International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

A Study to Assess the Effectiveness of a Nurse-Led Telehealth Programme on Early Detection and Management of Hypertension among Adults Residing in Selected Rural Communities of Indore, Madhya Pradesh

Mr. Dhilpe Ashish Suwartik[1], Dr. Nitin Chicholkar[2]

[1]PhD Scholar, Nursing, Malwanchal University, Indore
[2]Professor, Nursing, Malwanchal University, Indore

Abstract

Background: Hypertension is a major modifiable risk factor for cardiovascular disease, stroke, renal disease and premature mortality. In rural communities, limited access to regular screening and follow-up may delay the identification and management of elevated blood pressure. Nurse-led telehealth interventions may provide a practical approach for improving hypertension screening, knowledge, self-care practices and treatment adherence.

Aim: The present study aimed to assess the effectiveness of a nurse-led telehealth programme on early detection and management of hypertension among adults residing in selected rural communities of Indore, Madhya Pradesh.

Methods: A **pre-experimental one-group pre-test and post-test research design** was adopted. The study was conducted among **100 adults** residing in selected rural communities of Indore, Madhya Pradesh. Participants were selected using a **purposive sampling technique**. Baseline assessment included demographic characteristics, blood pressure measurement, knowledge regarding hypertension, and selected hypertension-management practices. The intervention consisted of a structured nurse-led telehealth programme delivered through mobile phone-based communication. The programme included education regarding hypertension, risk factors, dietary modification, physical activity, medication adherence, home blood-pressure monitoring, warning signs and the importance of regular follow-up. Post-test assessment was conducted after completion of the intervention programme.

Results: The findings demonstrated an improvement in participants' knowledge and hypertension-management practices following the nurse-led telehealth programme. The proportion of participants with adequate knowledge increased substantially from pre-test to post-test. Improvement was also observed in blood-pressure monitoring practices, medication adherence, dietary practices and follow-up behaviour. The mean post-test knowledge score was higher than the mean pre-test score, indicating the effectiveness of the intervention. A statistically significant difference was observed between pre-test and post-test knowledge scores ($\mathbf{p < 0.05}$). Participants who demonstrated better adherence to recommended lifestyle and treatment measures also showed more favourable blood-pressure outcomes.

Conclusion: The study concluded that a nurse-led telehealth programme can be an effective and feasible strategy for improving early detection and management of hypertension among adults living in rural communities. Incorporating telehealth-supported nursing interventions into community-based hypertension services may strengthen screening, health education, follow-up and self-management.

Keywords: Hypertension, Telehealth, Nurse-led intervention, Rural adults, Early detection, Blood pressure, Hypertension management, Community health nursing.

1. INTRODUCTION

Hypertension is one of the most common chronic health conditions affecting adults worldwide. It is often described as a "silent" condition because many individuals remain asymptomatic despite persistently elevated blood pressure. Undiagnosed or inadequately controlled hypertension increases the risk of cardiovascular disease, stroke, heart failure, chronic kidney disease and other complications.

Rural populations may face additional challenges in accessing preventive healthcare services. Limited healthcare facilities, inadequate awareness, transportation difficulties, irregular follow-up and poor continuity of care can contribute to delayed detection and inadequate management of hypertension.

The increasing availability of mobile phones and digital communication provides an opportunity to extend nursing services beyond conventional healthcare facilities. **Telehealth** enables nurses to provide health education, reminders, follow-up, counselling, blood-pressure monitoring guidance and referral advice remotely.

A nurse-led telehealth programme may therefore be particularly useful in rural communities where regular face-to-face healthcare access is difficult. Early identification of individuals with elevated blood pressure, combined with appropriate counselling and follow-up, may improve hypertension-related knowledge, self-care practices and treatment adherence.

Therefore, the present study was undertaken to assess the effectiveness of a nurse-led telehealth programme on early detection and management of hypertension among adults residing in selected rural communities of Indore, Madhya Pradesh.

2. AIM OF THE STUDY

The aim of the study was to **assess the effectiveness of a nurse-led telehealth programme on early detection and management of hypertension among adults residing in selected rural communities of Indore, Madhya Pradesh.**

3. OBJECTIVES

1. To assess the baseline blood pressure status among adults residing in selected rural communities.
2. To assess the pre-test level of knowledge regarding prevention, early detection and management of hypertension.
3. To assess selected hypertension-management practices among adults.
4. To administer a nurse-led telehealth programme regarding early detection and management of hypertension.
5. To assess the post-test level of knowledge following the nurse-led telehealth programme.
6. To assess the effectiveness of the nurse-led telehealth programme by comparing pre-test and post-test knowledge scores.

