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Effectiveness of 2024 Hypertension Guidelines Implementation in Improving Hypertension Control

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Abstract

The implementation of hypertension guidelines is crucial for controlling hypertension and reducing its complications. This study aims to evaluate the implementation of the 2024 hypertension guidelines at Puskesmas X in terms of the percentage of controlled, uncontrolled, and Missed Visits in hypertensive patients. Data were collected from the hypertension control program records at Puskesmas X, obtained through the community health center's information system, for four months before and four months after the new guidelines were implemented. This study employed a retrospective quantitative design with a comparative approach, using an independent t-test to determine statistical significance. The statistical results showed a significant increase in the percentage of controlled hypertension after the implementation of the guidelines ($p < 0.05$), while uncontrolled hypertension and Missed Visits did not show significant changes. These findings provide an initial evaluation of the effectiveness of the new guidelines in improving hypertension control and highlight the need for additional interventions to improve patient adherence to follow-up visits.

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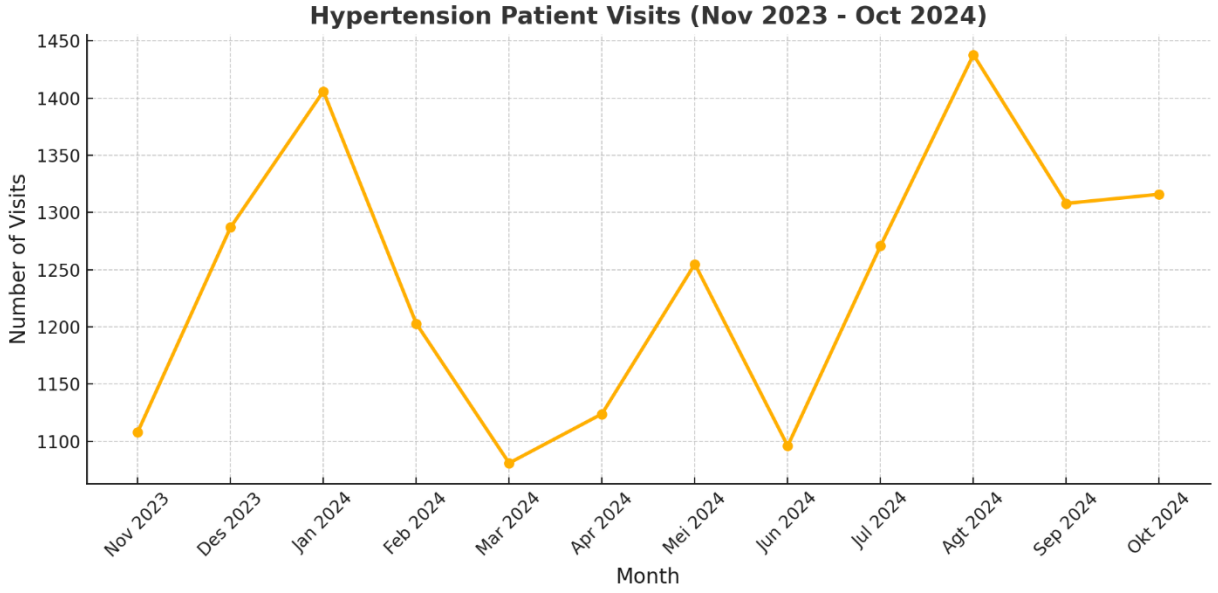
INTRODUCTION

Hypertension is a major risk factor contributing to increased morbidity and mortality from cardiovascular diseases. This condition has a widespread impact, not only on affected individuals but also on the public health and economic burden. Data from the World Health Organization (WHO) indicate that more than 1.13 billion people worldwide suffer from hypertension, with the highest prevalence in developing countries, including Indonesia (1).

In Indonesia, the prevalence of hypertension among adults reaches 34.1%, and this figure continues to rise due to lifestyle changes and an aging population. The 2018 Basic Health Research data recorded that only 36.8% of hypertensive patients were aware of their condition, and among them, only 13.3% regularly took medication. This non-adherence is exacerbated by the lack of effective education regarding the importance of long-term hypertension management (2).

