Effect of a Goal Attainment Nursing Program on Self-management and Blood Pressure Control in High-risk Hypertensive Patients in a Primary Care Unit

Chontida Ladee, MNS*, Sunee Lagampan, Ed.D.*, Panan Pichayapinyo, Ph.D.*, Korapat Mayurasakorn, M.D., FRCFPT, Chalita Lagampan, M.D.*****

**Department of Public Health Nursing, Faculty of Public Health, Mahidol University, Bangkok 10400, **Department of Health Research and Development, Siriraj Medical Research Center, Mahidol University, Bangkok 10700, ***Department of Internal Medicine, Chonburi Hospital, Thailand.*

ABSTRACT

Objective: To determine the effects of goal attainment in nursing programs among hypertensive patients who are at high-risk to cardiovascular disease.

Methods: A quasi-experimental study was conducted in a primary care unit setting. Eligible participants included hypertensive patients aged 35 years and above with poorly controlled blood pressure and accompanying risk factors for cardiovascular disease. Seventy-eight participants were divided evenly into two groups via simple random sampling. The experimental group participated in a 10-week program consisting of small group education/demonstration sessions focused on goal setting and self-management behavior. These participants also received a follow-up phone call and text messages that served as reminders/reinforcements. The control group received routine care only, which included appropriately consultation with health care providers.

Results: The proportion of participants who achieved optimal blood pressure control (SBP < 140 mmHg) in the experimental group (80.6%) was greater than the control group (44.1%) (p-value < 0.05). In addition, the systolic blood pressure of the experimental group ($\bar{x}$ 131.33 mmHg, S.D. 12.09) was significantly lower than that of the control group ($\bar{x}$ 142.96 mmHg, S.D. 15.77) (p-value < 0.05). The mean scores for self-management behavior were significantly higher in the experimental group ($\bar{x}$ 106.14, S.D. 14.43) than the control group ($\bar{x}$ 83.21, S.D. 8.17) (p-value < 0.05).

Conclusion: The goal attainment nursing program targeting behavior modification through empowerment was effective in improving self-management behavior among hypertensive patients at high risk for cardiovascular disease. Thus, this program can be applied to patients with uncontrolled chronic diseases.

Keywords: Self-management; hypertension; cardiovascular disease; goal attainment; behavior modification (Siriraj Med J 2020; 72: 140-150)

INTRODUCTION

Cardiovascular disease (CVD) is the world leading cause of death claiming roughly 17.9 million per annum. In view of this staggering statistic, the World Health Organization supports governments worldwide in preventative efforts.[1] Hypertension is a significant risk factor for CVD. There is broad evidence from longitudinal observational studies and meta-analyses of RCTs that

Corresponding author: Sunee Lagampan
E-mail: sunee.lag@mahidol.ac.th
Received 3 April 2019 Revised 30 May 2019 Accepted 7 June 2019
ORCID ID: http://orcid.org/0000-0002-8056-6754
http://dx.doi.org/10.33192/Smj.2020.19

the BP-related risk for CVD is determined by systolic blood pressure (SBP) of approximately 115 mmHg.[2] In previous findings, the majority of CVD events presented in patients with blood pressure (BP) > 140/90 mmHg. However, more recent studies have found that most CVD events occur in patients with BP < 140/90 mmHg. Similarly, according to a study conducted in the early 2000s, hypertension can lead to CVD events with coronary heart disease at 63 percent, stroke at 63 percent and heart failure 60 percent.[3] This illustrates the need for early detection and management of high-risk hypertensive patients to avoid CVD complications.

Lifestyle factors that lead to increased risk for CVD are well-known (poor diet quality, physical inactivity, tobacco use, increased blood pressure). Prevention programs often seek to address these factors through education and behavior modification. Interventions that have proven effective in combating hypertension include education on the aforementioned risk factors, physical activity with aerobic exercise and implementation of a DASH diet (limiting sodium consumption to less than 2,300 mg daily).[4-6] Regular blood pressure monitoring and medication adherence are also important for disease control.[7-9] Based on RCT evidence, hypertensive patients with systolic blood pressure of 130-139 mmHg who are at high risk for CVD should receive both lifestyle modification and BP-lowering medication.[2]

