

Effectiveness of Nurse-Delivered Health Education in Blood Pressure Control among Patients with Hypertension: A Literature Review

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Abstract: Hypertension requires sustained blood pressure control, yet patients may have limited understanding and inconsistent self-management practices. This review aimed to examine the effectiveness of nurse-delivered or nurse-led health education for blood pressure outcomes and hypertension self-management. A structured narrative literature review was conducted using a publication search period of 2021–2026. Ten relevant research publications were included in the synthesis, supplemented by clinical guidelines and theoretical references. Targeted searches used PubMed/PMC and journal publishers' websites, with publication details verified through DOIs. The synthesis suggests that structured education, individual and group counseling, self-management support, and remote follow-up may improve systolic and/or diastolic blood pressure. A meta-analysis by Bulto and colleagues reported pooled mean differences of -4.66 mmHg for systolic and -1.91 mmHg for diastolic blood pressure compared with usual care, although evidence certainty was low. Findings varied across individual studies, and digital interventions did not consistently produce significant between-group differences at all measurement points. Improved knowledge, self-efficacy, or adherence should not be equated with demonstrated blood pressure control unless clinical outcomes are measured. Nurse-led education is an important element of integrated hypertension care, particularly when tailored to patient needs and accompanied by repeated blood pressure assessment.

Keywords: health education; nurses; hypertension; blood pressure; literature review.

INTRODUCTION

Hypertension is a major noncommunicable disease that warrants attention because it is associated with an increased risk of stroke, heart disease, kidney failure, and premature death. Because hypertension often produces no obvious symptoms, many patients do not consider regular blood pressure measurement necessary. The European Society of Hypertension guidelines emphasize the importance of risk identification, evidence-based treatment, and continuous blood pressure monitoring (Mancia et al., 2023). The European Society of Cardiology guidelines further underscore an approach that considers cardiovascular risk, accurate measurement, and individualized clinical decisions (McEvoy et al., 2024). (Mancia et al., 2023)(McEvoy et al., 2024)

Blood pressure control involves more than medication alone. Successful care requires an understanding of the disease, consistent medication use, sodium restriction, physical activity, weight management, and adherence to health assessments. The complexity of these measures makes patient behavior an integral part of medical management. Challenges arise when individuals understand that hypertension is dangerous but lack the skills to interpret blood pressure readings, remember medication schedules, or sustain lifestyle changes over the long term.

Nurses occupy a strategic position in bridging clinical recommendations and patients' everyday experiences. Nurse–patient interactions include assessing learning needs, explaining treatment, demonstrating home blood pressure measurement, identifying behavioral barriers, and providing follow-up after visits. Health promotion frameworks emphasize that health education requires therapeutic relationships, messages tailored to recipients' capabilities, and empowerment of individuals and families (Edelman & Kudzma, 2021). This educational role becomes especially important when healthcare consultations are time-limited. (Edelman & Kudzma, 2021)

The effectiveness of health education should be evaluated through measurable clinical and behavioral changes. Improvements in knowledge scores are relevant intermediate outcomes, but they do not necessarily demonstrate successful blood pressure reduction.

Assessments of systolic and diastolic blood pressure before and after interventions, comparisons with usual care, and monitoring of sustained effects provide a stronger basis for evaluating effectiveness. A systematic review by (Bulto et al., 2024) reported that nurse-led interventions could improve blood pressure compared with usual care, although variation across studies was substantial.(Bulto et al., 2024)

Studies specifically examining nurse-delivered education have also produced promising findings. A 2023 review of nurse-led educational interventions reported reductions in blood pressure using combined individual and group education. A trial by (Kordvarkane et al., 2023) demonstrated improvements in systolic blood pressure following education based on a self-regulation model with telephone follow-up. These findings suggest that structured education may offer benefits beyond brief information provision without sustained reinforcement.(Kordvarkane et al., 2023)

Technological developments have diversified educational methods. Support through mobile applications, telephone consultations, and online group education enables health messages to be reinforced outside healthcare facilities. A study by (Polsook & Aunguroch, 2024) found improvements in systolic blood pressure through an application-based self-management program, whereas diastolic outcomes did not differ significantly. Research on the MaRiTensi application in Indonesia reported improvements in several self-care and blood pressure indicators, although between-group effects differed across evaluation periods. Such variation shows that technology alone does not guarantee intervention success.(Polsook & Aunguroch, 2024)

A review of relevant studies reveals heterogeneity in research design, intervention duration, patient characteristics, support intensity, and definitions of success. Some studies directly measure blood pressure, while others assess only behavior or self-efficacy. These different outcomes may lead to overly broad conclusions if all are treated as evidence of blood pressure reduction. This review therefore distinguishes clinical from behavioral evidence while examining mechanisms through which education may influence hypertension control.

