Comparison of hypertensive outcomes after the implementation of self-management program for older adults with uncontrolled hypertension in Krabi, Thailand: a quasi-experimental study

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Abstract

Purpose – This study aims to examine the effects of a self-management program (SMP) on self-care behavior, blood pressure and quality of life among older adults with uncontrolled hypertension.

Design/methodology/approach – A quasi-experimental design with repeated measures was conducted in two primary care units in Krabi, Thailand. One hundred and fifty-six older adults with uncontrolled hypertension were selected based on the inclusion criteria and divided into experimental and control groups with 78 participants in each. The experimental group received the SMP, including the intervention related to the self-management process (from the 1st to 4th weeks) and a follow-up phase (from the 5th to 16th weeks). The control group received standard care. The outcomes were measured over time, including self-care behavior (baseline, 4th and 16th weeks), blood pressure (baseline, 4th, 8th, 12th and 16th weeks) and quality of life (baseline and 16th week).

Findings – The generalized estimating equations showed that the SMP, compared with the control group, statistically significantly improved self-care behavior ($p < 0.001$), decreased blood pressure ($p < 0.001$) and improved quality of life ($p < 0.001$) at the 16th week.

Originality/value – The SMP improved the self-care behavior, decreased blood pressure and improved the quality of life among older adults with uncontrolled hypertension. Registered nurses could administer this program for long-term benefits and help reduce the burden on primary care services.

Keywords Self-management program, Self-care behavior, Blood pressure, Quality of life, Older adults with uncontrolled hypertension

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Introduction

Uncontrolled hypertension among older adults (BP ≥ 140/90 mmHg) is a leading cause of morbidity and mortality worldwide [1]. In Thailand, the prevalence rate of uncontrolled hypertension among older adults is nearly double the rates of younger adults [2]. Uncontrolled hypertension has a direct adverse impact on older adults because it is linked to the development of complications such as cardiovascular, cerebrovascular and end-stage renal diseases [3]. Effective treatment exists for the management of hypertension including both non-pharmacological and pharmacological approaches. These therapies could also help delay or prevent the risk of hypertensive complications when persons strictly adhere to their self-care behavior [4].

Self-care is the abilities of a person to perform important activities in order to improve health or prevent disease [5]. In hypertension, self-care behavior in controlling blood pressure comprises dietary changes, sodium restriction, exercise, stress relaxation and taking medication [4]. Despite the availability of effective hypertension treatment, uncontrolled hypertension among older adults with inappropriate self-care behavior still exists [6]. Thus, research on intervention is needed in order to improve the meaningful outcomes for older adults with uncontrolled hypertension.

Among intervention research, self-management is a well-known theoretically-based nursing intervention for improving the health outcomes of chronic illnesses [7]. Self-management is continual process of share decision-making and responsibility among patients and their family for handling chronic conditions [8]. Self-management including knowledge and belief, self-regulation skills and social facilitation was associated with improving self-care behavior [8, 9]. Previous studies illustrated self-management has an important role in increasing self-care behavior in persons with uncontrolled hypertension [10–14], reducing high blood pressure [10–14] and improving the quality of life [13]. During the past decades, most SMPs only focused on persons with uncontrolled hypertension through activities like health education [13], small group discussions for setting goals, decision-making and action planning [12] and a combination of health education, group discussions and telephone follow-ups [10, 11, 14]. However, the ability in older persons to solve problems with self-management skills diminish when they are older [15]. They also need support from family caregivers along with self-management [16].

Although recent evidence has indicated these SMPs emphasizing both older adults and family caregivers could potentially improve hypertensive outcomes [10, 17], few studies of family caregivers involved in motivating persons with uncontrolled hypertension to adhere to self-care behavior a part of the SMPs [10, 17, 18]. The level of motivation in each previous study was different [10, 17, 18]. Rujiwatthanakorn and colleagues' study that used the motivation from family caregivers found that persons with uncontrolled hypertension did not receive sufficient support from their family caregivers [18]. Therefore, more active involvement of family caregivers is also needed in order to help persons with uncontrolled hypertension have sustainable health behavioral changes. The individual and family self-management theory (IFSMT) plays an important role in the changes to the family's dynamics and helps the health outcomes be successful [8]. IFSMT was selected for this study because most Thai older adults have lived with family caregivers who have been taking care of older persons appropriate in Thai context [16]. This study examined the effects of the SMP on self-care behavior, blood pressure and quality of life among older adults with uncontrolled hypertension.