A previous study found that blood pressure (BP) self-monitoring resulted in lower systolic blood pressure. There is promise in interventions promoting self-management behavior in achieving proper BP control to lower the incidence of cardiovascular disease.[8] More research is needed to evaluate the benefits of group education programs with assessment of risk factors and information on lifestyle modification. Further studies are also required to determine optimal ways to overcome the barriers to engagement between patients and providers in these programs.[10] Home blood pressure (HBP) monitoring with weekly telephone follow-ups can effectively track measurements. In addition, telephone consultation is also useful in tracking HBP related to BP control. In this way, health providers can easily follow patients' BP at home.[7,23] Thus, interventions can also undertake a technology-mediated approach for ancillary follow-up with tele-counseling or tele-monitoring.[11]

In this study, a 10-week goal attainment nursing program was designed for hypertensive patients at high-risk for CVD at a primary care unit in Siriraj Hospital. Empowerment and self-management of hypertension were the fundamental elements of the program. The study aimed to determine the effects of the program on self-management behavior to prevent cardiovascular disease and decrease systolic blood pressure.

MATERIALS AND METHODS

Research Design

The present study was a quasi-experimental research with two groups in a pretest-posttest design conducted at a primary care unit (Siriraj Hospital) in Bangkok, Thailand, from May to August 2018.

Participants

Hypertensive individuals with follow-up appointments between May and August 2018 were recruited.

Inclusion Criteria:

1. Diagnosis of hypertension at least six months prior to the study
2. SBP over 130 mmHg and/or DBP over 85 mmHg
3. Prescription of at least one antihypertensive drug
4. At least one of the following additional cardiovascular risk factors:
    a) Family history of CVD
    b) Smoking
    c) Diagnosis with DM
    d) Hyperlipidemia (any of the following: total cholesterol > 200 mg/dL, triglycerides > 150 mg/dL, low-density lipoprotein > 130 mg/dL, high-density lipoprotein < 40 mg/dL)
    e) Overweight (body mass index > 25 kg/m^2 or waist circumference > 90 cm in males and > 80 cm in females)[12]
5. Personal mobile phone; Thai language literacy

Exclusion Criteria:

1. Pre-existing cardiovascular complications
2. Referral to special treatment without returning to the primary care unit

Sample Size Calculation

The researchers used the effect size of a previous study based on systolic blood pressure outcome.[13] The calculation showed that d is 1.24, which is higher than 0.8 and a good effect size.[14] The sample size for the present study was derived through power analysis (alpha = 0.05 with 80% power). The G power program (Version 3.1.9.2)[15] determined that the total sample size should be 70 people. In this study, the researchers increased the sample size by 10 percent to account for the drop-out rate. Thus, 78 participants were subsequently and evenly divided into the experimental and control groups by simple random sampling.

Ethics

This study was approved by the Human Research Protection Unit, Faculty of Medicine Siriraj Hospital at Mahidol University, Bangkok, Thailand (Si 201/2018). The protocol number is 079/2561(EC4), and all participants signed informed consent forms. (TCTR identification number: TCTR20190402001)

Recruitment

Eligible participants were screened from electronically recorded data (Medtrack system). The participants successfully recruited in odd-numbered weeks were assigned to the experimental group via simple random sampling; those recruited in even-numbered weeks were assigned to the control group.

Patients were invited to participate in the study after blood pressure measurements had been taken. Then the objectives, duration, and risks involved in the study were explained. Confidentiality issues were also addressed. The subjects who agreed to participate then voluntarily completed and signed the consent forms. (Fig 1)

Intervention

Experimental Group

The researchers developed a 10-week goal attainment nursing program to prevent cardiovascular diseases in hypertensive patients. This program emphasized goal attainment and promotion of self-management behavior. The initial process began with interactions to identify the barriers and common health problems with information about CVD risk factors. The program then created goals for the patients. Implementation of the aforementioned goals led to encouraging self-monitoring, recording and evaluating of goals. The difficulties and physical outcomes were tracked and supported for ten weeks via telephone follow-ups. At the last session, the patients received feedback on behavior modification and evaluation of goal achievement in a discussion group.

