



JURNAL PENDIDIKAN KEPERAWATAN INDONESIA

Journal Homepage: <http://ejournal.upi.edu/index.php/JPKI>



MMAS-8-Guided Nurse-Pharmacist Collaborative Education to Improve Medication Adherence and Blood Pressure Control in Patients with Hypertension: A Case Study

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ABSTRACT

Introduction: Poor adherence to antihypertensive medication remains a major challenge in hypertension management and may contribute to uncontrolled blood pressure and preventable complications. Structured education guided by medication adherence assessment may help patients understand their treatment and improve medication-taking behavior. **Objective:** This case study aimed to describe the implementation of MMAS-8-guided nurse-pharmacist collaborative education to improve medication adherence and blood pressure control in patients with hypertension. **Methods:** This study used a descriptive case study design involving five patients with hypertension in the working area of Cimandala Primary Health Center, Bogor, Indonesia. The intervention consisted of structured education delivered collaboratively by nurses and pharmacists over 14 days. Medication adherence was assessed using the Morisky Medication Adherence Scale-8 (MMAS-8), while blood pressure was measured before and after the intervention. **Results:** Before the intervention, four patients had medium medication adherence and one patient had low adherence. After the intervention, all patients achieved high adherence with MMAS-8 scores of 8. Mean systolic blood pressure decreased from 153 mmHg to 139 mmHg, and mean diastolic blood pressure decreased from 95 mmHg to 88 mmHg. Patients also reported improved understanding of hypertension management, increased motivation to take medication regularly, and stronger family support. **Conclusion:** MMAS-8-guided nurse-pharmacist collaborative education was associated with improved medication adherence and better blood pressure control among patients with hypertension. This approach may be considered a practical, patient-centered strategy to support hypertension management in primary healthcare settings.

ARTICLE INFO

Article History:

Received: Sept 12nd, 2025

Revised: May 28th, 2026

Accepted: June 30th, 2026

First Available Online:
June 30th, 2026

Published: June 30th, 2026

Keywords:

Keywords: hypertension, medication adherence, MMAS-8, nurse-pharmacist collaboration, blood pressure control

1. INTRODUCTION

Hypertension remains one of the leading public health challenges worldwide and contributes substantially to cardiovascular morbidity and mortality. The World Health Organization reported that hypertension affects approximately one in three adults globally and is a major risk factor for stroke, heart disease, kidney failure, and premature death (World Health Organization, 2023a, 2023b). Contemporary international guidelines also emphasize that hypertension management requires sustained blood pressure control, long-term follow-up, patient engagement, and adherence to antihypertensive therapy (Unger et al., 2020; Mancia et al., 2023; McEvoy et al., 2024). Although effective antihypertensive treatment is available, optimal blood pressure control remains difficult to achieve, particularly when patients do not take their medication consistently.

In Indonesia, hypertension continues to be a significant public health concern. The national prevalence of hypertension reached 36% in 2023, showing an increase from previous national data (Kementerian Kesehatan Republik Indonesia, 2023). In West Java, hypertension remains highly prevalent, including in Bogor District, where many patients require long-term treatment and follow-up care. This condition highlights the importance of strengthening hypertension management in primary healthcare settings, where continuous education, medication monitoring, and patient-centered support can be delivered close to the community (World Health Organization, 2020).

Medication adherence is a key factor in successful hypertension management. Poor adherence to antihypertensive medication may lead to uncontrolled blood pressure, disease progression, increased risk of complications, and higher healthcare burden. A scientific statement from the American Heart Association has emphasized that medication nonadherence is a major contributor to poor blood pressure control and requires interventions at patient, provider, and health-system levels (Choudhry et al., 2022). Several factors influence medication adherence, including limited knowledge, forgetfulness, fear of side effects, low motivation, inadequate family support, and misunderstanding of the need for long-term treatment (Susanto et al., 2018; Ruksakulpiwat et al., 2024; Zhou et al., 2024).

