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# Evaluation of Peer Education Intervention in Health Management for Elderly Hypertensive Patients

**Xiaojing Ren, Wenjing Zhang***

Nursing Department, Fenyang Hospital of Shanxi Province, Fenyang 032200, Shanxi, China

***Author to whom correspondence should be addressed.***



**Abstract:** *Objective:* To investigate the effectiveness of peer education interventions in health management for elderly hypertensive patients, providing evidence for enhancing self-management capabilities, improving blood pressure control, and promoting long-term behavioral change. *Methods:* A total of 82 elderly hypertensive patients admitted to a tertiary hospital in Shanxi Province in March 2024 were selected, with 41 patients in each of the control and observation groups. The control group received routine health management, while the observation group additionally underwent peer education intervention. Changes in blood pressure levels, scores on the Hypertension Self-Management Scale, and medication adherence were compared between groups before and after intervention. *Results:* Post-intervention, the observation group exhibited greater reductions in systolic and diastolic blood pressure compared to pre-intervention levels than the control group ($p < 0.05$). Scores on the Hypertension Self-Management Scale dimensions, diet management, medication management, emotional management, condition monitoring, work and rest management, along with the total score, improved significantly compared to pre-intervention levels and were superior to the control group ($p < 0.05$). However, improvement in the exercise management dimension was not significant. Post-intervention, the medication adherence scores in the intervention group were also higher than those in the control group ($p < 0.05$). *Conclusion:* Peer education intervention can effectively promote blood pressure improvement in elderly hypertensive patients, enhance self-health management capabilities and medication adherence, and is suitable as an important supplement to community and hospital-based continuing care models.

**Keywords:** Peer education; Nursing intervention; Elderly hypertension; Health management; Hypertension self-management scale

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## 1. Introduction

Hypertension, as one of the most prevalent chronic diseases among the elderly, exhibits an increasing

prevalence with age, affecting nearly 75% of individuals over the age of 60 [1]. Its management and intervention are crucial for enhancing the quality of life in the elderly and preventing chronic complications. However, elderly patients often face challenges such as memory decline and lack of social support, leading to poor self-management abilities and inadequate blood pressure control [2,3]. Studies have shown that 68.1% of elderly hypertensive patients exhibit low levels of self-management behavior, while enhancing social support can improve their self-management abilities and medication adherence, and even reduce the risk of hypertension [4–6]. Peer education, also known as peer support, is a mutual aid educational model among patients with similar diseases. Multiple studies have demonstrated that peer education interventions can significantly improve patients' quality of life, self-efficacy, medication adherence, treatment efficacy, and alleviate anxiety and depression [7–9]. This study aims to integrate peer education into the health management of elderly hypertensive patients and verify its effectiveness.

## 2. Materials and methods

### 2.1. Study participants

This study employed a consecutive case convenience sampling method and selected patients newly admitted to the Cardiovascular Department of Fenyang Hospital in Shanxi Province during the same week in March 2024 as the study participants. Inclusion criteria: age ≥ 60 years; meeting the diagnostic criteria for hypertension; disease duration ≥ 1 year; clear consciousness and basic communication ability; voluntary participation and signing of informed consent. Exclusion criteria: presence of severe cardiovascular and cerebrovascular complications (e.g., acute myocardial infarction, stroke); cognitive impairment; participation in other hypertension intervention studies; inability to cooperate with follow-up or intervention.