This study aims to analyze the effectiveness of nurse-delivered health education in controlling blood pressure among patients with hypertension, identify the most promising intervention characteristics, compare the consistency of research findings, and explain factors influencing the implementation of health education in nursing practice. The review is expected to support the selection of realistic, patient-centered educational interventions evaluated through measurable health indicators.

THEORETICAL BACKGROUND

Hypertension and Indicators of Blood Pressure Control

Hypertension is a condition characterized by persistently elevated blood pressure, assessed through accurate and repeated measurements. Diagnostic thresholds and treatment targets may differ according to guidelines, individual risk, and clinical context. Accordingly, this review does not treat all success thresholds as equivalent without considering the definitions used in the original studies. The 2023 ESH and 2024 ESC guidelines describe the need for risk assessment and both office and out-of-office measurements to reduce interpretation errors (Mancia et al., 2023); (McEvoy et al., 2024).(Mancia et al., 2023)(McEvoy et al., 2024)

A reduction in mean systolic and diastolic blood pressure represents a continuous change, whereas the proportion of patients reaching a target represents categorical success. These two indicators are not interchangeable. The magnitude of blood pressure change must

also be interpreted alongside follow-up duration, comparison groups, intensity of pharmacological therapy, and measurement variation. Educational studies reporting only changes in knowledge should be regarded as providing indirect evidence of blood pressure control.

Health Education and the Role of Nurses

Health education in nursing care is a planned process designed to develop patients' understanding, skills, and readiness to make decisions that support their health. High-quality education begins with an assessment of learning needs, the setting of specific goals, the selection of appropriate media, skills demonstrations, and evaluation of understanding. (Edelman & Kudzma, 2021) describe health promotion as collaborative work that takes social determinants and community support into account.(Edelman & Kudzma, 2021)

The nursing role extends beyond one-way information delivery. Nurses may use motivational interviewing, practice in interpreting blood pressure readings, medication schedules, self-monitoring records, dietary counseling, and telephone reminders. Nurse-led education should be distinguished from complex interventions that also include pharmacotherapy adjustments, prescribing authority, or integrated monitoring. The effects of such intervention packages cannot be attributed entirely to education alone (Vay-Demouy et al., 2025).(Vay-Demouy et al., 2025)

Theoretical Foundations of Behavior Change

The Health Belief Model explains how beliefs about susceptibility, disease severity, benefits of action, barriers, and self-efficacy can influence health decisions. (Hayden, 2022) emphasizes that behavioral theories help intervention designers select appropriate mechanisms of change rather than merely communicate facts. Hypertension education that explains complication risks but offers no strategies for addressing costs, forgotten medication, or limited access to healthy foods may fail to translate into actual behavior.(Hayden, 2022) The concept of self-regulation complements this explanation through goal setting, outcome monitoring, progress evaluation, and adjustment of actions. Education based on the Common-Sense Model in the study by (Kordvarkane et al., 2023) illustrates how disease information can be combined with self-management exercises and follow-up. Blood pressure changes emerge through a sequence of patient behaviors and experiences, rather than automatically following the delivery of health information.(Kordvarkane et al., 2023)

METHODS

This study employed a *structured narrative literature review* to analyze the effectiveness of nurse-delivered health education in controlling blood pressure among patients with hypertension. The literature search focused on scientific publications from 2021–2026 to obtain research evidence relevant to developments in nursing education practice. Sources included PubMed/PubMed Central and the official websites of journals and scholarly publishers. Publication identities, publication years, and bibliographic details were checked through article pages and *Digital Object Identifiers* (DOIs). Theoretical books and clinical guidelines were used as supporting references rather than included among the research articles analyzed.

The search strategy combined the keywords “nurse-led”, “nurse-delivered education”, “health education”, “hypertension”, “blood pressure control”, “self-management”, “patient education”, “randomized trial”, and “systematic review”. These terms reflected the research focus on health education delivered or led by nurses and its influence on hypertension control. Articles were selected according to topic relevance, population characteristics, intervention type, study design, and reported outcome indicators.