The Ministry of Health, through the 2020–2024 Strategic Plan (3), aims to enhance hypertension control at the primary healthcare level. One of the initiatives undertaken by the Ministry of Health is the launch of the 2024 Hypertension Guidelines, designed to improve the quality of hypertension management in primary healthcare services. These guidelines provide a comprehensive approach through the adjustment of treatment protocols, routine blood pressure monitoring, and continuous patient education. Standardized blood pressure monitoring devices are utilized, and healthcare professionals' capacity to diagnose and manage hypertension is strengthened (4).

Additionally, the guidelines integrate interdisciplinary collaboration principles to enhance hypertension control and reduce its complications (5). The implementation of the hypertension guidelines at Puskesmas X began at the end of March 2024, with the expectation of improving blood pressure management in hypertensive patients, particularly by increasing the percentage of controlled hypertension and reducing uncontrolled hypertension and Missed Visits. These guidelines emphasize periodic blood pressure monitoring, comprehensive non-pharmacological education, and appropriate therapy selection based on protocols. Patient visit data from November 2023 to October 2024 as shown in Figure



However, the effectiveness of these guidelines needs to be periodically evaluated. Studies indicate that recommendations in clinical guidelines can become outdated within 3 to 5 years, particularly in fields with rapid research advancements such as cardiovascular health. Therefore, evaluation within the first 6 to 12 months after

implementation is crucial to ensure the relevance and effectiveness of these guidelines. This evaluation aims to identify initial effectiveness and potential areas for improvement in future implementation (5).

The implementation of evidence-based guidelines is a key element in hypertension management, both for prevention and control. Other studies emphasize the importance of primary hypertension prevention through a population-based approach and intensive strategies targeted at high-risk individuals. This approach focuses on six proven effective steps: moderate physical activity, maintaining a normal weight, limiting alcohol consumption, reducing sodium intake, ensuring adequate potassium intake, and following a diet rich in fruits, vegetables, and low-fat dairy products with low saturated and total fat content (6). According to Supriati (2023) community-based approaches to hypertension control have been shown to effectively increase awareness, medication adherence, and healthy behavioral changes among patients (6).

This study aims to evaluate the initial impact of the 2024 hypertension guidelines implementation at Puskesmas X, focusing on the percentage achievements of controlled hypertension patients, uncontrolled hypertension, and the rate of missed patient visits. The guideline used in this study is an official regulation issued by the Indonesian Ministry of Health. As a national regulatory document, its development involved various stakeholders, including experts from the Ministry of Health, academics, professional medical organizations, and representatives from healthcare facilitiesThe evaluation was conducted in November 2024, eight months after the guidelines were implemented. The monitoring period includes four months before implementation (November 2023 – February 2024) and four months after implementation (July – October 2024). Post-implementation monitoring was conducted after a minimum of 3 months, in accordance with the standard definition of controlled hypertension. This evaluation is expected to provide insights and contribute to the refinement of national strategies in improving the quality of hypertension management in primary healthcare facilities in Indonesia. In this study, primary data were obtained directly from the hypertension dashboard integrated with the electronic medical record (EMR) system at the community health center (Puskesmas). Therefore, data collection did not involve direct interaction with patients or healthcare workers but was conducted by accessing patient visit reports documented within the health center's management information system (SIMPUS).

METHODS

This study employs a retrospective quantitative design with a comparative approach, utilizing the Independent Samples t-test to compare the achievements of controlled hypertension, uncontrolled hypertension, and missed visits between two groups of patients before and after the implementation of the 2024 Hypertension Guidelines.

The data used is secondary data obtained from the hypertension dashboard in the information system of Puskesmas X, covering patient data from four months before (November 2023 – February 2024) and four months after the implementation of the guidelines (July – October 2024).). The number of data points used in this study was taken in full from the SIMPUS report, without any sampling or selection process. Thus, all recorded hypertension patient visit data within the study period were used as the basis for analysis, in accordance with the official data available in the hypertension dashboard. The implementation of the guidelines began in March 2024, which included significant changes in hypertension therapy protocols, including the use of lisinopril according to the new guidelines. Data collection after the implementation of the guidelines began from the third month (July 2024), in accordance with the definition of controlled hypertension which requires a minimum monitoring of 3

months after therapy changes. However, the primary indicators assessed in this study were controlled hypertension, uncontrolled hypertension, and Missed Visits, defined as follows:

- Controlled Hypertension: Patients with systolic blood pressure <140 mmHg and diastolic <90 mmHg at the last visit within 3 months, divided by the total number of patients under care.
- Uncontrolled Hypertension: Patients with systolic blood pressure ≥140 mmHg or diastolic ≥90 mmHg at the last visit within 3 months, divided by the total number of patients under care.
- Missed Visit: Patients who did not attend a follow-up visit within the last three months.