Methods

A quasi-experimental design with repeated measures was conducted from December 2018 to May 2019. From seventy-two primary care units within Krabi, a province of the Southern part of Thailand, two of them were selected due to the high level of hypertensive prevalence.

The primary care units were allocated to either the control or experimental group by a simple random sampling method. Both primary care units were similar in terms of the hypertensive treatment guidelines [4].

A purposive sample of older adults with uncontrolled hypertension was obtained. The inclusion criteria were aged 60 years or older with a history of mild to moderate hypertension, determined as having uncontrolled hypertension (BP $\geq$ 140/90 mmHg) at the time of enrollment, no severe complications; cognitive morbidities; or depression, mildly dependent to independent in the activities of daily living, able to use a telephone and take responsibility for their own medication, a marginal to adequate health literacy, access to a telephone, ability to communicate in the Thai language and having a primary family caregiver determined by older adults with uncontrolled hypertension. The inclusion criteria for the family caregivers were aged 18 years or older, being a primary family caregiver living in the same home, access to a telephone and ability to communicate in Thai. Both older adults with uncontrolled hypertension and their family caregivers who had similar characteristics, but were already exposed to some education programs were excluded.

The sample size was determined by the G*power program version 3.1 [19]. An effect size (f^2) = 0.15 with correlation among the repeated measures (r) = 0.16 [13] were set at α = 0.05 and the power = 0.80. Thus, the sample size of 156, or 78 in each group, was required for this study. Generally, the effect size would be calculated from each outcome. The effect size on self-care behavior (f^2) = 0.20 [13] equaled the sample size of 52 per group; however, the effect size on blood pressure and quality of life (f^2) = 0.15 resulted in the sample size to equal 78 per group. Thus, the sample size from 52 to 78 should be considered sufficient.

Intervention program

The SMP was developed based on the IFSMT. It was composed of two phases including the intervention phase related to the self-management process (from the 1st to 4th weeks) and a follow-up phase (from the 5th to 16th weeks). Table 1 shows the details of the activities related to the program. The feasibility of this program was examined for objective congruence by five experts: three nurse instructors specializing in self-management, older adults and hypertensive care, a clinical nurse specialist experienced in hypertensive care and a physician specialized in hypertensive care. The index of congruence was 1.00.

Outcome measurements

The outcome measurements were used for the data collection at each time point, including the Demographic Data Form (baseline), the Self-Care Behavior for Older Adults with Hypertension Questionnaire (SCBOAHQ) [baseline, 4th and 16th weeks], an automatic blood pressure measurement (baseline, 4th, 8th, 12th and 16th weeks) and the World Health Organization Quality of Life-BREF THAI (WHOQOL-BREF THAI) [baseline and 16th week].

The Demographic Data Form: was semi-structure interviewed and was composed of a 12-item including gender, age, marital status, education, religion, occupation, income, sources of income, adequacy of income, sources of support, duration of hypertension, received medication and underlying diseases.

The SCBOAHQ: developed by Chaikul [10] was composed of a 37-item with a 4-point Likert scale (1 = "Never" and 4 = "Always"). A 15 - item was reversed. It was composed of four dimensions including diet, exercise, stress management and medication. The content validity of the original scale was 0.80 and the Cronbach's alpha was 0.78 [10]. The Cronbach's alpha of this current study was 0.84 (the pilot) and 0.92 (the overall study).

An automatic blood pressure measure (Omron HEM-9200T): was used along with the standard guideline of measuring blood pressure [4]. It was calibrated before monitoring the blood pressure and during the study once a month.