Structured patient education is one strategy to improve medication adherence among patients with hypertension. Education that is delivered systematically and tailored to patient needs can help patients understand their disease, recognize the importance of regular medication use, and develop practical strategies to overcome adherence barriers. Previous studies have shown that structured education can improve adherence to antihypertensive therapy and support better hypertension self-management (Setyoningsih & Zaini, 2020; Wulandari & Sari, 2022). More recent reviews also suggest that health education and theory-based behavioral interventions can strengthen adherence when they are individualized, practical, and integrated into primary healthcare or community-based care (Mustara et al., 2025; Yulianti et al., 2025).

The Morisky Medication Adherence Scale-8 (MMAS-8) is widely used to assess medication adherence and identify barriers related to medication-taking behavior. In addition to its function as an assessment tool, MMAS-8 can guide individualized education by helping healthcare professionals recognize specific adherence problems, such as forgetting medication, stopping treatment when symptoms improve, or concerns about medication effects (Morisky et al., 2008). In this context, adherence assessment can serve as a practical entry point for targeted counseling and behavior-oriented education.

Collaboration between nurses and pharmacists may further strengthen patient education in hypertension management. Nurses play an important role in health education, monitoring, motivation, and lifestyle counseling, while pharmacists provide medication-related counseling, including dosage, timing, side effects, drug safety, and strategies to prevent missed doses. Evidence supports the contribution of nurse-led interventions, pharmacist-led or pharmacist-involved care, and team-based approaches in improving hypertension management and medication adherence (Stephen et al., 2022; Reeves et al., 2021; Gastens et al., 2025; Burnier, 2025). Integrating these roles may provide more comprehensive and patient-centered support for patients with hypertension in primary healthcare settings.

However, reports describing MMAS-8-guided nurse-pharmacist collaborative education for patients with hypertension in Indonesian primary healthcare settings remain limited. Therefore, this case study aimed to describe the implementation of MMAS-8-guided nurse-pharmacist collaborative education to improve medication adherence and blood pressure control among patients with hypertension at Cimandala Primary Health Center, Bogor, Indonesia.

2. METHOD

Study Design

This study used a descriptive case study design to describe the implementation of MMAS-8-guided nurse-pharmacist collaborative education among patients with hypertension. This design was selected to provide a detailed description of the intervention process and the observed changes in medication adherence and blood pressure before and after the educational intervention.

Study Setting and Participants

The study was conducted in the working area of Cimandala Primary Health Center, Bogor, Indonesia. Five patients with hypertension were selected purposively. The inclusion criteria were patients diagnosed with hypertension, receiving antihypertensive medication, aged 45-60 years, able to communicate effectively, and willing to participate in the study. Patients with severe complications, cognitive impairment, or incomplete follow-up data were excluded.

All participants had been diagnosed with hypertension for 3-7 years and were undergoing antihypertensive therapy. Before the intervention, four patients had medium medication adherence and one patient had low medication adherence based on MMAS-8 assessment.

Instruments and Measurements

Medication adherence was assessed using the Morisky Medication Adherence Scale-8 (MMAS-8), which categorizes adherence into low, medium, and high levels. Blood pressure was measured before and after the intervention using a digital sphygmomanometer. Additional data were collected through interviews and observation, including patients' understanding of hypertension, medication-taking behavior, perceived adherence barriers, motivation, and family support.

To maintain consistency, the same assessment approach was used before and after the intervention. Blood pressure measurement was conducted using the same type of device, and MMAS-8 was administered using the same scoring criteria.

Intervention Procedure

The intervention consisted of structured education delivered collaboratively by nurses and pharmacists over 14 days. The educational content was guided by each patient's MMAS-8 assessment results and individual adherence barriers.

Nurses provided education about hypertension, possible complications, the importance of regular medication use, lifestyle modification, and self-management strategies. Nurses also reinforced motivation, monitored adherence behavior, and encouraged family involvement. Pharmacists provided medication-related counseling, including medication dosage, timing, storage, possible side effects, medication safety, and strategies to prevent missed doses.