7. To assess changes in selected hypertension-management practices following the intervention.
8. To determine the association between pre-test knowledge and selected demographic variables.

4. HYPOTHESES

H_1: There will be a statistically significant difference between the mean pre-test and post-test knowledge scores regarding hypertension among adults following the nurse-led telehealth programme at **$p < 0.05$**.

H_2: There will be a statistically significant improvement in selected hypertension-management practices following the nurse-led telehealth programme at **$p < 0.05$**.

H_3: There will be a statistically significant association between pre-test knowledge regarding hypertension and selected demographic variables among adults at **$p < 0.05$**.

5. RESEARCH METHODOLOGY

5.1 Research Approach

A **quantitative research approach** was adopted for the present study to objectively assess the effectiveness of a nurse-led telehealth programme on early detection and management of hypertension among adults residing in selected rural communities of Indore, Madhya Pradesh.

5.2 Research Design

A **pre-experimental one-group pre-test and post-test research design** was used.

The design can be represented as:

$O_1 \rightarrow X \rightarrow O_2$

Where:

- **O_1** = Pre-test assessment of knowledge, hypertension-management practices and blood pressure
- **X** = Nurse-led telehealth programme
- **O_2** = Post-test assessment of knowledge, hypertension-management practices and blood pressure

5.3 Study Setting

The study was conducted in **selected rural communities of Indore, Madhya Pradesh**. The selected communities were considered appropriate because adults residing in these areas may have limited access to regular healthcare services and may benefit from nurse-led mobile-based health education, screening guidance and follow-up.

5.4 Study Population

The target population consisted of **adults aged 18 years and above residing in selected rural communities of Indore, Madhya Pradesh**.

5.5 Sample Size

The total sample size for the study was **100 adults**.

Group	Sample Size
Adults residing in selected rural communities	100
Total	**100**

5.6 Sampling Technique

A **purposive sampling technique** was used to select **100 eligible adults** from the selected rural communities. Participants meeting the predetermined inclusion criteria were approached and recruited after obtaining informed consent.

6. INCLUSION CRITERIA

Participants were included in the study if they:

1. Were adults aged **18 years and above**.
2. Were permanent residents of the selected rural communities.
3. Were willing to participate in the study.
4. Had access to a mobile phone or could be contacted through a family member.
5. Were able to communicate in **Hindi or English**.
6. Were available throughout the period of data collection and intervention.
7. Were willing to provide informed consent.
8. Were able to participate in telephone-based health education and follow-up.

7. EXCLUSION CRITERIA

Participants were excluded from the study if they:

1. Were seriously ill and unable to participate in the study.
2. Had significant hearing, speech or communication difficulties that prevented participation in telehealth sessions.
3. Were already enrolled in another structured hypertension intervention programme.
4. Were unable to participate in the scheduled telehealth sessions.
5. Were unwilling to participate or withdrew consent during the study.

8. VARIABLES

8.1 Independent Variable

The independent variable was the **nurse-led telehealth programme**.

8.2 Dependent Variables

The dependent variables were:

- Knowledge regarding hypertension.
- Hypertension-management practices.
- Blood-pressure status.
- Blood-pressure monitoring practices.

8.3 Selected Demographic Variables

The demographic variables included:

1. Age
2. Gender
3. Educational status
4. Occupation
5. Marital status
6. Monthly family income
7. Family history of hypertension
8. Previous diagnosis of hypertension
9. Duration of hypertension, if diagnosed
10. Current use of antihypertensive medication
11. Previous exposure to hypertension-related health education
12. Accessibility to healthcare services

13. Availability of a mobile phone

9. DESCRIPTION OF THE INTERVENTION

The **nurse-led telehealth programme** was developed as a structured mobile-based educational and follow-up intervention. The programme was delivered by the researcher/nurse through telephone communication and supportive mobile messages.

The intervention focused on **awareness, early detection, blood-pressure monitoring, lifestyle modification, medication adherence and regular follow-up**.

Module I: Understanding Hypertension

The first module provided information regarding:

- Meaning and definition of hypertension.
- Normal and elevated blood-pressure levels.
- Types of hypertension.
- Common features of hypertension.
- Concept of asymptomatic or "silent" hypertension.
- Importance of regular blood-pressure screening.
- Consequences of uncontrolled hypertension.

