



## Effectiveness of a self-care education program on hypertension management in older adults discharged from cardiac-internal wards

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### Original Article

#### Abstract

**BACKGROUND:** The aim of the present study was to determine the effectiveness of a self-care education (SCE) discharge program with telephone follow-ups in managing hypertension (HTN) in older patients.

**METHODS:** The study was conducted on 56 older patients with HTN who had recently been discharged from the cardiac wards of hospitals in Isfahan, Iran, in 2017. Participants were randomly allocated to the intervention and control groups. The intervention was a 60-minute SCE discharge program with 4 re-educative telephone follow-ups every 2 weeks based on 4 chapters of the designed SCE program and booklet. After coding the data and entering them into SPSS software, data were analyzed for the comparison of mean systolic blood pressure (SBP) and diastolic blood pressure (DBP) as well as frequency of managed HTN in the intervention and control groups at baseline (before discharge), and 2 and 3 months after discharge.

**RESULTS:** Statistical tests showed no significant difference in any of the demographic and confounding variables as well as baseline BPs ( $P > 0.050$ ), but at post-intervention follow-ups, after Mauchly's sphericity test, repeated measurements ANOVA showed that the effect of time ( $P < 0.001$ ) and group ( $P = 0.043$ ) on SBP was significant. The effect of time ( $P = 0.036$ ) and group ( $P = 0.047$ ) on DBP was also significant. McNemar's test showed that the frequency of managed HTN (normal BP), 3 months after discharge, was significantly higher in the intervention group compared to the control group [87.5% ( $n = 21$ ) vs. 23.1% ( $n = 6$ ), respectively] ( $P < 0.001$ ).

**CONCLUSION:** SCE discharge program with telephone re-educative follow-ups was effective in reducing mean BP. The use of this program as a discharged plan for older adults with HTN and comparison of readmission rates for a longer period are recommended.

**Keywords:** Elderly, Discharge Planning, Hypertension, Patient Education, Self-Care, Telenursing

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#### Introduction

Hypertension (HTN) is one of the most prevalent diseases in older adults,<sup>1,2</sup> with a prevalence rate of 61% in Iran.<sup>3</sup> HTN is one of the preventable risk factors of cardiovascular diseases (CVDs) and cerebral accidents.<sup>4</sup> Unmanaged HTN is accompanied with complications leading to disability in older adults. These complications increase in severity with age in older adults.<sup>5,6</sup> Cardiac failure, one of these complications, alone accounts for 27% of the causes of these patients'

hospitalization.<sup>7</sup> Poor blood pressure (BP) management in developing countries, compared to developed countries, explains the high prevalence of such complications, which in turn result in patients' higher re-admission costs in such countries.<sup>2</sup>

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HTN is defined as systolic blood pressure (SBP)  $\geq 140$  mm Hg and diastolic blood pressure (DBP)  $\geq 90$  mm Hg,<sup>4</sup> and is accompanied with other unhealthy lifestyle risk factors.<sup>8</sup> In 2010, the ratios of awareness of diagnosis, treatment, and disease control were 43.5%, 33.8%, and 12.3%, respectively.<sup>9</sup>

HTN management is associated with a reduction in complications<sup>10</sup> and refers to controlling of BP (less than 140/90 mmHg). Experts believe that administration of self-care (including lifestyle modification), treatment compliance and regular BP rechecks are essential to achieve chronic diseases management. Lifestyle modification including weight reduction, compliance with Dietary Approaches to Stop Hypertension (DASH), increased physical activity, reduced alcohol consumption, and smoking cessation can somehow result in reinforcement of medical method effect and better BP control.<sup>11,12</sup> Considering the physical and mental limitations of older adults, only self-care education is inadequate in disease management, while continuing regular education along with follow-up for the patients and their families' accompaniment seem to result in self-care improvement.<sup>13,14</sup> It seems the missing ring in disease management in older adults with HTN is lack of re-education and post-discharge follow-ups.<sup>15</sup> Studies show that discharge education planning effects readmission and hospitalization days;<sup>16</sup> therefore, application of self-care education as a component of discharge education planning,<sup>17</sup> together with nurses' guidance and follow-up, can enhance self-care and BP control in older adults.<sup>18</sup> This issue can also be investigated concerning HTN in older adults.