Statistical Analysis

Statistical analysis was performed using IBM SPSS Statistics with the Independent Samples t-test, as this method is used to compare two independent groups (the periods before and after the implementation of the guidelines). The data analyzed is aggregate, in the form of percentage achievements of indicators from the total patients present each month at the Puskesmas. The selection of the Independent Samples t-test is based on the fact that the patients who come each month are not always the same individuals, so the two data groups do not have a direct relationship. Before conducting data analysis, the null hypothesis (H_0) and alternative hypothesis (H_a) were formulated for the three main variables: controlled hypertension, uncontrolled hypertension, and Missed Visits. H_0 states that there is no significant difference in the average percentage of each variable before and after the 2024 Hypertension Guidelines implementation. H_a states that there is a significant difference.

To test these hypotheses, a normality test was performed using the Shapiro-Wilk test, which is appropriate for small sample sizes ($n < 50$). If the data were not normally distributed (p-value ≤ 0.05), the Mann-Whitney U test was used as an alternative. Additionally, a homogeneity of variance test was conducted using Levene's Test for Equality of Variances to examine variance equality between groups.

- If the variance was homogeneous (p-value > 0.05), the independent t-test was performed under the assumption of equal variance.
- If the variance was not homogeneous (p-value ≤ 0.05), the independent t-test was performed assuming unequal variance.

The statistical test results determined whether significant differences occurred in the three analyzed variables (7). The secondary data in this study were processed independently by the researcher using the hypertension dashboard recorded in SIMPUS. Data entry was performed by healthcare professionals at the health center, including doctors, nurses, and medical record officers, but the analysis and interpretation were solely conducted by the researcher without direct involvement from healthcare professionals.

RESULTS AND DISCUSSION

Table 1 shows the changes in the percentages of controlled hypertension patients, uncontrolled hypertension, and missed visits before and after the guideline implementation. For controlled hypertension, the average increased from 33.50% (SD = 1.29) to 35.75% (SD = 1.26), an increase of 2.25%. For uncontrolled hypertension, the average decreased from 31.00% (SD = 1.83) to 29.50% (SD = 1.73), a decrease of 1.50%. In terms of missed visits, the average slightly increased from 28.25% (SD = 2.22) to 28.50% (SD = 0.58), a change of 0.25%.

Table 1. Descriptive Results Results Proportion of Controlled and Uncontrolled Hypertension Before and After Guideline Implementation

Variable	Before Implementation	After Implementation	Mean Difference
Controlled Hypertension	33.50 ±1.29	35.75 ±1.26	2.25
Uncontrolled Hypertension	31.00 ±1.83	29.50 ±1.73	-1.50
Missed Visit	28.25 ±2.22	28.50±0.58)	0.25

Next, to assess whether these differences are statistically significant, independent t-test procedures were conducted.

Normality Test

The data were analyzed using IBM SPSS Statistics, applying the Shapiro-Wilk normality test to determine the data distribution.

Table 2. Normality Test for the Percentage of Controlled Hypertension, Uncontrolled Hypertension, and Missed Visits Before and After the Implementation of the 2024 Hypertension Guidelines

Variable	Shapiro-Wilk Statistic		Sig		Interpretation	
	Pre	Post	Pre	Post	Pre	Post
Controlled Hypertension	0.993	0.895	0.972	0.406	Normal	Normal
Uncontrolled Hypertension	0.950	0.840	0.714	0.195	Normal	Normal
Missed Visit	0.963	0.729	0.798	0.024	Normal	Not Normal

Based on the Shapiro-Wilk test, the variables Controlled Hypertension and Uncontrolled Hypertension, both before and after the implementation of the 2024 Hypertension Guidelines, follow a normal distribution ($p > 0.05$). Therefore, these two variables proceeded to a homogeneity test using Levene's test, followed by an independent t-test. Meanwhile, the Missed Visit (After Implementation) variable does not follow a normal distribution ($p < 0.05$). As a result, the Mann-Whitney U Test was used for this variable.