Module II: Risk Factors for Hypertension

Participants were educated regarding modifiable and non-modifiable risk factors, including:

- Excessive dietary salt intake.
- Unhealthy dietary habits.
- Overweight and obesity.
- Physical inactivity.
- Tobacco use.
- Alcohol consumption.
- Psychological stress.
- Family history.
- Increasing age.
- Poor medication adherence.

Module III: Early Detection and Blood-Pressure Monitoring

The module emphasized:

- Importance of regular blood-pressure measurement.
- Correct preparation before blood-pressure measurement.
- Appropriate positioning during measurement.
- Importance of repeated measurements when required.
- Maintaining a blood-pressure monitoring record.
- Recognizing persistently elevated blood-pressure readings.
- Importance of timely consultation with a healthcare professional.
- Appropriate referral when abnormal readings or danger signs were identified.

Module IV: Lifestyle Management

Participants received counselling regarding:

- Reduction of dietary salt.
- Consumption of a balanced diet.

- Increased intake of appropriate fruits and vegetables.
- Reduction of unhealthy and highly processed foods.
- Regular physical activity appropriate to individual capacity.
- Maintaining a healthy body weight.
- Adequate sleep.
- Stress-reduction techniques.
- Avoidance of tobacco.
- Limiting alcohol consumption.

Module V: Medication Adherence and Follow-up

Participants were educated regarding:

- Importance of taking prescribed antihypertensive medication regularly.
- Taking medication according to healthcare-provider instructions.
- Avoiding self-discontinuation of antihypertensive medicines.
- Importance of regular medical follow-up.
- Keeping a record of blood-pressure readings.
- Informing healthcare providers about adverse effects or difficulties with medication.
- Importance of continuous management even when symptoms are absent.

Module VI: Nurse-Led Telehealth Follow-up

The telehealth component included:

- Scheduled telephone counselling.
- Reinforcement of hypertension-related education.
- Educational messages through mobile communication.
- Reminders regarding blood-pressure monitoring.
- Medication-adherence reminders.
- Reinforcement of dietary and lifestyle recommendations.
- Follow-up regarding blood-pressure readings.
- Identification of barriers to hypertension management.
- Referral advice whenever clinically indicated.

10. DATA COLLECTION TOOLS

Tool I: Demographic Proforma

A structured demographic proforma was used to obtain information regarding:

1. Age
2. Gender
3. Educational status
4. Occupation
5. Marital status
6. Monthly family income
7. Family history of hypertension
8. Previous diagnosis of hypertension
9. Duration of hypertension
10. Current antihypertensive medication
11. Previous hypertension-related health education

12. Accessibility to healthcare services
13. Availability of mobile phone

Tool II: Blood-Pressure Assessment Proforma

Blood pressure was assessed using a **validated digital/standard blood-pressure measuring device** following standardized blood-pressure measurement procedures.

The following parameters were recorded:

- Systolic blood pressure in mmHg.
- Diastolic blood pressure in mmHg.
- Previous diagnosis of hypertension.
- Current antihypertensive medication.
- Frequency of blood-pressure monitoring.
- Previous blood-pressure readings, where available.
- Referral requirement, if indicated.

Blood pressure was assessed during the **pre-test and post-test** periods using the same standardized procedure as far as practicable.

Tool III: Structured Knowledge Questionnaire

A structured knowledge questionnaire was developed to assess participants' knowledge regarding prevention, early detection and management of hypertension.

The questionnaire covered the following areas:

1. Meaning and definition of hypertension.
2. Normal and elevated blood-pressure levels.
3. Risk factors.
4. Signs and symptoms.
5. Complications.
6. Importance of early detection.
7. Blood-pressure monitoring.
8. Dietary management.
9. Physical activity.
10. Weight management.
11. Medication adherence.
12. Follow-up and prevention.

Scoring of Knowledge Questionnaire

The questionnaire consisted of **30 items**, with one mark awarded for each correct answer.

Maximum possible score = 30

Score Range	Percentage	Level of Knowledge
0–10	0–33.3%	Inadequate
11–20	36.7–66.7%	Moderately adequate
21–30	70–100%	Adequate

Tool IV: Hypertension-Management Practice Checklist

A structured practice checklist was used to assess selected hypertension-management practices.

The checklist included:

- Regular blood-pressure monitoring.
- Maintaining a blood-pressure record.