Time	Participants	Activities
Intervention phase		
1st week: Session 1 (60 mins)	Older adults/Family caregivers	(1) Ten older adults/family caregivers participating in group discussion to assess knowledge and health beliefs regarding hypertension and health education via VDO (Southern language) developed by researchers from literature review (2) Individual discussion related to setting goals, decision-making and action plans (3) Provided a self-care behavior booklet developed by researchers from literature review
1st week: Session 2 (30 mins)	Family caregivers	(1) Extra session for coaching family caregivers concerning monitoring older adults with uncontrolled hypertension in terms of self-care behavior to help this group of older adults adhere to self-care behavior and give feedback on patients' self-care behavior
2nd, 3rd weeks (15 mins)	Older adults/Family caregivers	(1) Telephone follow-up asking older adults to share experiences and compare goals (2) Telephone follow-up asking family caregivers to continually monitor older adults' self-care behavior
4th week (60 mins)	Older adults/Family caregivers	(1) Ten older adults/family caregivers participating in group discussion for self-reflection about their action plan (2) Review eating choices (Southern-style diet), focusing on sodium limitations by demonstrating sodium measurements in food (3) Ten older adults/family caregivers participating in group discussion regarding sodium restriction strategies (4) Skills training on reading instant food labels
Follow-up phase		
6th, 10th and 14th weeks (15 mins)	Family caregivers	(1) Telephone follow-up asking them to monitor older adults' self-care behavior and offer older adults support
8th and 12th weeks (60 mins)	Older adults Family caregivers	(1) Monthly group meetings for self-evaluation and self-reflection (2) Review knowledge of hypertension via VDO (Southern language)

Table 1.
Summary of the self-management program

The WHOQOL-BREF THAI: developed by WHO and translated into Thai language by Mahatnirunkul [20] was composed of a 26-item with a 5-point Likert scale (1 = "Never" and 5 = "Always"). A 3 - item was reversed. It was composed of four dimensions including physical, psychological, social relationships and environment. The content validity of the original scale was 0.65 and the Cronbach's alpha was 0.84 [20]. The Cronbach's alpha of this current study was 0.86 (the pilot) and 0.90 (the overall study).

Ethical considerations

This study was approved by the Human Research Ethics Committee of the Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Thailand (COA No. MURA 2018/957).

Data collection

Two research assistants were trained in data collection by the principle investigator. The objectives and methods of this study were explained to the research assistants, who then received the questionnaire and instructions for collecting the data, were given an automatic

blood pressure measurement and were trained in blood pressure measurement in accordance with the guidance of the Thai Hypertension Society. After the training, the research assistants were required to perform data collection in real-life situations in order to demonstrate their understanding of the instructions. The inter-rater reliability was 0.92. The demographic data and baseline measurement were completed by the research assistants. The participants in the control group were provided the standard care for hypertensive treatment by the nurses, while those in the experimental group received the SMP from the researchers. The post-tests were obtained at different time points (Figure 1).