Table 3. Homogeneity Test for Controlled and Uncontrolled Hypertension

Variable	F	Sig	Interpretation	Statistical Test
Controlled Hypertension	0.070	0.801	Homogeneous	Independent t-test
Uncontrolled Hypertension	0.950	0.714	Homogeneous	Independent t-test

Based on the IBM SPSS Statistics results on table 3, the variables Controlled Hypertension and Uncontrolled Hypertension have p-values > 0.05, indicating that the variances are considered homogeneous. Therefore, the independent t-test was conducted under the assumption of equal variances. Meanwhile, the Missed Visit variable was analysed using the Mann-Whitney U test because the data did not follow a normal distribution.

Table 4. Independent t-test and Mann-Whitney U Test Results

Variable	Test	Sig. (2-tailed)	Interpretation
Controlled Hypertension	Independent t-test	0.047	Significant
Uncontrolled Hypertension	Independent t-test	0.278	Not Significant
Missed Visit	Mann-Whitney U Test	0.834	Not Significant

Based on the independent t-test results in the Equal Variances Assumed section on table 4, the Sig. (2-tailed) value for Controlled Hypertension is 0.047 ($p < 0.05$), indicating that H_0 is rejected and H_a is accepted. Thus, it can be concluded that there is a significant difference in the mean percentage of controlled hypertension before and after the implementation of the 2024 Hypertension Guidelines.

However, for Uncontrolled Hypertension (Sig. 2-tailed = 0.278) and Missed Visit (Sig. 2-tailed = 0.834), there is no significant difference ($p > 0.05$) before and after the implementation of the guidelines. This guideline evaluation was conducted in November 2024, eight months after its implementation. This interval aligns with recommendations in the literature and the 2024 Hypertension Guidelines, which emphasize the importance of regular monitoring and evaluation of programs. The purpose is to assess its impact on clinical and operational indicators, specifically the proportion of controlled hypertension, uncontrolled hypertension, and Missed Visits.

A structured guideline implementation in hypertension management has proven to be crucial for enhancing intervention effectiveness and improving patient health outcomes. Studies indicate that guideline-based interventions can significantly reduce blood pressure. Research also highlights the benefits of patient education, counseling, and systematic management as integral components of a successful hypertension program (8).

Increase in Controlled Hypertension Proportion

The study results indicate a significant increase in the proportion of controlled hypertension after implementing the 2024 Hypertension Guidelines. Strategies such as blood pressure monitoring, lisinopril use according to protocol, and structured education contributed to better outcomes. Although this improvement was relatively small, statistical analysis confirmed a significant change, reinforcing that evidence-based pharmacological approaches can positively impact most patients (4).

To maintain successful hypertension control, equitable distribution of antihypertensive drugs is necessary to ensure treatment continuity, as sustained pharmacological therapy is a critical element in maintaining blood pressure control (9). However, to achieve optimal outcomes, a more comprehensive approach, including non-pharmacological strategies such as healthy lifestyle promotion, should be strengthened (4).

A non-pharmacological approach plays a central role in hypertension management, contributing to blood pressure reduction and the prevention of cardiovascular complications. According to the 2024 Hypertension Guidelines and the WHO HEARTS Technical Package, these strategies include a healthy diet, regular physical activity, smoking cessation, alcohol consumption control, and improved sleep patterns to support overall hypertension control.

Dietary Approaches to Stop Hypertension (DASH) diet, has been shown to effectively reduce blood pressure by promoting the consumption of fruits, vegetables, whole grains, and lean protein sources. Additionally, limiting salt intake to less than 5 grams per day plays a crucial role in lowering the risk of hypertension (6). The WHO HEARTS module further emphasizes the importance of including at least 400 grams of fruits and vegetables daily as part of a balanced diet to support cardiovascular disease prevention (10).

Regular physical activity, such as 150 minutes of aerobic exercise per week, can lead to a 5-7 mmHg reduction in systolic and diastolic blood pressure. In addition to hypertension management, physical activity helps reduce the risk of other cardiovascular diseases (11). WHO further highlights that regular exercise assists in weight management, improves lipid profiles, and prevents depression (10).