The primary outcome measure in this study was blood pressure, and the sample size was calculated using the formula for comparing means of two independent samples. Relevant research findings indicated that peer education had the most significant effect on improving systolic blood pressure, with a mean difference of 10.15 mmHg between groups, indicating an average reduction of 10.15 mmHg in the intervention group compared to the control group [8]. Therefore, the expected effect size δ was set at 10.15; the standard deviation of systolic blood pressure σ was 15 mmHg; for a two-tailed test, $\alpha = 0.05$, corresponding to $Z\alpha/2 = 1.96$; $\beta = 0.20$, with a test power of $1-\beta = 80\%$, corresponding to $Z\beta = 0.84$. The calculated sample size per group was $n = 34.24$, rounded up to 35 cases per group. Considering a loss to follow-up rate of 15% during the study period, the adjusted sample size per group was 41 cases, totaling 82 cases. The calculation formula is as follows:

$$n=2\times(Z_{\alpha/2}+Z_{\beta})^2\times\sigma^2/\delta^2$$

### 2.2. Sample enrollment and grouping methods

Prior to the commencement of the study, thorough communication was established with the healthcare staff in the cardiology department to secure their cooperation. The primary shift nurse randomly assigned beds to newly admitted patients, who were naturally grouped based on physical space. Patients admitted to wards numbered 1–14 constituted the intervention group, while those in wards 15–28 formed the control group. There was no crossover between the two groups, and the allocation of healthcare staff and daily treatment protocols remained identical for both groups (Ethics Approval Number: 2023051). Researchers screened newly admitted patients through the HIS system and conducted surveys and assigned codes to eligible

patients within 24 hours of their admission. For patients who withdrew from the study due to changes in their condition requiring transfer to another department or refusal to participate, replacements were recruited from newly admitted patients according to the same criteria. The replacement patients were required to have an overlapping hospital stay of at least three days with the originally enrolled patients.

## 2.3. Intervention methods

### 2.3.1. The control group received routine health management for an observation period of eight weeks

Nurses provided bedside health guidance to inpatients; after discharge, nurses continued health guidance through a WeChat group between nurses and patients, covering health education, follow-up, and Q&A sessions.

### 2.3.2. The intervention group received peer education intervention in addition to routine health management for eight weeks

(1) Selection and training of peer educators

Four patients with strong communication skills, a willingness to help fellow patients, and an interest in undertaking peer education roles were selected from the contemporary hospitalized patients to serve as peer educators. They were jointly trained by clinical education nurses from the cardiology department and the researchers. Training content included core skills for self-health management, communication strategies for peer education, and management of a peer support WeChat group.

(2) Implementation of peer support

The 41 patients in the intervention group were divided into four groups, each consisting of 10-11 members, led by one peer educator (hereinafter referred to as the group leader). In the hospital, group leaders communicated with members on a one-on-one basis. After discharge, communication continued via WeChat, with each group establishing its own WeChat group. These groups were jointly managed by the group leader, clinical education nurses, and researchers. The researchers organized weekly online meetings with the group leaders to discuss issues and deficiencies identified during the intervention.

(3) Peer support

The content of peer support was designed around the dimensions of the "Self-Management Behavior Assessment Scale for Hypertensive Patients", covering blood pressure measurement, diet, medication adherence, rest, psychological state, and exercise. Members completed daily health check-ins within the WeChat group using a mini-program, reporting on medication adherence, emotional state, blood pressure levels, adherence to a low-salt, low-fat diet, exercise frequency and duration, rest status, and engagement with shared content in the group. The researchers compiled and promptly fed back the check-in results to the group leaders. Group leaders sent daily "Health Tips" and shared "Experience Stories" via weekly WeChat live broadcasts to facilitate communication among group members and provide emotional and social support. Members could ask questions in the group at any time, with group leaders responding within 24 hours; professional questions were answered by healthcare staff.

## 2.4. Observation indicators

(1) Blood pressure control

Patients measured their blood pressure daily in the morning (upon waking, fasting) and evening (before

bed) using a calibrated electronic sphygmomanometer (Omron HEM-7200). The average of three consecutive measurements taken on the day of admission and the day of intervention completion was used as the baseline and post-intervention blood pressure values, respectively.