In recent years, telephone follow-up, as one of the tele-nursing methods, compared to the routine care treatment system, bridges the gap between patients' discharge and home visit. It not only reduces patients' treatment referrals, but also improves their quality of life (QOL).<sup>19,20</sup> Therefore, with regard to the increased population of older adults, the importance of HTN management<sup>24</sup> and nurses' role in education and management of chronic non-communicable diseases (NCDs),<sup>21</sup> the present study was conducted to define the quarterly effectiveness of a self-care education program with telephone follow-ups on the management of HTN in older adults who were discharged from hospital.

## Materials and Methods

This quasi-experimental study (controlled-trial) was conducted in three-stages in two educational

medical centers in Isfahan, Iran.

The participants were 56 older adults (60-79 years old) who were diagnosed with HTN and were being discharged from the internal/cardiac wards of 2 major hospitals in Isfahan. Sample size was calculated as at least 25 subjects in each group (control and intervention) based on the following formula:

$$n = \frac{2(z_1+z_2)^2(2S^2)}{d^2}$$

(80%)  $z_2 = 0.84$ ;  $z_1 = 1.96$ ;  $d = 0.8$  S;  
n (sample size) = 25 subject in each group

In order to recruit subjects, 28 older adults were selected from the two hospitals (considering 10% drop out). Having obtained their informed consent, the subjects were allocated to intervention or control groups with random number assignment (1 or 2) at discharge.

The inclusion criteria consisted of positive history of HTN (recorded in patients' file) and undergoing treatment with antihypertensive medication at least 1 year prior to the study or at least 2 blood pressures over 140/90 mmHg recorded in the vital signs sheet of the patients by staff nurses, and lack of cognitive impairment. In addition, they needed to have the ability to perform daily living activities independently and no acute HTN complications such as heart failure, stroke, renal failure, and visual impairment at sampling time. The exclusion criteria were unwillingness to cooperate, no telephone follow-ups in 2 weeks, or drop out which resulted from stressful events, or diagnosis of an acute disease by a specialist.

First, the researcher extracted the list of hospitalized elders with HTN on consecutive days within 2 weeks. After obtaining informed written consent, according to the study inclusion criteria and using r quota sampling, the patients were assigned to intervention and control groups.

A digital sphygmomanometer (model Alpk2 K2-232, Japan) was used as data collection tool to measure SBP and DBP and a researcher made 16-item questionnaire was used to record the subjects' data in two sections:

A) Demographic characteristics form with 8 questions on age, sex, level of education, occupation, marital status, number of children, residence address, and people they live with.

B) Baseline information form about probable cofounding variables [number of years of HTN history, weight and height to calculate body mass index (BMI), history and dosage of anti-hypertension medications, history of contraceptive consumption (women), history and number of hospitalizations due

to HTN 1 year prior to the study, history and amount of smoking, specific diet, physical activity, and major diseases] with 8 questions and matched in the two groups before analysis of dependent variables.

To confirm face and content validities of the questionnaire, it was reviewed and evaluated by 10 experts in various professions of nursing and medicine. After implementing their modifications, reliability was estimated at 80% correlation of test-retest on 10 subjects with a 3-day interval. To ensure the accuracy of the BP measurement device, it was calibrated using a mercury sphygmomanometer. As BP measurements were all conducted by the researcher, to confirm accuracy (reliability), SBP and DBP measurements were administered twice with 2-5-minute interval in 10 subjects; a high correlation of 80% was observed in standard conditions. To maintain reliable results during the study, BP measurement was conducted only by the researcher and with a unique sphygmomanometer after confirmation of reliability.