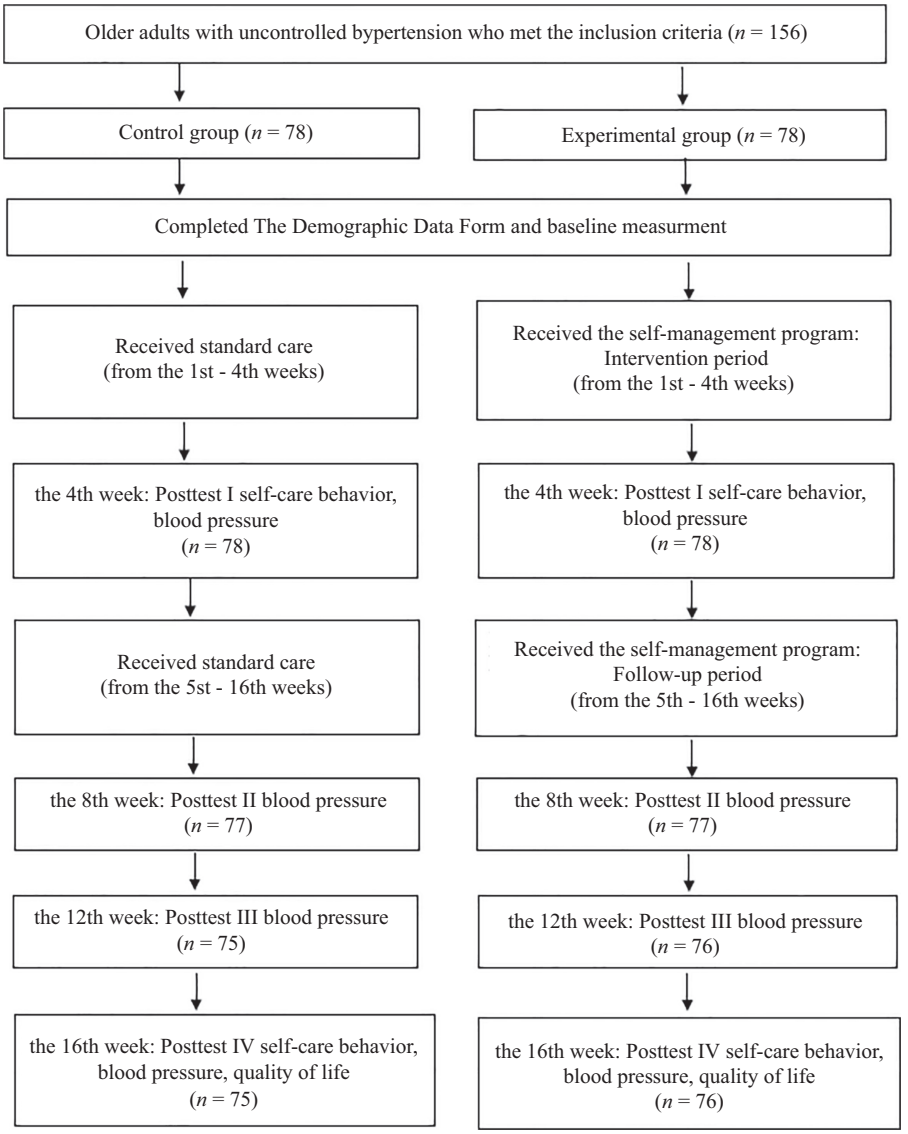

Figure 1.
Flow chart of data collection

Data analysis

The SPSS statistical package version 18.0 was employed for the data analysis. Descriptive statistics analyzed the demographic data, and *t*-test was used to analyze the mean differences of the health outcome variables at the baseline. Generalized estimating equations (GEEs) were performed to compare the self-care behavior, blood pressure and quality of life between the experimental and control groups, as well as the differences between the points of measurement.

Results

There were 156 older adults with uncontrolled hypertension that met the criteria and enrolled in the study. Fifty percent of them were recruited to the experimental group. Most participants were females. The average age was 71.40 ± 7.30 years in the control group while the average age of those in the experimental group was 70.00 ± 6.20 years. There were no demographic differences between the two groups at the baseline. During the follow-up phase, 3.84% ($n = 3$) of the control group as opposed to 2.56% ($n = 2$) of the experimental group dropped out due to falling and moving to other villages. The self-care behavior did not significantly differ between the two groups at the baseline (Table 2). The total mean score for the self-care behavior in the experimental group was significantly higher than that in the control group at the 4th and 16th weeks. Furthermore, the mean scores of all of the dimensions were significantly higher than those in the control group at the 4th and 16th weeks. The results of the GEEs also showed that the SMP, compared with the control group, significantly increased the self-care behavior score by 35.27 points ($\beta = 35.27$; 95% CI: 31.48–39.07; $p < 0.001$) at the 16th week. The SMP, compared with the control group, was also significant over time in all dimensions.

Variables	Baseline ($n_c = 78$; $n_e = 78$) *M* (SD)	Program completion 4th week ($n_c = 78$; $n_e = 78$) *M* (SD)	Follow-up 16th week ($n_c = 75$; $n_e = 76$) *M* (SD)	β	95% CI	*p*-value
Self-care behavior						
Control	103.23 (13.03)	102.01 (13.59)	101.13 (10.92)	–	–	–
Experimental	100.10 (11.77)	130.35 (7.79)	133.29 (8.43)	35.27	31.48–39.07	<0.001*
Diet						
Control	41.26 (4.49)	40.49 (4.65)	40.39 (4.14)	–	–	–
Experimental	40.03 (4.65)	52.79 (3.00)	51.95 (3.30)	12.83	11.11–14.55	<0.001*
Exercise						
Control	17.86 (7.66)	17.51 (8.10)	16.97 (7.46)	–	–	–
Experimental	16.37 (7.99)	29.01 (6.16)	31.61 (5.80)	16.00	13.62–18.37	<0.001*
Stress management						
Control	23.27 (2.61)	23.01 (2.02)	23.29 (2.34)	–	–	–
Experimental	22.77 (2.70)	26.03 (1.63)	26.59 (1.32)	3.80	2.78–4.81	<0.001*
Taking medication						
Control	20.85 (3.33)	21.00 (3.07)	20.48 (3.19)	–	–	–
Experimental	20.94 (1.45)	22.51 (.92)	23.14 (0.76)	2.62	1.87–3.36	<0.001*

Note(s): n_c = control group; n_e = experimental group; β = unstandardized beta coefficient; CI = confidence interval, *$p < 0.001$