(2) Self-health management ability for hypertension

The "Self-Management Behavior Assessment Scale for Hypertensive Patients", developed by Zhao Qiuli et al., was used [10]. This scale comprises six dimensions with 33 items, including dietary management (10 items), medication management (4 items), emotional management (7 items), work and rest management (5 items), disease monitoring (4 items), and exercise management (3 items). A Likert scoring method was employed (1 point = never, 2 points = rarely, 3 points = sometimes, 4 points = often, 5 points = always), with a total score ranging from 33 to 165. Higher scores indicated stronger self-health management abilities. The scale demonstrated good reliability and validity, with a Cronbach's α coefficient of 0.914 and a content validity index of 0.91. Patients independently completed the scale before and eight weeks after the intervention under the guidance of researchers, with immediate collection and a 100% effective response rate.

(3) Medication adherence

The Chinese version of the Morisky Medication Adherence Scale (MMAS-8), localized by Cui Shujie et al., was used to assess medication adherence [11]. This scale consists of eight items, with items 1-7 answered by patients as "yes" or "no", scored as 1 and 0 points, respectively; item 8 offers options "always", "often", "sometimes", "rarely", and "never", scored as 0, 0.25, 0.5, 0.75, and 1 point, respectively. The total score ranges from 0 to 8, with scores of 8 indicating high medication adherence, 6–7 indicating moderate adherence, and < 6 indicating low adherence. The scale's Cronbach's α coefficient was 0.849.

### 2.5. Statistical methods

Data were analyzed using SPSS 24.0 software. Normally distributed continuous data were presented as mean ± standard deviation, non-normally distributed continuous data as median and interquartile range, and categorical data as counts and percentages. For inter-group comparisons, normally distributed continuous data were analyzed using two independent samples *t*-tests, while non-normally distributed continuous data were analyzed using the Wilcoxon signed-rank test. Unordered categorical data were compared using the $\chi^2$ test, and ordered categorical data using the Mann-Whitney U test. Paired samples *t*-tests were used for intra-group comparisons before and after the intervention. A $p$-value < 0.05 was considered statistically significant.

## 3. Results

### 3.1. Comparison of general information between the two groups

There were no statistically significant differences in baseline data, including age, gender, marital status, systolic blood pressure, diastolic blood pressure, medication adherence scores, and total scores on the Self-Health Management Scale for Hypertension, between the two groups ($p > 0.05$), indicating comparability (see **Table 1**).

**Table 1.** Comparison of general information between the two groups

| Item | | Intervention group | Control group | Test statistic | *p* |
|---|---|---|---|---|---|
| Age (years, $\overline{x}$ ± s) | | 71.83 ± 8.88 | 73.59 ± 10.53 | -0.613[a] | 0.540 |
| Gender [cases (percentage, %)] | Male | 22 (53.66) | 17 (41.46) | 1.220[c] | 0.377 |
| | Female | 19 (46.34) | 24 (58.54) | | |
| Marital status [cases (percentage, %)] | Married | 28 (68.29) | 29 (70.73) | 0.058[c] | 0.810 |
| | Widowed | 13 (31.71) | 12 (29.27) | | |
| Systolic blood pressure (mmHg, $\overline{x}$ ± s) | | 164.85 ± 9.07 | 165.98 ± 7.89 | -0.598[b] | 0.552 |
| Diastolic blood pressure (mmHg, $\overline{x}$ ± s) | | 94.22 ± 4.59 | 94 ± 4.37 | 0.222[b] | 0.825 |
| Medication adherence [score, M(P25, P75)] | | 6 (5,6.5) | 6 (5.5,6.5) | -0.772[a] | 0.440 |
| Self-management of hypertension (score, $\overline{x}$ ± s) | | 98.22 ± 6.3 | 98.56 ± 5.91 | -0.253[b] | 0.801 |

Note: a represents the *Z* value, b represents the *t* value, and c represents the $\chi^2$ value.

## 3.2. Comparison of blood pressure levels between the two groups before and after intervention

The results indicate that peer education intervention can effectively control blood pressure. After the intervention, both the systolic blood pressure values in the intervention group and the control group decreased, but the reduction was more significant in the intervention group, with notable differences both within and between groups ($p < 0.001$). The diastolic blood pressure values in the intervention group also decreased and were lower than those in the control group, with significant differences both within and between groups ($p < 0.001$), while the within-group difference in the control group was not significant. See **Table 2** and **3**.