All of these processes improved the continued interactions between nurses and patients. The program included two education sessions in a small group, two follow-up text message reminders, and a 10-minute personal follow-up telephone call. During the group education sessions, activities were conducted in each sub-group of 4-6 patients. (Table 1)

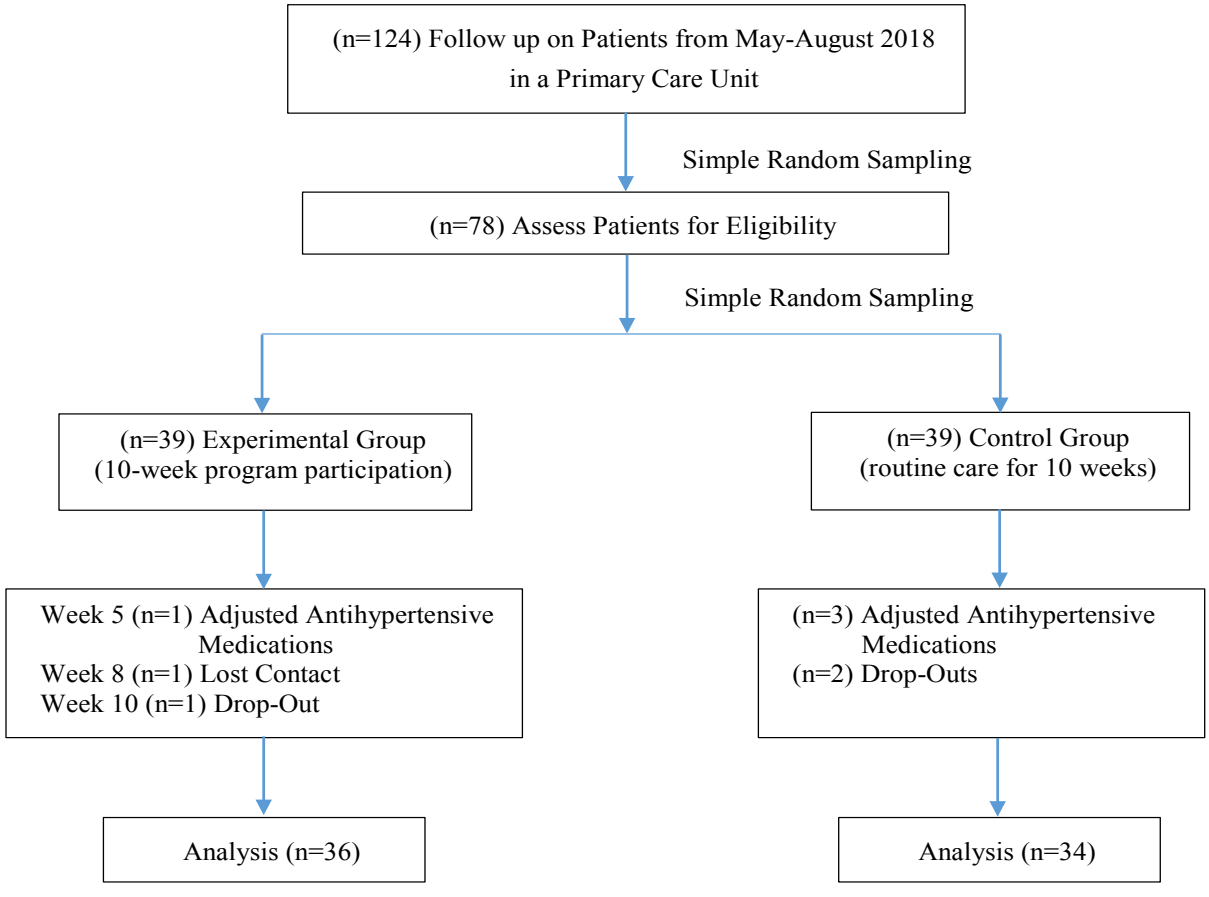

Fig 1. Flow Chart of Research Process.

TABLE 1. Program activities.