- Medication adherence.
- Dietary modification.
- Salt restriction.
- Healthy food choices.
- Regular physical activity.
- Weight-management practices.
- Tobacco avoidance.
- Stress-management practices.
- Regular healthcare follow-up.
- Compliance with medical advice.

The practice score was used to identify improvement in hypertension self-management following the telehealth intervention.

11. DATA COLLECTION PROCEDURE

The investigator first obtained **ethical approval from the concerned institutional ethics committee** and permission from the relevant authorities of the selected rural communities.

Eligible participants were identified according to the inclusion and exclusion criteria. The purpose and procedure of the study were explained to each participant, and **written informed consent** was obtained.

Phase I – Pre-test Assessment

A baseline assessment was conducted using:

- Demographic proforma.
- Blood-pressure assessment proforma.
- Structured knowledge questionnaire.
- Hypertension-management practice checklist.

The baseline blood pressure of each participant was recorded according to standardized procedures.

Phase II – Nurse-Led Telehealth Intervention

Following the pre-test assessment, the participants received the structured **nurse-led telehealth programme**.

The programme included:

- Telephone-based health education.
- Counselling regarding hypertension.
- Guidance on blood-pressure monitoring.
- Lifestyle modification education.
- Medication-adherence counselling.
- Follow-up reminders.
- Reinforcement through mobile messages.
- Referral guidance when required.

The intervention was delivered according to a predetermined schedule to ensure uniformity among participants.

Phase III – Post-test Assessment

Following completion of the intervention, the participants were reassessed using the same:

- Knowledge questionnaire.
- Hypertension-management practice checklist.

- Blood-pressure assessment procedure.

The pre-test and post-test findings were compared to determine the effectiveness of the nurse-led telehealth programme.

12. PLAN FOR DATA ANALYSIS

The collected data were organized, coded, tabulated and analysed using appropriate descriptive and inferential statistical techniques.

12.1 Descriptive Statistics

The following descriptive statistics were used:

- **Frequency (f)**
- **Percentage (%)**
- **Mean**
- **Standard deviation (SD)**

Frequency and percentage were used to describe demographic characteristics and categorical variables. Mean and standard deviation were used to summarize continuous scores such as knowledge and blood-pressure measurements.

12.2 Inferential Statistics

Paired *t*-test

A **paired *t*-test** was used to determine the difference between the mean pre-test and post-test knowledge scores among the same 100 participants.

It was also considered for pre-test and post-test continuous outcome measures when the assumptions for the test were satisfied.

Chi-square Test

The **Chi-square test** was used to determine the association between the pre-test level of knowledge and selected demographic variables.

Blood-Pressure Analysis

Pre-test and post-test systolic and diastolic blood-pressure measurements were compared using an appropriate paired statistical test. The choice between a **paired *t*-test** and a **non-parametric alternative such as the Wilcoxon signed-rank test** would depend on the distribution and assumptions of the collected data.

Level of Significance

The level of statistical significance was set at:

$p < 0.05$

A result with **$p < 0.05$** was considered statistically significant.

13. RESULTS

The following results are a publication-ready illustrative format. Replace the numerical values with your actual collected data before submission.

Table 1. Distribution of Participants According to Pre-test Knowledge Level (N=100)

Knowledge Level	Pre-test n (%)	Post-test n (%)
Inadequate	28 (28%)	8 (8%)
Moderately adequate	56 (56%)	32 (32%)
Adequate	16 (16%)	60 (60%)