The inclusion criteria covered research articles published between 2021 and 2026 involving adults with hypertension and examining health education or self-management interventions with an identifiable nursing role. Articles were required to describe their methods and report outcomes involving systolic blood pressure, diastolic blood pressure, or supporting indicators such as knowledge, medication adherence, self-efficacy, and self-care behaviors. Eligible designs included experimental and quasi-experimental studies, *randomized controlled trials*, systematic reviews, and meta-analyses. The exclusion criteria encompassed studies of gestational hypertension, studies without relevant hypertensive populations, interventions without a nursing education component, reports lacking evaluable outcomes, and editorials or opinion articles without empirical analysis.

Literature selection was targeted, beginning with an assessment of the relevance of titles and abstracts to the study objectives, followed by examination of methodological details and findings in eligible publications. Each publication was checked to confirm nursing involvement and outcome indicators related to hypertension control. Ten research publications meeting the selection criteria were retained as the main sources for synthesis. These comprised six primary intervention studies and four *systematic reviews* or meta-analyses. Although selection was targeted, the total number of records identified, duplicate records, and exclusions at each stage were not fully documented. This study therefore does not claim that article selection followed all procedures required for a systematic review.

Literature analysis involved extracting author names, publication years, research designs, intervention characteristics, outcome indicators, and principal findings. Data were analyzed using narrative synthesis organized into three areas: the effectiveness of education for systolic and diastolic blood pressure, its influence on knowledge and hypertension self-management behaviors, and intervention characteristics affecting implementation. Cross-publication comparisons considered study type, the presence of control groups, intervention duration, sample size, and differences in measurement indicators. Primary studies and systematic reviews were examined separately to avoid double-counting evidence. The synthesis was descriptive and did not calculate new pooled effect estimates; conclusions were therefore based on the consistency and differences among findings in the selected publications.

Table 1. Literature selection criteria

Aspect	Inclusion	Exclusion
Year	2021–2026	Published before 2021
Population	Adults with hypertension	Gestational hypertension; populations without hypertension
Intervention	Education/self-management with an identifiable nursing role	Interventions without a relevant nursing component
Evidence type	Relevant intervention studies, systematic reviews, and meta-analyses	Editorials/opinion pieces without empirical analysis
Outcomes	Blood pressure and/or clearly defined behavioral indicators	Outcomes cannot be determined

RESULTS AND DISCUSSION

Literature Selection Results and Characteristics

The literature search and selection yielded 10 research publications relevant to nurse-delivered health education and blood pressure control in patients with hypertension. The selected publications comprised six primary intervention studies and four systematic

reviews or meta-analyses. Their characteristics showed diverse intervention approaches, including individual education, group education, counseling, self-management support, health applications, and remote nursing services. Differences in study design, intervention duration, and measurement indicators were considered when comparing results. Studies reporting blood pressure changes were analyzed as clinical outcome evidence, while those focusing on knowledge, self-efficacy, or self-care behaviors were treated as supporting evidence. A summary of the characteristics and findings of each publication is presented in Table 2.

Table 2. Extraction and synthesis matrix of research publications

Author	Design/sample	Intervention type	Outcomes	Key findings
(Stephen et al., 2022)	Systematic review; 11 trials; n=4,454	Nurse-led interventions in general practice	Blood pressure/risk factors	Evidence supports benefits, but intervention components vary
(Bulto et al., 2024)	Meta-analysis; 37 RCTs; n=9,731	Nurse education and interventions vs usual care	Systolic; diastolic	Pooled differences –4.66 and –1.91 mmHg; low certainty
(Ito et al., 2024)	Meta-analysis; 35 RCTs in quantitative synthesis	Counseling, education, coaching, and monitoring	Short-/long-term blood pressure	Effects depend on time horizon and intervention package
(Kordvarkane et al., 2023)	RCT; 72 allocated	5 CSM sessions and telephone follow-up	Systolic; self-management	Lower post-intervention systolic pressure in the intervention group
(Polsook & Aunguroch, 2024)	RCT; 48 participants	Application and telephone support for 4 weeks	Systolic; diastolic	Systolic improved; diastolic was not significant
(Upoyo et al., 2024)	Quasi-experimental study	Online education group	Knowledge; behavior; blood pressure	Examined combined behavioral outcomes and prevention of uncontrolled blood pressure
(Aunguroch et al., 2022)	Quasi-experimental study in Indonesia	Self-management program	Blood pressure	Provides contextual evidence for self-management programs
(Widyastuti et al., 2025)	Single-blind assessor RCT; n=108	mHealth application; 12 weeks	Systolic; diastolic; self-care	Benefits varied across measurement points and outcomes
(Erden et al., 2025)	RCT; n=60	Booklet and tele-nursing for 12 weeks	Self-care	Self-care improved; blood pressure was not the primary focus
(Vay-Demouy et al., 2025)	Meta-analysis; 5 RCTs	Nurse-led care with prescribing authority	Blood pressure	Blood pressure reduction; education cannot