Session	Purpose	Activities
Week 1		
Nurse-patient interaction process (30 minutes)	1. To build rapport and share information on health problems.	**Sub-group small-talk** - Patients reveal individual obstacles to controlling disease.
Collaborative goal-setting process (2 hours)	1. To collaborate on setting goals for behavior modification.	**Sub-Group Education** - Lecture on CVD risks, provision of adequate information using the PowerPoint program, video content and a guidebook developed by the researchers. - Patients set short- and long-term goals by collaborating with the researchers. - Discussion about appropriate solutions on how to achieve set goals.
	1. To encourage self-management to facilitate patients in achieving behavior modification. 2. To provide essential information on CVD and how patients can improve completely for behavior modification.	**Sub-Group Education** - Coaching on self-management skills in various aspects including nutrition, exercise, compliance with hypertensive medication, avoidance of CVD risks and home-BP monitoring. - Practicing self-monitoring, evaluation and reinforcement by using handbooks to keep records. - Researchers guided patients on practical action to achieve short- and long-term goals.
Week 3		
Transaction process	1. To continue communication with patients by promoting constant behavior modification through text messages.	**Text reminders** are sent individually.
Week 5		
Transaction process	1. To follow progress towards established goals, and to address any potential barriers to change. 2. To track home-BP measurement and follow monitoring of goal achievement.	**Personal Follow-Up Telephone Calls:** (10 minutes per patient) by following a self-recorded handbook. - Researchers allow patients to reveal prideful feelings regarding reach optimal BP (<140/90 mmHg) and improve self-confidence on BP-control. - Barriers to behavior modification are clarified and solves with feasible methods to change former habits.
Week 7		
Transaction process	1. To continue communication with patients by promoting constant behavior modification through text messages.	**Text reminders** are sent individually.
Week 10		
Evaluating the goal achievement process (2 hours)	1. To reflect on changeable behaviors and BP control for the ten-week period. 2. To evaluate goal achievement: self-management behavior and physical outcomes. 3. To discuss health information, share obstacles and achievable behavior modification.	**Sub-Group Small-Talk** - Patients review goals and their respective accomplishments e.g. physical outcomes, alterations of self-management behavior. - Weekly self-recording on nutrition, exercise and blood pressure are reviewed and compared through participation in the program. - Researchers provide individualized feedback at the end of the session.

Control Group

During the 10-week sessions, patients received routine nursing care at the primary care unit, obtaining a self-management guidebook to prevent cardiovascular disease in the first week for self-study at home. At the end of the program, the patients received recommendations and five to ten minutes of individualized counseling on behavior modification.

Measurements

Part 1: Demographic Data

Demographic information on gender, age, marital status, religion, education level, occupation, and monthly income was obtained from all of the participants. Anthropometric indices (body weight and waist circumference) were collected at baseline. The baseline blood pressure (SBP, DBP) was collected pre- and post-program for comparison. The researchers also obtained participants' medical history for the duration of hypertensive illness, antihypertensive medications, comorbidities, CVD risks, alcohol consumption, smoking, and exposure to secondhand smoke.

Part 2: Self-Management Behavior for CVD Prevention

Lifestyle practices were evaluated by using a questionnaire on self-management behavior to prevent CVD with 35 items composed of dietary intake (11 items), physical activity (7 items), medication (5 items), avoidance of CVD risks (5 items) and home BP monitoring (7 items) with both positive and negative questions. The questionnaire was developed based on the literature review of research on the following topics: 1) self-management promotion program for health behavior in hypertensive patients[16]; 2) self-management behavior questionnaires[17] and 3) medication adherence questionnaires.[18] The responses were rated on 4-point scales by which the participants indicated frequency of consumption by choosing only one category. The frequency was categorized from 1 (never) to 2 (1-2 times/week), 3 (3-4 times/week) and 4 (5-7 times/week). The total scores ranged between 35 - 140 points and Cronbach's alpha coefficient for this questionnaire was 0.81.

Blood Pressure Measurement

BP was measured with a GE Carescape V100 Vital Signs Rolling Stand Monitor. The participants were required to sit and rest for five minutes prior to BP measurement. BP was then measured twice over a period of one minute on the left arm, and the average BP was calculated.

Statistical Analysis

SPSS statistics software (Version 18) was used for data analysis. The significance level was set at .05 by using descriptive statistics (frequency, percentage, mean and standard deviation) for the presentation of the demographic data. Subsequently, a Chi-square test was used for comparison between the experimental and control groups.

Within-group differences in the mean systolic blood pressure and self-management behavior scores were analyzed both pretest and posttest with paired *t*-test; the between-group differences of these markers were analyzed with independent *t*-test. The Kolmogorov-Smirnov Test was used for normality testing for baseline data between the two groups.

RESULTS

Thirty-six subjects remained in the experimental group at the end of the study (attrition rate = 7.7%). One subject was not able to participate in the activities, one patient was prescribed changes in antihypertensive medications, and contact was lost with one patient. Thirty-four subjects remained in the control group (attrition rate = 12.8%). Three subjects were prescribed to new antihypertensive medications, and two patients could not attend the follow-up appointment. Overall, the total attrition rate was 10.3 percent.