**Table 2.** Comparison of systolic blood pressure between the two groups before and after intervention ($\overline{x}$ ± s, mmHg)

| Group | Number of cases | Before intervention | After intervention | *t* value | *p* value |
|---|---|---|---|---|---|
| Intervention group | 41 | 164.85 ± 9.07 | 156.59 ± 8.32 | 31.919 | < 0.001 |
| Control group | 41 | 165.98 ± 7.89 | 162.98 ± 8.03 | 16.848 | < 0.001 |
| *t* value | - | -0.598 | -3.539 | | |
| *p* value | - | 0.552 | < 0.001 | | |

**Table 3.** Comparison of diastolic blood pressure between the two groups before and after intervention ($\overline{x}$ ± s, mmHg)

| Group | Number of cases | Pre-intervention | Post-intervention | *t* value | *p* value |
|---|---|---|---|---|---|
| Intervention group | 41 | 94.22 ± 4.59 | 90.95 ± 4.07 | 21.187 | < 0.001 |
| Control group | 41 | 94.00 ± 4.37 | 94.15 ± 4.28 | -1.290 | 0.205 |
| *t* value | | 0.222 | -3.464 | | |
| *p* value | | 0.825 | < 0.001 | | |

## 3.3. Comparison of scores on the hypertension self-health management scale between the two groups before and after intervention

The results show that before the intervention, there were no statistically significant differences in the scores

of the six dimensions and the total score on the Hypertension Self-Health Management Scale between the two groups. After the intervention, the intervention group demonstrated improvements in all dimensions and the total score compared to their pre-intervention scores (all $p < 0.05$). In contrast, the control group showed no statistically significant differences in the scores of each dimension and the total score before and after the intervention (all $p > 0.05$). A post-intervention comparison between groups revealed that the intervention group scored higher than the control group in the dimensions of dietary management, medication management, emotional management, disease monitoring, and work and rest management, as well as in the total score (all $p < 0.05$). However, there was no statistically significant difference in the score of the exercise management dimension between the two groups. See **Table 4**.

**Table 4.** Comparison of scores on the hypertension self-health management scale between the two groups before and after intervention ($\overline{x} \pm s$, points)

| Group | Cases | Diet management | | *t* value | *p* value | Medication management | | *t* value | *p* value |
|---|---|---|---|---|---|---|---|---|---|
| | | Before intervention | After intervention | | | Before intervention | After intervention | | |
| Intervention group | 41 | 29.51 ± 3.81 | 33.39 ± 3.58 | -4.936 | < 0.001 | 11.27 ± 2.11 | 13.46 ± 2.38 | -4.409 | < 0.001 |
| Control group | 41 | 29.85 ± 2.89 | 29.88 ± 3.14 | -0.036 | 0.972 | 11.88 ± 2.18 | 11.27 ± 2.11 | 1.317 | 0.195 |
| *t* value | | -0.457 | 4.720 | | | -1.286 | 4.421 | | |
| *p* value | | 0.649 | < 0.001 | | | 0.202 | < 0.001 | | |

| Group | Cases | Emotion management | | *t* value | *p* value | Work and rest management | | *t* value | *p* value |
|---|---|---|---|---|---|---|---|---|---|
| | | Before intervention | After intervention | | | Before intervention | After intervention | | |
| Intervention group | 41 | 21.32 ± 2.81 | 23.15 ± 2.62 | 12.332 | < 0.001 | 15.27 ± 2.19 | 16.73 ± 2.57 | -3.024 | 0.004 |
| Control group | 41 | 20.59 ± 3.00 | 21.00 ± 2.77 | -0.644 | 0.523 | 14.95 ± 2.63 | 15.12 ± 2.37 | -0.327 | 0.745 |
| *t* value | | 1.141 | 3.606 | | | 0.594 | 2.950 | | |
| *p* value | | 0.257 | < 0.001 | | | 0.555 | 0.004 | | |