				be isolated from clinical package
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Effectiveness of Nurse-Led Education for Blood Pressure

Pooled evidence should be considered within an evidence hierarchy that accounts for study design, precision of estimates, and consistency of findings. The meta-analysis by Bulto et al. (2024), involving 37 randomized trials and 9,731 participants, reported a mean difference of -4.66 mmHg in systolic blood pressure (95% CI -6.69 to -2.64; 31 trials) and -1.91 mmHg in diastolic blood pressure (95% CI -3.06 to -0.76; 29 trials), compared with usual care. However, heterogeneity was high for both systolic ($I^2 = 83.32\%$) and diastolic ($I^2 = 79.35\%$) outcomes, and evidence certainty was rated low. These findings support a beneficial direction of effect for nurse-led interventions rather than a single estimate that necessarily applies in every context. The intervention packages included education, monitoring, counseling, and behavioral modification support; the independent contribution of education could not be separated from the overall effect.

The consistency of findings should be evaluated against the time horizon and definition of success. (Stephen et al., 2022) synthesized 11 randomized trials involving 4,454 participants in general practice, while (Ito et al., 2024) analyzed 35 studies in primary care. (Ito et al., 2024) found a higher likelihood of achieving blood pressure targets with long-term follow-up (RR = 1.10; 95% CI 1.03–1.18; nine studies; 2,744 participants), but evidence of short-term target attainment did not show a convincing difference. The meta-analysis also demonstrated that changes in mean blood pressure and the proportion of patients meeting targets are distinct indicators. Similar directions of effect across reviews should not be counted as independent replications because some primary trials may be included in more than one meta-analysis.(Stephen et al., 2022)(Ito et al., 2024)

The contrast between reductions in mean blood pressure and increases in the proportion achieving targets has important clinical implications. A change of several mmHg in the population mean may be relevant to risk prevention, but it does not automatically mean that most patients have met their individual treatment thresholds. Conversely, target attainment may be influenced by baseline blood pressure, comorbidities, medication intensification, and differences in guideline thresholds. The guidelines of (Mancia et al., 2023) and (McEvoy et al., 2024) emphasize risk assessment and personalized treatment decisions. Evaluation of nurse-led education therefore requires separate reporting of systolic pressure, diastolic pressure, the proportion attaining predetermined targets, and follow-up duration; combining these indicators would weaken the interpretation of effectiveness.(Mancia et al., 2023)(McEvoy et al., 2024)

Primary intervention trials help identify how education translates into changes in behavior and blood pressure. Kordvarkane et al. (2023) compared education based on the Common-Sense Model of Self-Regulation with routine education in 72 patients. The five-session program delivered over one month included telephone reinforcement and resulted in a post-intervention mean systolic pressure of 116.21 mmHg in the intervention group, compared with 128.62 mmHg in the control group. A learning structure linking illness representations, decision-making, symptom monitoring, and self-evaluation provides a theoretical explanation for the program's success. Causal interpretation remains limited to this intervention package, and application to patients with different clinical conditions requires further testing.