The educational intervention included explanation and counseling on hypertension and its complications, regular antihypertensive medication use, correct medication schedule and dosage, management of side effects and medication concerns, lifestyle modification including diet and physical activity, and practical reminder strategies such as pill boxes, logbooks, family reminders, and daily routines. Simple reminder strategies were selected because they are feasible in routine community-based care; however, they are also aligned with broader evidence that reminder and eHealth approaches can support medication adherence in cardiovascular disease management (Miao et al., 2024).

Data Collection Procedure

Baseline data were collected before the intervention, including MMAS-8 scores, adherence categories, blood pressure values, and patient-reported barriers to medication adherence. The collaborative educational intervention was then implemented over 14 days. At the end of the intervention period, medication adherence and blood pressure were reassessed using the same instruments.

Ethical Consideration

All participants received an explanation regarding the purpose and procedures of the study before participation. Written informed consent was obtained from each participant. Participant confidentiality and anonymity were maintained throughout the study.

Data Analysis

Data were analyzed descriptively by comparing medication adherence categories, MMAS-8 scores, and blood pressure values before and after the intervention. The findings were presented in tables and described narratively to illustrate changes observed among the participants.

3. RESULTS

This section presents the characteristics of the patients, changes in medication adherence, blood pressure changes, and patient responses after the implementation of MMAS-8-guided nurse-pharmacist collaborative education.

Patient Characteristics

Table 1 shows the characteristics of the five patients with hypertension who participated in this case study. The patients were aged between 45 and 60 years and had been diagnosed with

hypertension for 3–7 years. Three patients were male and two were female. Based on the initial MMAS-8 assessment, four patients were categorized as having medium medication adherence, while one patient had low medication adherence. These baseline findings indicate that none of the patients had achieved high medication adherence before receiving the MMAS-8-guided nurse–pharmacist collaborative education.

Table 1. Patient Characteristics and Medication Adherence Before Intervention

Patient	Age	Gender	Hypertension Duration	MMAS-8 Score Before	Adherence Category Before
P1	45	Male	3 years	6	Medium
P2	52	Female	5 years	5	Low
P3	60	Male	7 years	7	Medium
P4	47	Female	4 years	6	Medium
P5	55	Male	6 years	7	Medium

Medication Adherence Before and After Intervention

Changes in medication adherence before and after the intervention are presented in Table 2. At baseline, no patient was categorized as having high medication adherence. Four patients had medium adherence, and one patient had low adherence. Following the 14-day MMAS-8-guided nurse–pharmacist collaborative education, all patients achieved high medication adherence, with MMAS-8 scores increasing to 8.

This improvement was observed across all participants. The greatest change occurred in Patient 2, whose MMAS-8 score increased from 5, categorized as low adherence, to 8, categorized as high adherence. Patients who initially had medium adherence also improved to high adherence after the intervention.

Table 2. Changes in Medication Adherence Before and After Intervention

Patient	MMAS-8 Before	Category Before	MMAS-8 After	Category After
P1	6	Medium	8	High
P2	5	Low	8	High
P3	7	Medium	8	High
P4	6	Medium	8	High
P5	7	Medium	8	High

Figure 1 further illustrates the improvement in MMAS-8 scores for each patient. Before the intervention, MMAS-8 scores ranged from 5 to 7, indicating low to medium adherence. After the structured nurse–pharmacist education program, all patients reached an MMAS-8 score of 8, indicating high adherence. This pattern suggests a consistent improvement in medication-taking behavior following the intervention.