Table 2.
Comparison of self-care behavior over time between the two groups by using generalized estimating equations

In terms of clinical outcomes, both the systolic (SBP) and diastolic (DBP) blood pressures did not significantly differ between the two groups at the baseline (Table 3). The average SBP in the experimental group was significantly lower than that in the control group immediately after the program's completion at the 4th week. The effects of the program on the average SBP in the experimental group were maintained from the 8th to 16th weeks. The average DBP in the experimental group was significantly lower than that in the control group at the 8th week with the effects being maintained from the 8th to 16th weeks. The GEE analysis also showed that the program, compared with the control group, decreased the SBP by 14.76 mmHg ($\beta = -14.76$; 95% CI: –18.43 to –11.09; $p < 0.001$) and DBP by 8.34 mmHg ($\beta = -8.34$; 95% CI: –12.00 to –4.68; $p < 0.001$) at the 16th week, respectively.

Moreover, the quality of life did not significantly differ between the two groups at the baseline (Table 4). The mean scores for the quality of life and all the domains in the experimental group were significantly higher than those in the control group at the 16th week. The GEEs analysis also showed that the program, compared with the control group, significantly increased the quality of life score by 9.67 points ($\beta = 9.67$; 95% CI: 6.62–12.71; $p < 0.001$) at the 16th week. The significant changes in the scores were found in all dimensions at the 16th week.

Discussion

The SMP had a positive impact on many hypertensive outcomes. Self-care behavior and each dimension significantly improved over time when compared to the control group. The program provided a structure for the sessions and yielded significant positive changes over time. A number of previous studies on hypertension reported that SMPs were effective in improving the self-care behavior of Thai persons with uncontrolled hypertension [10, 12, 14, 18]. The results of the present study differed from the previous studies that discovered that there was a decrease in self-care behavior regarding the long-term effects [13]. A possible reason for the inconsistency was that the previous studies used different activities from the present study; such as, health education, small group discussions, group goal setting and action plans that focused only on persons with uncontrolled hypertension without telephone follow-ups. In contrast, the present study was designed to include health education, skills training by allowing older adults with uncontrolled hypertension and their family caregivers to participate in every activity, coaching family caregivers about the care of older adults with uncontrolled hypertension at home, monthly small group meetings and providing individual consultation during the telephone follow-ups. The advantage was that when an older adult with uncontrolled hypertension performed his/her self-care behavior in the long term, he/she would continuously receive support from the family caregivers. The family caregivers showed their competency in supervising older adults with uncontrolled hypertension when ineffective self-care behavior was performed. Thus, these activities might contribute to helping older adults with uncontrolled hypertension sustain their self-care behavior.

Moreover, the program was directly associated with changes in the clinical value of the blood pressure. Older adults with uncontrolled hypertension and their family caregivers received health education that focused on providing knowledge and skills training of self-management related to self-care behavior based on their culture. Through these activities, older adults with uncontrolled hypertension were able to adjust their beliefs in positive ways, which could consequently result in changes in self-care behavior; such as, improving adherence to the therapy and the potential impacts on the variables involved with the disease, including blood pressure. This was in agreement with the IFSMT, which suggested that it was more likely that persons would perform the suggested health behavior if the information

Table 3.
Comparison of blood pressure over time between the two groups by using generalized estimating equations

Variables	Baseline (n_c = 78; n_e = 78) *M* (SD)	Program completion 4th week (n_c = 78; n_e = 78) *M* (SD)	Follow-up 8th week (n_c = 77; n_e = 77) *M* (SD)	Follow-up 12th week (n_c = 75; n_e = 76) *M* (SD)	Follow-up 16th week (n_c = 75; n_e = 76) *M* (SD)	β	95% CI	*p*-value
SBP								
Control	150.88 (6.22)	149.64 (7.21)	150.00 (9.89)	150.05 (9.18)	149.17 (9.17)	–	–	–
Experimental	150.23 (7.10)	136.05 (11.34)	133.05 (9.87)	133.93 (10.64)	133.91 (13.30)	–14.76	–18.43–11.09	<0.001
DBP								
Control	82.96 (9.47)	82.13 (8.65)	82.73 (10.35)	83.51 (8.65)	86.35 (9.44)	–	–	–
Experimental	81.91 (9.36)	80.01 (9.20)	77.21 (8.37)	78.21 (9.48)	77.03 (9.21)	–8.34	–12.00–4.68	<0.001