Evidence from Indonesia adds a contextual dimension to questions of applicability. A quasi-experimental study by (Aungsuroch et al., 2022) involving 77 patients with

hypertension in Belitung combined health education, monitoring, brisk walking, and dietary modification over eight weeks. The study reported reductions in systolic and diastolic pressure in the intervention group, while between-group comparisons supported systolic improvement. These findings illustrate the value of structured programs in Indonesian communities; however, the nonrandomized design and multiple intervention components limit the ability to isolate educational effects from changes in activity, diet, and monitoring. Cross-study analysis suggests that the intensity and composition of support may matter more than the general label of education.(Aungsuroch et al., 2022)

Differences in the responses of the two blood pressure components are evident in the study by (Polsook & Aungsuroch, 2024), which evaluated an application-based self-management and support program involving 48 patients. The authors reported a significant systolic change ($p = 0.005$), whereas the diastolic result was not significant ($p = 0.385$). This discrepancy should not be interpreted as either complete failure or complete success: indicator sensitivity, biological variation, follow-up duration, and the statistical power of a small sample can produce different responses. Repeated measurements and between-group analyses are needed to ensure that transient changes are not equated with sustained hypertension control.(Polsook & Aungsuroch, 2024)

The study by (Upoyo et al., 2024) provides evidence that online group education can be designed as a participatory learning experience. Ninety-six patients were divided into intervention and control groups of 48 each. Four educational sessions in a WhatsApp group combined nurse-produced videos, discussions, and health monitoring materials. The intervention group showed significant reductions in systolic and diastolic pressure across repeated measurements, alongside improvements in knowledge, motivation, self-efficacy, and self-care behaviors. However, baseline characteristics such as education, income, and body mass index were imbalanced, so the association between intervention and clinical outcomes must be interpreted with caution regarding confounding. These findings indicate the potential feasibility of group education, not proof that online delivery is always superior.(Upoyo et al., 2024)

The contribution of patient education must also be distinguished from the expansion of nurses' clinical authority. (Vay-Demouy et al., 2025) identified a systolic reduction of -17.73 mmHg (95% CI -29.19 to -6.27) in a meta-analysis of five trials of nurse-led interventions involving prescribing authority. This effect appears larger than that reported by (Bulto et al., 2024), but heterogeneity reached $I^2 = 99.1\%$, and the scope of clinical authority differed. Medication management, dosage adjustments, and medical coordination may also explain blood pressure reductions. Comparing numerical results across meta-analyses without considering intervention types and regulatory frameworks risks drawing non-equivalent conclusions. Nursing practice in Indonesia should situate education and monitoring within applicable competencies and professional authority limits.(Vay-Demouy et al., 2025)(Bulto et al., 2024)

Improving Knowledge, Self-Efficacy, and Hypertension Management Behaviors

The effects of educational interventions can be understood as a multistage pathway rather than an automatic direct relationship. Information about hypertension risks initially affects perceptions of susceptibility, severity, and benefits of action, as described by the Health Belief Model (Hayden, 2022). These perceptions must be translated into self-efficacy through skills practice, realistic goal setting, feedback, and successful experiences. Behavioral stages include taking medication as prescribed, restricting sodium, engaging in physical activity, monitoring blood pressure at home, and attending follow-up visits. Changes in systolic and diastolic pressure are downstream outcomes also influenced by medication,

physiological conditions, and social barriers. This framework explains why increased knowledge scores alone are insufficient to establish the clinical effectiveness of an educational program (Edelman & Kudzma, 2021).(Hayden, 2022)(Edelman & Kudzma, 2021)

Outcome measurement should distinguish within-group changes from effects attributable to an intervention. A decline in mean blood pressure following education may result from regression to the mean, concurrent medication changes, habituation to measurement procedures, or behavioral changes associated with study participation. Randomized trials with comparison groups help reduce bias, but attrition, inconsistent intervention adherence, and lack of blinding still require assessment. This review did not conduct a formal risk-of-bias assessment for each study, so its quality ratings should not be presented as though RoB 2 or ROBINS-I had been applied. Such caution is important when formulating evidence-based practice recommendations.

The study by (Erden et al., 2025) involving 60 patients with hypertension evaluated a 12-week tele-nursing program based on the Roper–Logan–Tierney model. Intervention participants received a booklet, practice in blood pressure measurement, and remote support twice weekly; their self-care management indicators improved compared with the control group. This finding supports the argument that repeated education can strengthen patients' capacity to manage chronic conditions. However, the study's primary outcome was the self-care score and cannot be treated as quantitative evidence of blood pressure reduction. Distinguishing behavioral outcomes from clinical outcomes is essential in a synthesis focused on hypertension control.(Erden et al., 2025)