| Group | Cases | Condition monitoring | | *t* value | *p* value | Exercise management | | *t* value | *p* value |
|---|---|---|---|---|---|---|---|---|---|
| | | Before intervention | After intervention | | | Before intervention | After intervention | | |
| Intervention group | 41 | 11.90 ± 2.23 | 13.68 ± 2.31 | -3.308 | 0.002 | 8.95 ± 1.66 | 9.98 ± 1.81 | -2.629 | 0.012 |
| Control group | 41 | 12.17 ± 1.67 | 11.93 ± 2.38 | 0.525 | 0.602 | 9.12 ± 2.05 | 9.76 ± 1.73 | -1.632 | 0.110 |
| *t* value | | -0.616 | 3.392 | | | -0.414 | 0.562 | | |
| *p* value | | 0.540 | < 0.001 | | | 0.680 | 0.576 | | |

| Group | Cases | Total score | | *t* value | *p* value |
|---|---|---|---|---|---|
| | | Pre-intervention | Post-intervention | | |
| Intervention group | 41 | 98.22 ± 6.30 | 110.39 ± 5.59 | -10.138 | < 0.001 |
| Control group | 41 | 98.56 ± 5.91 | 98.95 ± 6.62 | -0.281 | 0.780 |
| *t* value | | -0.253 | 8.455 | | |
| *p* value | | 0.801 | < 0.001 | | |

### 3.4. Comparison of medication adherence between the two groups before and after intervention

The medication adherence of patients in the intervention group improved compared to before the intervention, while the control group also showed some improvement under the conventional health management model, but the magnitude of improvement was smaller than that in the intervention group; there was a significant difference between the two groups after the intervention. This suggests that peer education intervention can effectively enhance medication adherence among elderly patients with hypertension. See **Table 5**.

**Table 5.** Comparison of medication adherence between the two groups before and after intervention [n (%)]

| Group | Cases | Total score | | *Z* value | *p* value |
|---|---|---|---|---|---|
| | | Before intervention | After intervention | | |
| Intervention group | 41 | 6 (5, 6.5) | 7 (6.5, 7.5) | -5.721 | < 0.001 |
| Control group | 41 | 6 (5.5, 6.5) | 6 (6, 6.5) | -2.236 | 0.025 |
| *Z* value | | -0.772 | -7.446 | | |
| *p* value | | 0.440 | < 0.001 | | |

## 4. Discussion

### 4.1. Peer education is beneficial for improving patients' blood pressure control

In traditional self-health management, patients' health behaviors largely rely on their personal willpower, whereas peer education improves patients' blood pressure levels by providing continuous external motivation and conducting behavioral supervision. Li Song et al. found that peer intervention can enhance patients' execution of behaviors such as self-monitoring, salt restriction, and healthy eating habits, thereby effectively improving blood pressure levels [12]. Related studies indicate that elderly individuals are more likely to accept experiences shared by individuals with similar backgrounds and establish trust with them, thereby enhancing their motivation and confidence for behavioral change [13]. Scholars have pointed out that the long-term effectiveness of behavioral interventions is often influenced by factors such as weakened patient motivation and insufficient follow-up support [14]. The results show that although the systolic blood pressure of the control group decreased under the conventional health management model, this improvement may be related to occasional adjustments in health behaviors during the course of the disease, lacking systematicity and continuity. This suggests that blood pressure management not only relies on health education but also on patients' ability to persist in healthy behaviors over the long term. Peer education compensates for the shortcomings of traditional health education, which is characterized by "one-way output and lack of continuous support and interaction". The empathy between peers is more likely to evoke emotional resonance than the one-way instruction from healthcare professionals. The intervention period in this study was limited, and it was not possible to observe whether the improvement in blood pressure could be maintained over the long term. Therefore, future research should extend the follow-up period to evaluate further the long-term effects of peer education in continuous blood pressure management.