Note(s): n_c = control group; n_e = experimental group; β = unstandardized beta coefficient; CI = confidence interval, *$p < 0.001$

Variable	Group	Baseline (n_c = 78; n_e = 78) *M* (SD)	Follow-up 16th week (n_c = 75; n_e = 76) *M* (SD)	β	95% CI	*p*-value
Quality of life						
Control		87.71 (9.45)	87.88 (7.89)	–	–	–
Experimental		87.65 (11.52)	105.20 (12.38)	9.67	6.62–12.71	<0.001
Physical health						
Control		23.29 (4.11)	22.97 (2.89)	–	–	–
Experimental		23.24 (3.68)	27.92 (3.84)	4.99	3.82–6.16	<0.001
Psychological						
Control		23.09 (2.50)	23.24 (2.49)	–	–	–
Experimental		23.23 (2.81)	25. 49 (2.89)	2.11	1.12–3.09	<0.001
Social relationships						
Control		12.42 (1.33)	11.51 (1.56)	–	–	–
Experimental		12.45 (1.52)	13.24 (1.62)	1.79	1.21–2.37	<0.001
Environment						
Control		28.90 (4.33)	26.56 (3.55)	–	–	–
Experimental		28.73 (5.74)	30.66 (4.41)	4.33	2.88–5.78	<0.001

Note(s): n_c = control group; n_e = experimental group; β = unstandardized beta coefficient; CI = confidence interval, *p < 0.001

Table 4. Comparison of quality of life over time between the two groups by using generalized estimating equations

about the behavior was available and the health beliefs that they embraced were consistent [8]. The impact of the SMP was maintained during the follow-up phase. This might be related to the regular continuous self-care behavior of older adults with uncontrolled hypertension and complied with the previous study, in which it was found that the effects of a SMP maintained the SBP over 12 weeks [14]. However, there were significant time-dependent changes in the DBP than the SBP. This demonstrated that the pathophysiology of the vascular system in older adults and the duration of the program affected the reduction of the DBP. In hypertension, the DBP was related to changes in the increased total peripheral resistance and increased afterload, which were related to microvascular alterations; such as, abnormalities in the decreased vasodilation reserve, the functional and structural network rare faction, the vasomotor tone and the modified wall-to-lumen ratio of the arterioles that would be larger [3]. Consequently, the reduction of the DBP would depend on the point in time [21].

The program also improved the quality of life and all the domains. The SMP focused on improving the participants' cognitive processes by learning problem-solving and self-regulation skills. These methods were able to help older adults have better self-care behavior and reduced their blood pressure due to the continuous performance of their self-management skills. Therefore, they realized their capacity to better control the disease owing to a reduction in their blood pressure, which represented improved results after their adjustments in healthcare. Consequently, older adults perceived that they were able to live well with hypertension. This was relevant with the previous study that found the SMP improved the quality of life of persons with uncontrolled hypertension [13].

Although the number of essential advantages involved cultural considerations, health education, individualized goal setting with action plans, integration of the family caregivers in the program and the utilization of standardized measurement instruments were strengths of the study, the limitations should also be considered when interpreting the research

findings. First, the majority of participants had at least marginal health literacy or above. Thus, it may be impossible to generalize the findings to include older adults with uncontrolled hypertension who have inadequate levels of health literacy. Second, most participants were young-old and middle-old, so generalizing the findings may prove difficult for older adults (aged > 80 years). Third, the short-term treatment outcomes were evaluated at only the 16th week. Fourth, the purposive sampling technique (non-randomized sampling) might limit the generalizability of the findings. The further studies could be undertaken on the effects of the SMP among older adults with uncontrolled hypertension that have inadequate health literacy, and the long-term effects of the program should be determined at 6 and 12 months after the program's completion. A randomized control trial should also be conducted for determining the SMP. Lastly, the family caregivers' outcomes from the program should be taken into consideration, e.g., knowledge, family burden and satisfaction.

Conclusion

The SMP, developed from IFSMT, improved the self-care behavior, decreased blood pressure and improved the quality of life among older adults with uncontrolled hypertension. Registered nurses could administer this program into the regular service of hypertension clinics for long-term benefits and help reduce the burden on the primary care services. The model of the SMP could be applied in the primary care units of rural areas.

Conflict of Interest: None

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