SBP and DBP were measured and recorded for the subjects twice with an interval of 2-5 minutes in standard conditions (sitting position, sphygmomanometer cuff size appropriate to patients' arm circumference, laying arm at the heart level, at least 5 minutes of rest before BP measurement, bladder voiding and no smoking and coffee 30 minutes before measurement, and folding patients' sleeves up to arm).<sup>22</sup>

Primary discharge data form was filled for the patients at the time of discharge in the presence of accompanying persons. Having coordinated with the ward manager, a 60-minute self-care education (SCE) session was held based on the designed education program in the form of a booklet in 2-6 member groups through lecture and Teach Back method (a method of repeated question and answer for providing feedback and deep learning). An educational booklet had been designed prior to the study based on needs assessment conducted among the older adults with HTN<sup>23</sup> with focus on disease control, secondary complications prevention, medicine education, appropriate diet, weight loss, increased physical activity, and smoking cessation. This booklet was used as teaching aid not only to enhance their learning but as a source of information in telephone follow-ups. Subjects in the control group and their accompanying persons were recommended to have routine visits in health system. The primary outcomes of this study include:

1-Intergroup and intragroup comparison of mean SBP and DBP in the intervention and control

groups before discharge, as well as 2 and 3 months after discharge

2- Intergroup and intragroup comparison of frequencies of managed HTN in the intervention and control groups before discharge, as well as 2 and 3 months after discharge

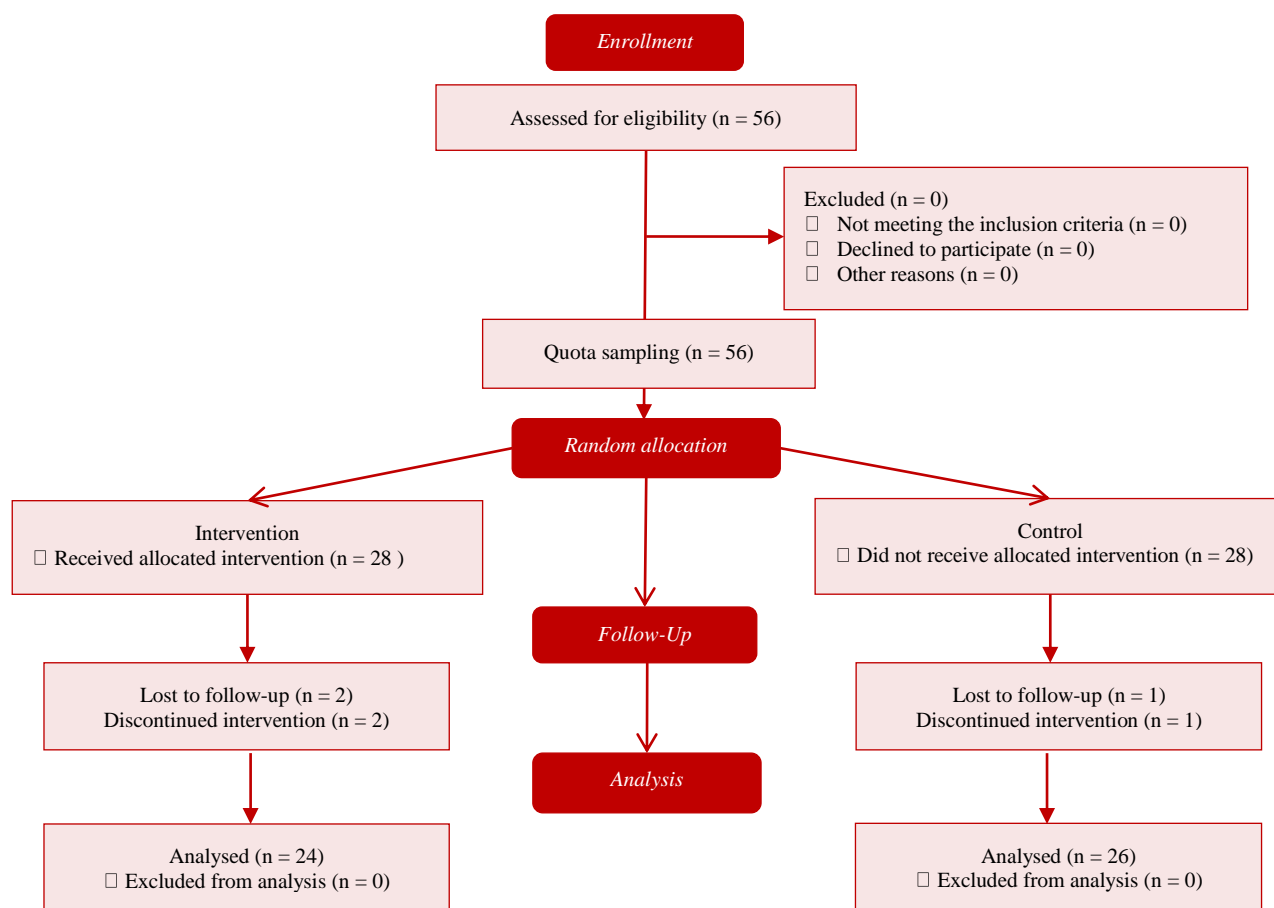
In addition to the above-mentioned educational intervention, the intervention group participants were followed up at their home by the researcher through phone calls every 2 weeks since the day of discharge. The 25-30-minute phone calls were aimed at reviewing the already presented materials and completing the educational program about HTN management in older adults and were presented based on 4 chapters of the SCE booklet. The SCE program and telephone follow-ups in the intervention group have been presented in table 1. The researcher conducted 4 telephone follow-ups for each older adult in the intervention group for 8 weeks. Then, the follow-ups were discontinued for 1 month and both groups were called back to the relevant center to undergo BP measurement by the researcher 2 and 3 months post discharge (The diagram of the study is showed in figure 1).