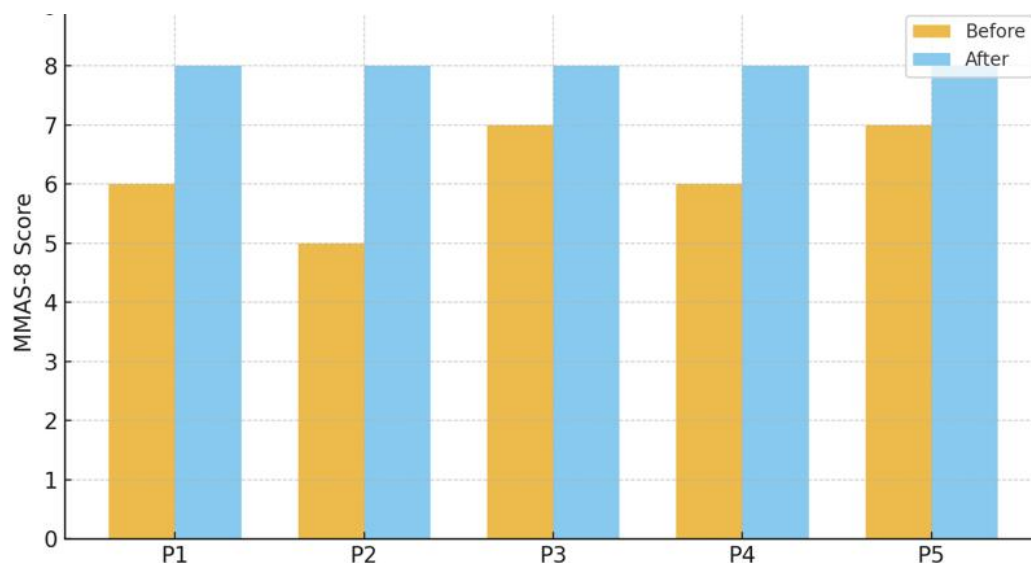


Figure 1. Changes in MMAS-8 scores Before and After Intervention

Blood Pressure Changes

Blood pressure values decreased after the 14-day educational intervention. As presented in Table 3, the mean systolic blood pressure declined from 153 ± 4.7 mmHg before the intervention to 139 ± 2.1 mmHg after the intervention. The mean diastolic blood pressure also decreased from 95 ± 1.5 mmHg to 88 ± 1.5 mmHg. These reductions indicate an improvement in blood pressure control following the MMAS-8-guided nurse–pharmacist collaborative education, although several patients had not yet reached optimal blood pressure targets.

Table 3. Mean Blood Pressure Before and After Intervention

Parameter	Before Intervention, Mean $\pm$ SD	After Intervention, Mean $\pm$ SD	Change
Systolic blood pressure	153 ± 4.7 mmHg	139 ± 2.1 mmHg	-14 mmHg
Diastolic blood pressure	95 ± 1.5 mmHg	88 ± 1.5 mmHg	-7 mmHg

The graphs in Figure 2 shows a consistent reduction in both systolic and diastolic blood pressure across all five patients following the 14-day structured education program.

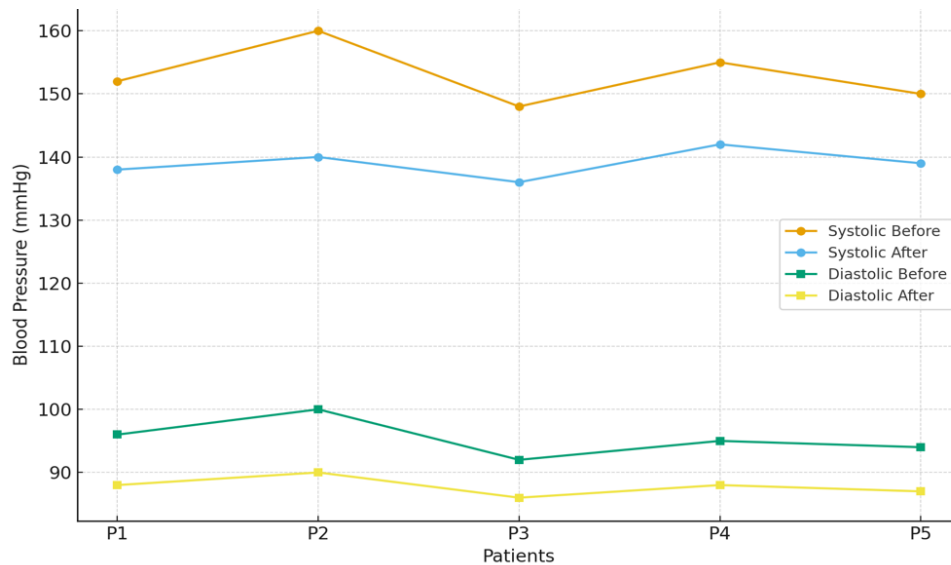


Figure 2. Systolic and Diastolic Blood Pressure Trends Before and After Education