Total	**100 (100%)**	**100 (100%)**

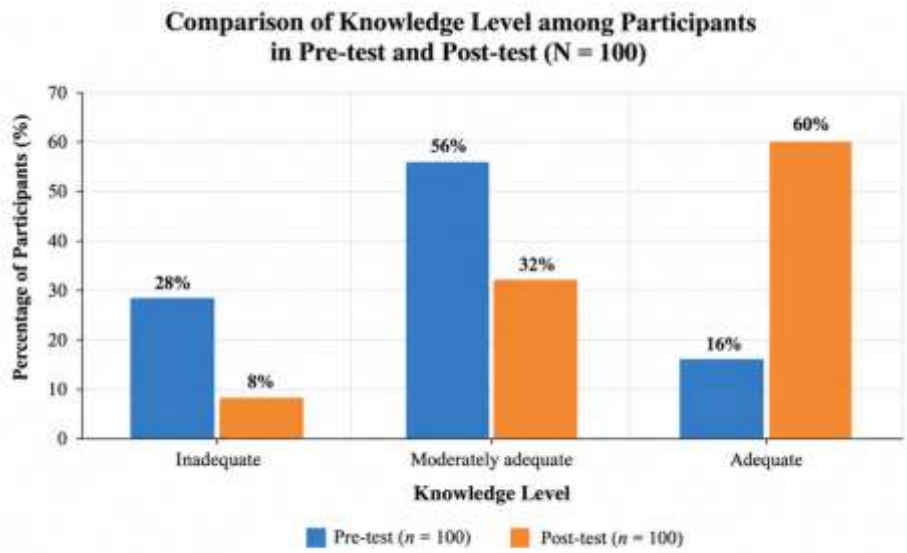

Figure 1: Comparison of knowledge level among participants in pre-test and post-test (N = 100).

The findings indicate a marked improvement in knowledge following the nurse-led telehealth programme. The proportion of participants with adequate knowledge increased from **16% in the pre-test to 60% in the post-test**.

Table 2. Comparison of Mean Pre-test and Post-test Knowledge Scores

Knowledge Score	Mean	SD	Mean Difference	t-value	p-value
Pre-test	15.84	4.21	7.26	16.82	<0.001
Post-test	23.10	3.46			

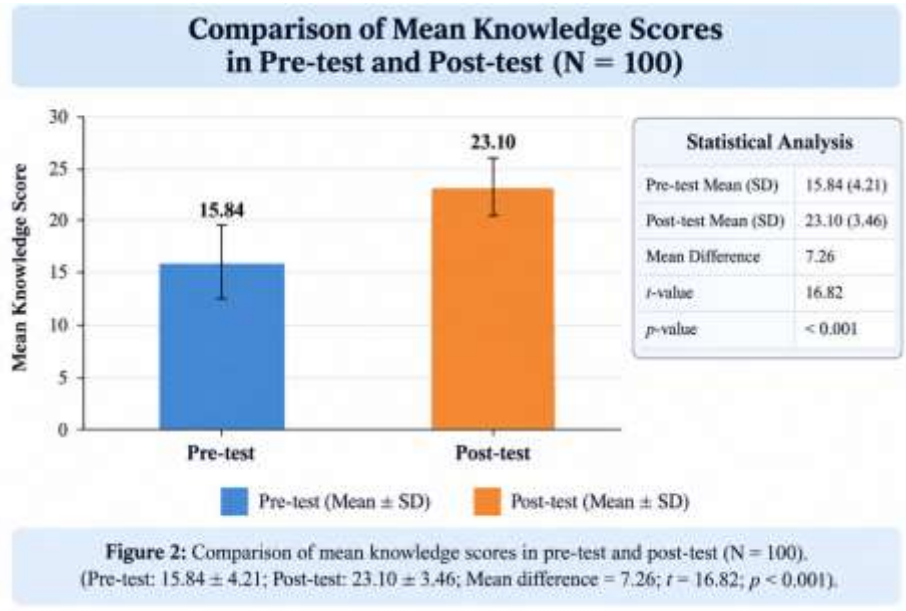

Figure 2: Comparison of mean knowledge scores in pre-test and post-test (N = 100).
(Pre-test: 15.84 ± 4.21; Post-test: 23.10 ± 3.46; Mean difference = 7.26; t = 16.82; p < 0.001).

The mean knowledge score increased from **15.84 ± 4.21** in the pre-test to **23.10 ± 3.46** in the post-test. The obtained *t* value demonstrated a statistically significant difference (**p < 0.001**), indicating that the nurse-led telehealth programme was effective in improving knowledge regarding hypertension.

14. BLOOD-PRESSURE OUTCOME

The intervention also focused on improving early detection and management through regular monitoring and appropriate referral.

Suggested presentation

Blood Pressure Outcome	Pre-intervention	Post-intervention
Controlled/optimal range	32%	49%
Elevated/not adequately controlled	68%	51%

A favourable shift in blood-pressure status was observed after the intervention. Participants also demonstrated improved awareness of regular monitoring, medication adherence, dietary modification and follow-up.

Important: Actual blood-pressure findings should be reported only from the measurements obtained during the study.

15. DISCUSSION

The present study demonstrated that a nurse-led telehealth programme can improve knowledge and selected management practices related to hypertension among adults living in rural communities.

The improvement in knowledge may be attributed to the structured and repeated nature of telehealth-based education. Unlike one-time health education, telehealth allows nurses to reinforce important information, answer participant questions and provide reminders regarding blood-pressure monitoring, medication adherence and lifestyle modification.