After coding the data and entering them into the SPSS software (version 18, SPSS Inc., Chicago, IL, USA). Continuous and categorical variables were reported as mean  $\pm$  SD and absolute number (percent), respectively. The collected data were analyzed using independent t-test, Mann-Whitney U, chi-square, and repeated measures ANOVA with Mauchly's sphericity test, Cochran's Q, and McNemar's tests. P-values of less than 0.050 were considered as significant.

## Results

Statistical tests showed no significant difference in any of the demographic and confounding variables, age ( $71.5 \pm 4.5$  and  $69 \pm 4.9$  years, respectively, in the intervention and control groups), history of HTN ( $9.9 \pm 5.9$  and  $8.8 \pm 8.2$  years, respectively, in the intervention and control groups), BMI ( $29.1 \pm 4.1$  and  $28.4 \pm 3.1$  kg/m<sup>2</sup>, respectively, in intervention and control groups), gender, marital, occupational, and life status, level of education, and number of hospitalizations for BP control, in the year prior to the study ( $P > 0.050$ ) (Table 2).

Moreover, the other variables such as history of medication, concurrent diseases (CVDs, diabetes, hyperlipidemia, and renal failure diseases), hormonal contraceptive methods, smoking, any special diets, and level of physical activities were similar in both groups before the study ( $P > 0.050$ ).



**Figure 1.** Diagram of the study

From among 56 subjects, 4 subjects in the intervention group and 2 subjects in the control group were excluded from the study due to the exclusion criteria (lack of response to the telephone follow-ups twice consecutively and lack of referral for BP measurement in the third run).

After Mauchly's sphericity test, repeated measurements ANOVA showed that the effect of time ( $P < 0.001$ ) and group ( $P = 0.043$ ) on SBP was significant. The effect of time ( $P = 0.036$ ) and group ( $P = 0.047$ ) on DBP was also significant (Table 3).

Frequency of normal range BP (managed HTN) before discharge was 33.3% ( $n = 8$ ) and 30.8% ( $n = 8$ ) in the intervention and control groups, respectively ( $P = 0.760$ ). HTN crisis occurred in one subject in the control group who was excluded from the study because of lack of response in follow-ups. The frequency of managed HTN was 41.7% ( $n = 10$ ) and 26.9% ( $n = 7$ ) in the intervention and control groups, respectively, 2 months after discharge; this differences was not significant ( $P = 0.270$ ). Furthermore, the frequency of managed HTN, 3 months after discharge, was significantly higher in the intervention group

compared to the control group [87.5% ( $n = 21$ ) vs. 23.1% ( $n = 6$ )] ( $P < 0.001$ ). In addition, Cochran's Q test showed that the frequency of managed HTN in the intervention group was significantly different between the three times ( $P < 0.001$ ); however, in the control group, there was no significant difference between the three times ( $P = 0.470$ ). McNemar test showed that the frequency of managed HTN in the intervention group did not differ significantly before discharge and 2 months after discharge ( $P = 0.620$ ); however, 3 months after discharge, it was significantly higher than before discharge ( $P < 0.001$ ) and 2 months after discharge ( $P = 0.001$ ) (Table 4).