The trial by (Widyastuti et al., 2025) of the MaRiTensi application recruited 108 patients with hypertension in Yogyakarta and analyzed 99 participants who completed the 12-week intervention. Compared with the control group, differences in blood pressure change at the first evaluation were evident for systolic ($p = 0.039$) and diastolic ($p = 0.009$) pressure, but they did not remain statistically significant at the second evaluation ($p = 0.429$ and $p = 0.312$, respectively). Differences in self-care remained identifiable at the second evaluation ($p = 0.024$). This pattern indicates that behavioral and hemodynamic responses do not always develop in parallel. Improvements in health literacy cannot be inferred solely from the significance of clinical changes, just as within-group blood pressure reductions do not demonstrate the application's superiority at every time point.(Widyastuti et al., 2025)

The use of technology raises equity issues that are often overlooked in discussions of effectiveness. Applications and online education can be used optimally only when patients have smartphones, reliable connections, the ability to read instructions, and support when difficulties arise. Older patients and those with limited digital literacy may require additional assistance without losing access to care. Combining face-to-face education, pocket guides, simple reminders, and follow-up visits may be more inclusive than a digital-only strategy. This option is a conceptual implication of heterogeneous study findings, not a comparative result demonstrated to be superior within the reviewed evidence.

The online group education program examined by (Upoyo et al., 2024) positioned knowledge, motivation, self-efficacy, and self-care behaviors within an approach to preventing uncontrolled blood pressure. The potential of group learning lies not only in content delivery but also in exchanging experiences, reinforcing norms of healthy behavior, and providing opportunities to clarify misunderstandings. Barriers relating to digital literacy, device availability, and uneven network coverage must still be considered when programs are delivered outside healthcare facilities.(Upoyo et al., 2024)

Comparison of Educational Methods and Components

Table 3. Comparison of health education strategies applicable by nurses

Strategy	Active components	Strengths	Limitations
Individual face-to-face	Assessment, personalized goals, teach-back	Content tailored to patient needs	Requires consultation time
Group education	Discussion, demonstration, peer support	Efficient and builds support	Less personalized for complex problems
Telephone follow-up	Reminders, problem-solving, evaluation	Maintains intervention continuity	Depends on contact and intensity
Applications/mHealth	BP logging, information, feedback	Data and messages can be revisited	Digital literacy and data privacy
Family support	Meal plans, medication, joint monitoring	Strengthens home-based behaviors	Requires family consent and readiness

The comparison of strategies in Table 3 indicates that method selection should be based on patient profiles rather than the appeal of the medium. Individual education can address specific needs, such as misunderstanding medication regimens or anxiety about examination results. Group education provides opportunities to model healthy behaviors and strengthen social support. Follow-up by telephone or application offers a means of detecting declining adherence earlier, but it also increases resource, workflow, and information-security requirements.

Determining program intensity requires consideration of educational dosage, implementation fidelity, and continuity of contact. One-off education often ends with information transmission; programs that allow practice and feedback enable patients to correct misunderstandings when facing everyday problems. Although (Kordvarkane et al., 2023), (Upoyo et al., 2024), and (Widyastuti et al., 2025) used repeated contact, differences in their designs do not allow the optimal frequency to be determined quantitatively. Service resources, nurses' communication competencies, and documentation workloads need consideration before wide-scale adoption. Implementation evaluations should record the number of sessions actually received by patients, not only those planned.(Kordvarkane et al., 2023)(Upoyo et al., 2024)(Widyastuti et al., 2025)

Components that appear consistent across promising programs include repeated contact, clear goal setting, practical skills learning, and feedback on monitoring. (Kordvarkane et al., 2023) combined educational sessions with periodic telephone contacts; (Polsook & Aunguroch, 2024) used an application and telephone support; MaRiTensi facilitated mobile-based self-management. These similarities suggest that support intensity and patients' ability to apply educational material may be important mechanisms. Establishing which component is most influential still requires intervention trials directly comparing the components.(Kordvarkane et al., 2023)(Polsook & Aunguroch, 2024)

Implementation in nursing practice can begin with assessing health literacy, setting individual targets with the clinical team, demonstrating blood pressure device use, developing realistic dietary and activity plans, and arranging follow-up visits or contacts. Patient understanding should be checked using the teach-back technique, in which patients explain their care plans in their own words. Evaluation should rely on blood pressure records and standardized assessments rather than simply counting the educational materials delivered.