### 4.2. Peer education is beneficial for improving patients' self-health management abilities

Peer education can effectively enhance the self-health management abilities of patients with hypertension, showing significant effects in areas such as dietary control, medication adherence, emotional regulation,

work and rest arrangements, and disease monitoring. Peer education enables the establishment of trust among individuals with similar health experiences, generating a modeling effect. Peers who have mastered the experience of hypertension management have health behavior patterns that are more easily understood and accepted by patients, thereby promoting positive changes in behaviors such as dietary control and regular medication [8,13]. Moreover, interactive health education and continuous follow-up can help patients form good health behavior habits in the short term and enhance their self-behavioral regulation abilities [7]. Additionally, peer support can effectively improve patients' negative emotions. During frequent interactions between peer supporters and patients, patients' anxiety levels can be reduced [9,15]. In peer interactions, patients can acquire emotional regulation skills, dietary and exercise methods, and disease-related knowledge, thereby enhancing their willingness and ability to execute. However, the intervention measures were less effective in the exercise management dimension. It may be that for elderly individuals, exercise behaviors often face more practical constraints, such as joint degeneration, chronic pain, decreased balance ability, and internal and external conditions such as the outdoor environment. Scholars emphasize that the difficulty of behavioral change is closely related to the cost of execution, and exercise behaviors require continuous investment of time and physical energy, making them more susceptible to restrictions [16]. Additionally, the intervention period in this study was limited and insufficient for patients to form long-term stable exercise habits. It may also be related to the timing of the intervention implementation, as the unstable weather and low outdoor temperatures in spring in the north restrict outdoor exercise for older people. Future research can design exercise intervention plans tailored to the exercise behavior characteristics of elderly patients to explore further the role of peer education in improving the exercise management abilities of elderly patients with hypertension.

## 4.3. Peer education has a positive impact on medication adherence

The results of this study indicate that peer education can effectively promote patients' adherence to regular medication. This is consistent with the research results of Ranjbar et al., which showed that peer education can promote medication adherence in elderly patients with hypertension and is more cost-effective than conventional education provided by healthcare professionals [17]. As mentioned earlier, patients are more likely to accept medication experiences from peers with the same disease, and mutual encouragement among peers can further enhance their treatment adherence. The supportive form of peer education can subtly influence patients through positive behavioral modeling [13]. Furthermore, elderly patients have varying abilities to understand health information. Compared to guidance from professionals, peer patients use language that is closer to daily life to translate complex disease and medication knowledge into executable behaviors in practical situations, thereby enhancing the understandability and acceptability of medication behaviors [8]. Additionally, the shared disease experiences among peers can provide psychological support to patients, reducing their resistance to long-term medication and further enhancing adherence. Therefore, factors closely related to medication behavior, such as understanding the necessity of medication, concerns about adverse reactions, anxiety about treatment plans, lack of motivation, and lack of social support networks, may be improved through peer education [18]. In summary, peer education enhances patients' medication adherence by improving their understanding of the disease and medication, enhancing self-efficacy, and providing sustained social support.

## 5. Conclusion

The peer education model can transmit health knowledge in a way that is familiar and easily accepted by patients, enhance the feasibility of behavioral change through peer demonstration, and provide continuous emotional support and behavioral supervision. The insignificant improvement in the exercise management dimension in the study also suggests that future interventions should focus on the exercise behaviors of elderly patients and incorporate professional exercise guidance to improve the effectiveness of improvement in this dimension. As a low-cost and scalable health management model, peer education has strong application potential in the management of chronic diseases in the elderly. Future research can further explore its long-term effects, optimal intervention periods, and synergistic effects with other health promotion strategies to form a more systematic and sustainable chronic disease management plan and provide new practical evidence for improving the management quality of elderly patients with hypertension in China.

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## Disclosure statement

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