## Discussion

Considering the decreased SBP in the intervention group 2 months after discharge and reduced mean SBP and DBP 3 months after discharge compared to the previous measurements in this group, and the increase in mean SBP and DBP in the control group during the same time interval, the SCE program together with telephone follow-ups was found to be effective.

**Table 1.** Self-care education program and telephone follow-ups in the intervention group

Educational subject	Summary of conversations and the outcome of the initial and final evaluation of the meeting Compliance with self-care recommendations related to in-person education at discharge
First telephone call: familiarity with medications The content: greeting -Review previous session results; -Review goals: 1. Identifying and prescribing antihypertensive medications 2. Reporting the amount, frequency, time, and method of taking antihypertensive medication correctly in accordance with the latest prescription Time: .../.../2017 ...:.. am/pm Second telephone call: Appropriate diet The content: greeting -Review previous session results; -Review goals: 1. Explaining at least three of the principles of appropriate diet in hypertension by simple and complete words 2. Identifying the four main food groups in the hypertension diet Time: .../.../2017 ...:.. am/pm	Help questions: <u>1. What have you changed in your diet?</u> Evaluation: Patient can explain three changes in his/her diet that are related to blood pressure control. Result: <input type="checkbox"/> No change (totally inappropriate) <input type="checkbox"/> No change (relatively inappropriate) <input type="checkbox"/> Change (proper proportion) <input type="checkbox"/> Change (complete) <u>2. Explain the amount of salt intake during the last week.</u> Evaluation: Patient describes the amount of salt consumed by referring to the relevant principles in the previous class. Result: <input type="checkbox"/> No change (totally inappropriate) <input type="checkbox"/> No change (relatively inappropriate) <input type="checkbox"/> Change (proper proportion) <input type="checkbox"/> Change (complete) Recommendation / Referral / Consultant / Additional guidance: Help questions: <u>1. Explain the amount, timing, and frequency of taking two consumable medicines.</u> Evaluation: Patient can explain the amount, timing, and frequency of taking two consumable medicines referring to the relevant principles in the previous call. Result: <input type="checkbox"/> No change (totally inappropriate) <input type="checkbox"/> No change (relatively inappropriate) <input type="checkbox"/> Change (proper proportion) <input type="checkbox"/> Change (complete) <u>2. Explain the relationship between the hypertensive medication and its three side effects experienced by the patient.</u> Evaluation: Patient can relate medicinal side effects to the type of hypertensive medication consumed. Result: <input type="checkbox"/> No change (totally inappropriate) <input type="checkbox"/> No change (relatively inappropriate) <input type="checkbox"/> Change (proper proportion) <input type="checkbox"/> Change (complete) Recommendation / Referral / Consultant / Additional guidance:
Third telephone call: Physical activity and weight loss The content: greeting -Review previous session results; -Review of goals: 1. Explaining the type and required duration of physical activity to reduce blood pressure 2. Explaining the importance of having physical activity regularly and its relationship with weight loss and blood pressure reduction in their own words Time: .../.../2017 ...:.. am/pm	Summary of conversations on how to comply with relevant self-care recommendations Help questions: <u>1. Explain at least three main principles of appropriate diet in hypertension by using own words.</u> Evaluation: Patient can explain three main principles of appropriate diet in hypertension referring to the relevant principles in the previous call. Result: <input type="checkbox"/> No change (totally inappropriate) <input type="checkbox"/> No change (relatively inappropriate) <input type="checkbox"/> Change (proper proportion) <input type="checkbox"/> Change (complete) <u>2. Describe the maximum amount of salt consumed.</u> Evaluation: Patient can describe the maximum amount of salt consumed referring to the relevant principles in the previous call. Result: <input type="checkbox"/> No change (totally inappropriate) <input type="checkbox"/> No change (relatively inappropriate) <input type="checkbox"/> Change (proper proportion) <input type="checkbox"/> Change (complete) Recommendation / Referral / Consultant / Additional guidance:

**Table 1.** Self-care education program and telephone follow-ups in the intervention group (Continue)

Educational subject	Summary of conversations and the outcome of the initial and final evaluation of the meeting Compliance with self-care recommendations related to in-person education at discharge
Forth telephone call: Familiarity with hypertension symptoms and complications: The content: greeting -Review previous session results; -Review goals: 1. Explaining at least three symptoms of increased blood pressure in its self 2. Explaining at least three symptoms of decreased blood pressure in its self  Time: .../.../2017 ... am/pm	Summary of conversations on how to comply with relevant self-care recommendations Help question: <u>1. Explain the type and required duration of physical activity for blood pressure reduction.</u> Evaluation: Patient can explain the type and required duration of physical activity for blood pressure reduction referring to the relevant principles in the previous call. Result: <input type="checkbox"/> No change (totally inappropriate) <input type="checkbox"/> No change (relatively inappropriate) <input type="checkbox"/> Change (proper proportion) <input type="checkbox"/> Change (complete) <u>2. Explain the importance of having physical activity regularly in reduced blood pressure in their own words.</u> Evaluation: Patient can explain the importance of having physical activity regularly in reduced blood pressure referring to the relevant principles in the previous call. Result: <input type="checkbox"/> No change (totally inappropriate) <input type="checkbox"/> No change (relatively inappropriate) <input type="checkbox"/> Change (proper proportion) <input type="checkbox"/> Change (complete) Recommendation / Referral / Consultant / Additional guidance:

**Table 2.** Demographic and confounding variables in the intervention and control groups at baseline

Variable	Group		P
	Intervention group (n = 28)	Control group (n = 28)	
	Mean ± SD	Mean ± SD	
Age (year)	71.5 ± 5.4	69.03 ± 4.9	P <sup>1</sup> = 0.100
History of hypertension (year)	9.9 ± 5.9	8.80 ± 8.2	P <sup>1</sup> = 0.570
Body Mass Index	29.1 ± 4.1	28.40 ± 3.1	P <sup>1</sup> = 0.540
	n (%)	n (%)	
Gender	Female	12 (46.2)	P <sup>2</sup> = 0.750
	Male	14 (58.3)	
Marital status	Married	20 (76.9)	P <sup>2</sup> = 0.610
	Widowed	7 (29.2)	
Occupational status	Employed	4 (15.4)	P <sup>2</sup> = 0.860
	Retired	9 (34.6)	
	Insurance Recipient	5 (20.8)	
Living status	Housekeeper	9 (37.6)	P <sup>2</sup> = 0.650
	Alone	3 (12.5)	
	With wife	16 (66.7)	
Level of Education	With children	3 (11.5)	P <sup>3</sup> = 0.920
	Illiterate	6 (23.1)	
	pre-high school diploma	11 (42.3)	
	High school diploma	8 (30.8)	
Hospitalization for HTN in the past year	Academic education	1 (3.8)	P <sup>5</sup> = 0.460
	less than once	20 (76.9)	
	one to two times	4 (15.4)	
	more than twice	2 (7.7)	

SD: Standard deviation; P<sup>1</sup>: Independent t-test; P<sup>2</sup>: Chi-Square test; P<sup>3</sup>: Mann-Whitney U test

**Table 3.** Blood pressure status for intervention and control groups at three stages of the study

Variable	Group	Time			P <sup>1</sup>	P <sup>2</sup>
		Baseline (before discharge)	2 months after discharge	3 months after discharge		
		Mean ± SD	Mean ± SD	Mean ± SD		
SBP	Intervention group (n = 24)	153.4 ± 13.7	145.7 ± 11.3	137.2 ± 9.0	0.043*	< 0.001*
	Control group (n = 26)	150.5 ± 15.6	151.3 ± 14.0	153.3 ± 13.7		
DBP	Intervention group (n = 24)	87.6 ± 9.3	85.7 ± 8.9	84.1 ± 8.3	0.047*	0.036*
	Control group (n = 26)	88.5 ± 10.5	89.4 ± 9.5	90.0 ± 7.9		

SBP: Systolic blood pressure; DBP: Diastolic blood pressure; SD: Standard deviation

P<sup>1</sup>: Effect of group; P<sup>2</sup>: Effect of time; \* P-value of less than 0.050 was considered as significant.