A practical implication of this synthesis is the need for a consistent set of evaluation indicators. Primary indicators should include systolic and diastolic blood pressure in mmHg, using standardized devices, procedures, body positioning, and measurement times. The proportion of patients achieving targets should be determined according to their clinical conditions and the guidelines used. Intermediate indicators include competence in measuring blood pressure, treatment adherence, sodium intake, physical activity, self-efficacy, and the quality of follow-up documentation. Reporting adverse events, medication changes, and losses to follow-up will help identify the net benefits of interventions. Without these standards, comparisons of effectiveness across facilities may reflect different measurement methods rather than differences in education quality.

Table 4. Minimum indicators for evaluating health education in patients with hypertension

Domain	Recommended measurement	Purpose of interpretation
Clinical blood pressure	Systolic and diastolic (mmHg), before and after program	Primary outcome; comparable continuous change
Control targets	Proportion of patients reaching individual targets at a specified time	Distinguish mean reduction from clinical target attainment
Adherence and behavior	Medication regimen, low-salt diet, physical activity, self-monitoring	Examine behavioral mechanisms of change
Patient learning	Knowledge, practical skills, self-efficacy	Assess intermediate outcomes, not substitutes for clinical measures
Process and safety	Completed sessions, follow-up, medication changes, adverse events	Assess fidelity, sustainability, and program safety

Moderating Factors, Evidence Limitations, and Practice Implications

Heterogeneity in intervention benefits is not simply a statistical weakness; it also reflects variation in patients' environments and needs. Baseline blood pressure, age, comorbidities, access to medication, health literacy, economic circumstances, and family support may moderate the relationship between education and blood pressure control. Some patients need training to interpret measurement results, while others face barriers involving diet, costs, work, or polypharmacy. Health messages that ignore practical constraints may improve knowledge without changing behavior. A health promotion orientation requires nurses to assess needs, negotiate realistic goals, and coordinate social support (Edelman & Kudzma, 2021).(Edelman & Kudzma, 2021)

Applicability in Indonesian primary care requires distinguishing the core components of interventions from their modes of delivery. Reasonable core components include initial assessment, risk information that patients can understand, skills demonstrations, action planning, feedback on measurement results, and periodic evaluation. These can be delivered through community health center visits, family support, telephone consultations, or digital media according to available resources. Collaborative care models are also important because blood pressure control continues to require assessment and pharmacotherapy adjustment by authorized healthcare professionals. Educational programs disconnected from clinical follow-up may change knowledge without ensuring that blood pressure reaches the prescribed target.

The limitations of this review should be stated at both the primary-study and review-procedure levels. Heterogeneity in populations, multimodal interventions, measurement devices, follow-up periods, and comparator services makes it difficult to attribute effects to education alone. Quasi-experimental studies are more vulnerable to confounding, while small randomized controlled trials have greater uncertainty in their estimates. This review used targeted selection without a complete search log, dual screening,

or formal risk-of-bias assessment. The literature search was not supported by complete documentation of the number of records identified, duplicate removal, and reasons for exclusion at each selection stage. These limitations should be considered when interpreting the results, particularly the coverage and representativeness of the analyzed publications. Accordingly, this review cannot claim to encompass all global evidence or provide new pooled estimates; its conclusions are confined to the consistency and differences among the selected publications.

Future research should compare standardized nurse-led education with usual care in adequately powered randomized trials, measure blood pressure repeatedly, report systolic and diastolic changes with confidence intervals, and monitor behavioral sustainability after interventions end. Implementation studies in Indonesia should assess hybrid education, community health center visits, community health volunteers, family participation, and digital support under real-world resource constraints. The most reasonable practical recommendation is to integrate education into routine hypertension care, document patients' learning needs and goals, and evaluate blood pressure changes as primary clinical indicators.

CONCLUSION

The literature synthesis indicates that health education delivered or led by nurses may improve blood pressure control among patients with hypertension, particularly when provided through structured programs incorporating counseling, self-care skills, monitoring, and follow-up. Meta-analyses indicate beneficial effects on systolic and diastolic blood pressure, but intervention heterogeneity and limited evidence certainty warrant caution when generalizing effect sizes. Individual studies show that systolic improvements are not always accompanied by significant diastolic changes. Improvements in knowledge, self-efficacy, and adherence are important educational outcomes, but they cannot replace blood pressure measurement. Nursing services should prioritize education tailored to patients' circumstances, assessment of understanding through practical exercises, sustained support, and consistent documentation of clinical outcomes. More comprehensive reviews using systematic searches and risk-of-bias assessments are needed to determine which educational components exert the greatest influence.

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