Smoking cessation is also essential, as smoking increases the risk of hypertension and cardiovascular diseases. The 4T smoking cessation method has proven effective in helping patients overcome nicotine addiction (10). The WHO HEARTS module underscores the importance of smoking cessation interventions, as quitting smoking can significantly reduce the risk of heart attacks and strokes, with notable health benefits within just one year.

Excessive alcohol consumption should be avoided, as it contributes to increased hypertension risk and heart damage. Moderate alcohol intake or complete abstinence is recommended to minimize cardiovascular complications. Research from Alcohol and Society further emphasizes that chronic alcohol consumption can elevate systolic and diastolic blood pressure, exacerbate hypertension, and increase the risk of various cardiovascular diseases (12).

Adequate sleep (7–9 hours per night) is essential for blood pressure regulation, as sleep deprivation or disorders like sleep apnea can increase the risk of hypertension. Maintaining a regular sleep schedule and avoiding caffeine or screen exposure before bedtime are recommended for effective blood pressure management. WHO also emphasizes that adequate sleep and stress management are essential components of a healthy lifestyle (10) (13).

These non-pharmacological strategies are most effective when consistently applied, particularly in primary healthcare settings. The HEARTS module and 2024 Hypertension Guidelines recommend brief counseling approaches, which reinforce non-pharmacological interventions to achieve optimal hypertension management outcomes.

Uncontrolled Hypertension

Uncontrolled hypertension did not show a significant decrease. Patients in this group often face more complex barriers. Pharmacological treatment alone is often insufficient, especially for individuals with unhealthy lifestyles or additional risk factors. Additionally, research indicates that integrating lifestyle education with medical therapy can significantly lower blood pressure (14).

Stronger support systems are required to enhance these strategies. Moreover, Kartikasari et al. (2022) identified that family support, easy access to healthcare services, the role of healthcare workers, and patient motivation significantly contribute to hypertension treatment success.(15) Barriers to hypertension control often stem from patients themselves. A study found that the program's implementation still faces various challenges, including limited infrastructure and healthcare human resources (HRH), insufficient sustainable funding, and low public awareness and adherence to regular check-up (16). To improve treatment success, patient-centered educational interventions, enhanced healthcare access, and sustained community support are necessary.

Missed Visits

Missed Visits also showed no significant reduction after guideline implementation. Missed visits present another challenge in hypertension management. Studies indicate that low patient knowledge is a key factor influencing treatment adherence, especially among the elderly. Other contributing factors include socioeconomic status, education level, and treatment motivation (17). Community-based programs, such as Posbindu, have proven effective. Education involving healthcare cadres and hypertension patient groups can improve self-management behaviors, including diet, physical activity, and medication adherence (18). The high unmet healthcare needs (78.4%) highlight economic barriers, the lack of elderly-focused healthcare facilities (Posyandu Lansia), and the distance to healthcare services as contributors to

Missed Visits (19). Digital technology offers a strategic solution. m-Health applications, as discussed in Kang and Park's study, improve medication adherence through reminder features, blood pressure tracking, and healthy lifestyle education (20). Noviyanti et al. (2024) further confirmed that these applications effectively address geographical and healthcare cost barriers, making them relevant for primary healthcare services (21).

This study has several limitations that may affect the results. The use of aggregated data prevents the analysis of individual factors such as patient adherence or comorbidities, limiting a more detailed understanding of the findings. Additionally, the observation period of only four months before and after the guideline implementation is not sufficient to capture long-term effects. Another limitation is that the patients visiting each month were not always the same individuals, leading to population heterogeneity, which may have influenced the percentage of controlled hypertension. Furthermore, the absence of a control group makes it challenging to determine whether the observed changes were entirely due to the implementation of the new guidelines. To strengthen these findings, future research should consider using individual-level data, a longer observation period, and a study design that includes a control group. This approach would allow for a more comprehensive evaluation of the effectiveness of the hypertension guidelines, providing stronger recommendations for future implementation.

CONCLUSION

The implementation of the 2024 Hypertension Guidelines at Puskesmas X has been successful in improving controlled hypertension. However, no significant changes were observed in uncontrolled hypertension and Missed Visits. These findings highlight the importance of additional interventions and the need to enhance the implementation of intensive and sustainable lifestyle modification education, involving families, and leveraging community-based approaches and social support to optimize hypertension management outcomes in primary healthcare facilities.

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