the literature review, it can be concluded that education provided by pharmacists has consistently proven effective in improving patient adherence to medication use. Interventions such as face-to-face counseling, educational media, digital reminders, and medication monitoring have been shown to have a positive impact on patients with chronic diseases such as hypertension, diabetes, asthma, and mental health disorders. The effectiveness of these interventions is supported by the principles of pharmaceutical care and adherence theory, which emphasize the importance of therapeutic communication between patients and pharmacists. Therefore, the educational role of pharmacists in the healthcare system is a crucial strategy for improving therapy success and patient quality of life.

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