Findings showed the effect of the intervention on the reduction of SBP and DBP in the intervention group at the end of the study compared to before the intervention. During the same time interval (i.e., before discharge until the end of the study), mean SBP and DBP showed an increase in the control group. Similarly, Chiu and Wong reported that mean SBP and DBP were significantly lower in their intervention group after educational session and counseling by phone calls for 8 weeks in older adults (mean age of 54 years) with HTN compared to the control group who only received nursing counseling at the clinic.<sup>24</sup> Furthermore, Park et al. obtained similar results in older adults with HTN residing in nursing homes after SCE with 8-week follow-ups.<sup>10</sup> Their results showed that SCE, especially with follow-ups and counseling, reduced BP of older adults with HTN. Their research was different from the present study in terms of the discharge planning protocol and administration of regular self-care education, which can lead to effectiveness of education and a behavior change in self-care by reinforcing follow-ups. In some other studies, the effectiveness of counseling and telephone follow-ups on self-care behaviors of patients with HTN has been evaluated differently. For example, Faraji showed that the intervention had a consistent positive effect on the patients' SBP control after 8 weeks (P = 0.030), but it could not improve the patients' adherence to

treatment and lifestyle modification (P > 0.050).<sup>25</sup> Researchers emphasized the necessity of long-term and regular follow-up to enhance the patients' self-care behaviors in chronic conditions. The difference in the results of the above-mentioned research and the present study could be due to difference in the participants' age group (18-65 vs. 60+ years).

Moreover, the frequency of managed HTN at the end of the study was significantly higher in the intervention group compared to the control group. This variable was a little higher in the intervention group 2 months after discharge with no significant difference (P > 0.050). Furthermore, controlled HTN distribution was significantly higher in the intervention group compared to the control group 3 months after discharge (P < 0.050). These results are consistent with those of Park et al. who reported a significant increase in the percentages of managed HTN in the intervention group compared with the control group (P = 0.03).<sup>10</sup> Mohammadi et al. also reported a significant increase in the level of managed SBP (P < 0.001) and DBP (P < 0.004) in the intervention group after 3 months of follow-ups compared to the control group.<sup>26</sup> Comparison of the aforementioned results show the importance of follow-up along with SCE in the reduction of the percentage of unmanaged HTN which is one of the main factors for readmission among older adults with HTN.

**Table 4.** Frequency of managed hypertension (normal blood pressure) for the intervention and control groups at three stages of the study

Group	Time			P <sup>2</sup>
	Baseline (before discharge)	2 months after discharge	3 months after discharge	
	Frequency (%)	Frequency (%)	Frequency (%)	
Intervention group (n = 24)	8 (30.8)	7 (26.9)	6 (23.1)	< 0.001*
Control group (n = 26)	8 (33.3)	10 (41.7)	21 (87.5)	
P <sup>1</sup>	0.76	0.27	< 0.001*	

P<sup>1</sup>: McNemar's test; P<sup>2</sup>: Cochran's Q test; \* P-value of less than 0.050 was considered as significant.

## Conclusion

This program was designed with a holistic approach towards the educational needs of older adults considering their specific barriers of learning such as their physical and functional restrictions. Therefore, the positive changes observed in SBP and DBP and the increase in the percentage of controlled HTN seem to result directly from this program. Designing a discharge program for older adults with HTN and the holistic approach towards their educational needs and self-care behaviors along with telephone follow-ups aimed at providing continuous training are the outstanding points of the present study compared to previous research.

**Research Constraints:** Regarding the chronicity of the process of HTN management and the importance of long-term follow-up in these cases, the short duration of the study was one of the limitations of this research (because of the limitation of thesis protocols in MSc degrees). In addition, polypharmacy, comorbidities, and lack of permanent access to these patients or their relatives for telephone follow-up limited the obtaining of valuable information.

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## Conflict of Interests

Authors have no conflict of interests.

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