Patient Responses During the Intervention

Patients responded positively to the collaborative education. They reported improved understanding of hypertension, greater awareness of the importance of long-term medication use, and increased motivation to take medication regularly. Pharmacist counseling helped patients better understand medication schedules, possible side effects, and safe medication use. Nurse-led education supported motivation, lifestyle modification, and family involvement.

Several patients stated that medication reminders and family support helped them become more disciplined in taking medication. One participant stated, “I used to stop taking my medicine when I felt fine, but now I understand I must continue every day to prevent complications.” Another participant emphasized, “The daily reminders and my family’s support helped me become more disciplined.” No serious adverse events were reported during the intervention period. Two patients initially experienced mild dizziness, which was managed through reassurance and education.

4. DISCUSSION

This case study showed that MMAS-8-guided nurse-pharmacist collaborative education was followed by improved medication adherence and reduced blood pressure among five patients with hypertension. Before the intervention, four patients had medium adherence and one patient had low adherence. After the 14-day structured education, all patients achieved high adherence based on MMAS-8 scores. In addition, mean systolic blood pressure decreased from 153 mmHg to 139 mmHg, and mean diastolic blood pressure decreased from 95 mmHg to 88 mmHg. These findings suggest that structured, individualized, and collaborative education may support better medication-taking behavior and blood pressure control in patients with hypertension.

The improvement in medication adherence may be related to the structured and individualized nature of the educational intervention. In this study, MMAS-8 was not only used as an assessment tool but also as a guide to identify patient-specific adherence barriers. Patients who forgot to take medication were supported with reminder strategies, while patients who misunderstood the need for continuous medication received further explanation about the chronic

nature of hypertension and the importance of long-term treatment. This approach is consistent with recent evidence showing that health education can improve medication adherence among patients with hypertension, particularly when delivered in an individualized and face-to-face format (Mustara et al., 2025). A systematic review of theory-based interventions also supports the importance of behavioral strategies in improving medication adherence in primary healthcare and community settings (Yulianti et al., 2025).

The role of nurses was also important in supporting adherence behavior. Nurses provided health education, motivation, monitoring, lifestyle counseling, and reinforcement of daily treatment routines. Previous evidence has shown that nurse-led interventions in primary care or general practice settings can reduce blood pressure and improve medication adherence, lifestyle behaviors, and cardiovascular risk factors (Stephen et al., 2022). In the present case study, nurse-led support may have helped patients translate health information into practical daily actions, such as taking medication regularly, reducing salt intake, and involving family members in medication reminders.

Pharmacist involvement further strengthened the intervention by addressing medication-specific concerns. Pharmacists provided counseling on medication dosage, timing, side effects, storage, medication safety, and strategies to prevent missed doses. This role is supported by evidence showing that pharmacist-led or pharmacist-involved hypertension care can improve blood pressure outcomes, especially when delivered collaboratively with other healthcare professionals (Reeves et al., 2021; Gastens et al., 2025). In this case study, pharmacist counseling may have increased patients' understanding and confidence in using antihypertensive medication correctly.

The collaborative approach between nurses and pharmacists may provide added value compared with education delivered by a single health professional. Team-based hypertension care is increasingly recognized as an important strategy to improve adherence, reduce therapeutic barriers, and support better blood pressure control. Burnier (2025) emphasized that team-based care involving nurses and pharmacists can strengthen treatment adherence and persistence in patients with hypertension. This is also consistent with the WHO HEARTS framework, which supports team-based and protocol-driven approaches to strengthen cardiovascular disease management in primary healthcare settings (World Health Organization, 2020). In the present case study, nurses and pharmacists had complementary roles: nurses focused on education, motivation, monitoring, and behavioral reinforcement, while pharmacists focused on medication-related counseling. This combination may have provided more comprehensive and patient-centered support.