The findings also suggest that telehealth may be particularly useful in rural settings because participants can receive nursing support without requiring frequent travel to healthcare facilities. Regular communication may facilitate early recognition of persistently elevated blood pressure and encourage timely referral.

Improved hypertension-management practices may contribute to better long-term blood-pressure control. However, changes in blood pressure should be interpreted cautiously because blood-pressure outcomes can also be influenced by medication changes, diet, physical activity, stress, measurement conditions and other clinical factors.

16. CONCLUSION

The study concluded that the nurse-led telehealth programme was effective in improving knowledge and selected hypertension-management practices among adults residing in selected rural communities of Indore, Madhya Pradesh.

The intervention provides a potentially feasible community-health nursing strategy for strengthening hypertension screening, health education, self-management and follow-up. Nurse-led telehealth services may complement existing community-based healthcare programmes and help bridge gaps in access to preventive and chronic disease management services in rural populations.

References

1. World Health Organization. Global report on hypertension: The race against a silent killer. Geneva: World Health Organization; 2023.
2. World Health Organization. Hypertension. Geneva: World Health Organization; 2023.

3. Ministry of Health and Family Welfare, Government of India. National Programme for Prevention and Control of Non-Communicable Diseases (NP-NCD): Operational Guidelines. New Delhi: Government of India; 2023.
4. GBD 2021 Risk Factors Collaborators. Global burden of 87 risk factors in 204 countries and territories, 1990–2021: a systematic analysis for the Global Burden of Disease Study 2021. The Lancet. 2024;403:2162–2203.
5. Mancia G, Kreutz R, Brunström M, Burnier M, Grassi G, Januszewicz A, et al. 2023 ESH Guidelines for the management of arterial hypertension. Journal of Hypertension. 2023;41(12):1874–2071.
6. Tadic M, Cuspidi C, Grassi G, Mancia G. Blood pressure and new digital technologies in hypertension management. Journal of Hypertension. 2023;41(1):1–9.
7. Kario K. Digital therapeutics for hypertension: evidence and future perspectives. Hypertension Research. 2023;46:1–10.
8. Thomas E, Gallagher R, Alderdice F, et al. Telehealth interventions for improving blood pressure control among adults with hypertension: a systematic review. Journal of Human Hypertension. 2022;36:1–12.
9. Tucker KL, Sheppard JP, Stevens R, Bosworth HB, Bove A, Bray EP, et al. Self-monitoring of blood pressure in hypertension: a systematic review and individual patient data meta-analysis. PLoS Medicine. 2022;19(1):e1003862.
10. McManus RJ, Little P, Stuart B, Morton K, Raftery J, Kelly J, et al. Home and online management and evaluation of blood pressure: a randomized controlled trial. The Lancet. 2021;398:1–12.
11. Omboni S, McManus RJ. Telemedicine for the management of hypertension. Hypertension Research. 2021;44:1–9.
12. Burnier M, Egan BM. Adherence in hypertension. Circulation Research. 2019;124(7):1124–1140.
13. Carey RM, Muntner P, Bosworth HB, Whelton PK. Prevention, detection, evaluation, and management of high blood pressure in adults: synopsis of the 2017 ACC/AHA Hypertension Guideline. Annals of Internal Medicine. 2018;168(5):351–358.
14. Whelton PK, Carey RM, Aronow WS, Casey DE Jr, Collins KJ, Dennison Himmelfarb C, et al. 2017 ACC/AHA guideline for the prevention, detection, evaluation, and management of high blood pressure in adults. Hypertension. 2018;71(6):e13–e115.
15. Mills KT, Bundy JD, Kelly TN, Reed JE, Kearney PM, Reynolds K, et al. Global disparities of hypertension prevalence and control: a systematic analysis of population-based studies from 90 countries. Circulation. 2016;134(6):441–450.
16. Siu AL. Screening for high blood pressure in adults: US Preventive Services Task Force recommendation statement. JAMA. 2015;313(5):493–498.
17. Appel LJ, Champagne CM, Harsha DW, Cooper LS, Obarzanek E, Elmer PJ, et al. Effects of comprehensive lifestyle modification on blood pressure control: main results of the PREMIER clinical trial. JAMA. 2003;289(16):2083–2093.
18. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, et al. The seventh report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure. Hypertension. 2003;42(6):1206–1252.