The reduction in blood pressure observed after the intervention may be associated with improved medication adherence and better self-management behavior. Consistent medication use is essential to achieve blood pressure control and prevent hypertension-related complications. This is aligned with the American Heart Association scientific statement, which highlights medication adherence as an important determinant of blood pressure control and emphasizes the need for multilevel adherence-support strategies (Choudhry et al., 2022). However, these findings should be interpreted cautiously because this study used a descriptive case study design without a control group. Therefore, the observed improvements cannot be concluded as a direct causal effect of the intervention. Other factors, such as increased patient attention during the study period, family involvement, lifestyle changes, and regular monitoring, may also have contributed to the observed outcomes.

Family support appeared to be an important factor in improving adherence. Several patients reported that reminders and encouragement from family members helped them take medication more consistently. This finding is supported by Guo et al. (2023), who reported that social support and health literacy were associated with medication adherence among patients with hypertension. Qualitative evidence also shows that medication adherence is shaped by interacting patient, family, health-system, and medication-related barriers and facilitators (Zhou et al., 2024). In chronic disease management, family support may improve adherence by strengthening motivation, reducing anxiety, reminding patients about medication schedules, and helping them understand the importance of continuous treatment.

From a primary healthcare perspective, this case study suggests that MMAS-8-guided nurse-pharmacist collaborative education is feasible and practical for community-based hypertension management. The intervention is relatively simple, low-cost, and adaptable to routine primary care services. It can help healthcare professionals identify adherence barriers, provide targeted education, involve family members, and monitor patient progress. The use of simple reminders in this case study may also be complemented in the future by digital or eHealth-supported adherence strategies, as recent evidence suggests that eHealth interventions can support medication adherence among patients with cardiovascular disease (Miao et al., 2024). This is particularly relevant because hypertension control remains a major priority in primary healthcare, where continuous education and follow-up are essential to prevent long-term complications.

The findings of this case study should be understood within the context of current hypertension management recommendations. International guidelines emphasize lifestyle modification, pharmacological treatment, regular monitoring, and long-term adherence as core components of hypertension care (Unger et al., 2020; Mancia et al., 2023; McEvoy et al., 2024). The present intervention does not replace standard pharmacological treatment, but it may complement routine hypertension care by strengthening patients' understanding, adherence, and engagement in self-management.

Nevertheless, several limitations should be considered. First, this study involved only five patients, which limits the generalizability of the findings. Second, the intervention was conducted over a short period, so long-term medication adherence and sustained blood pressure control could not be evaluated. Third, the study did not include a control group; therefore, causal conclusions cannot be made. Fourth, medication adherence was assessed using self-reported MMAS-8 scores, which may be influenced by recall bias or social desirability bias. Future studies with larger samples, longer follow-up periods, comparison groups, and stronger research designs are needed to further evaluate the effectiveness of MMAS-8-guided nurse-pharmacist collaborative education in hypertension management.

5. CONCLUSION

This case study demonstrated that MMAS-8-guided nurse-pharmacist collaborative education was followed by improved medication adherence and reduced blood pressure among patients with hypertension. After the 14-day intervention, all patients achieved high medication adherence based on MMAS-8 scores, while mean systolic and diastolic blood pressure also decreased.

The findings suggest that structured education guided by adherence assessment and delivered through nurse-pharmacist collaboration may offer a practical, patient-centered strategy to support hypertension management in primary healthcare settings. This approach may help identify individual adherence barriers, strengthen patient understanding, improve medication-taking behavior, and encourage family involvement. Further studies with larger samples, longer follow-up periods, and stronger research designs are needed to confirm the effectiveness of this intervention.

6. ACKNOWLEDGEMENT

The authors would like to express sincere gratitude to the patients who participated in this case study and to the healthcare staff of Cimandala Primary Health Center, Bogor, Indonesia, for their support and cooperation during the implementation of this study. This study was conducted without external funding.

7. CONFLICT OF INTEREST

The authors declare no conflict of interest related to this study.

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