There were differences in gender distribution across both groups; 75 percent of the experimental group was female versus 50 percent in the control group. Furthermore, the mean age of the patients in the experimental group was 61.47 (±6.33) years, and the mean age in the control group was 65.29 (±8.42) years. The other demographic characteristics of the experimental and groups showed no statistically significant differences (marital status, religion, education level, employment status, income level) (Table 2).

Both groups had similar health characteristics such as body weight, waist circumference and systolic and diastolic blood pressure prior to participation in the study. The antihypertensive agents prescribed for the participants included diuretics, calcium channel blockers, angiotensin-converting enzymes, angiotensin receptor blockers, beta-blockers and vasodilators with similar prescription among the hypertensive patients in both groups. The groups had similar prevalence of CVD risk behaviors (alcohol consumption, smoking, and secondhand smoke exposure). The majority of the participants in both groups had a total of three CVD risk factors (41.7% in the experimental group, 50.0% in the control group) (Table 3).

TABLE 2. Demographic data of the experimental and control groups.

Characteristics	Experimental Group n (%)	Control Group n (%)	*P*-value
Gender			0.030[a]
Male	9 (25.0)	17 (50.0)	
Female	27 (75.0)	17 (50.0)	
Age			0.035[b]
35-59 years	12 (33.3)	9 (26.5)	
≥ 60 years	24 (66.7)	25 (73.5)	
	($\bar{x}$ = 61.47, S.D. = 6.33, Min = 50, Max = 71)	($\bar{x}$ = 65.29, S.D. = 8.42, Min = 38, Max = 79)	
Marital Status			0.782[a]
Single/Widowed/ Divorced	16 (44.4)	14 (41.2)	
Married	20 (55.6)	20 (58.8)	
Buddhism	36 (100.0)	34 (100.0)	
Education Level			0.352[a]
Lower than secondary school	26 (72.2)	21 (61.8)	
Higher than secondary school	10 (27.8)	13 (38.2)	
Occupation			0.989[a]
Unemployed	19 (52.8)	18 (52.9)	
Employed/business owner/ Farming/sewing	17 (47.2)	16 (47.1)	
Monthly income			0.355[b]
Less than/as 5,000 Baht	21 (58.3)	22 (64.7)	
More than 5,000 Baht	15 (41.7)	12 (35.3)	

[a] = Chi-square testing; [b] = *t*-test

Self-Management Behavior for CVD Prevention

The experimental group had significantly higher mean self-management behavior scores as compared to the control group (106.14, S.D. 14.43 VS 83.21, S.D. 8.17) (p-value < 0.05). Differences were reflected in the mean scores for dietary intake (p-value < 0.05), physical activity (p-value < 0.05), avoidance of CVD risk factors (p-value < 0.05), and home blood pressure monitoring (p-value < 0.05) (Table 4).

Systolic Blood Pressure

Posttest, the mean systolic blood pressure was 131.33 mmHg (S.D. 12.09) in the experimental group and 142.96 mmHg (S.D. 15.77) in the control group. Analysis with independent *t*-test revealed the aforementioned differences to be significant (p-value < 0.05). In addition, the experimental group experienced a greater decrease in systolic blood pressure than the control group (91.7% vs. 70.6%) (p-value < 0.05). More participants in the experimental group achieved optimal systolic blood pressure control (< 140 mmHg) than the control group (80.6% VS 44.1%, p-value < 0.05) (Table 5).

Furthermore, after the participants had taken part in the goal attainment program for ten weeks, the researchers compared the patients who were under blood pressure control in both groups. Optimal or acceptable systolic and diastolic blood pressure levels were defined to interpret who was able to achieve blood pressure control. According to the findings, the experimental group (50.0%) had more patients with blood pressure under 130/80 mmHg than in the control group (20.6%). Moreover, there were also more patients who had achieved blood pressure control at posttest (50.0%) than at pretest (2.8%) in the experimental group (Fig 2).

TABLE 3. Health information of the experimental group and control groups.

Health Information	Experimental Group n (%)	Control Group n (%)	*P*-value
Body Weight			0.879[a]
($\bar{x}$ = 68.75, S.D. =12.03, min=51.40, max=120.00)		($\bar{x}$ = 69.22, S.D. =13.79, min=43.00, max=107.00)	
Waist Circumference			0.143[b]
Normal	3 (8.3)	7 (20.6)	
Over (Male> 90 cm, female> 80cm)	33 (91.7)	27 (79.4)	
Baseline Systolic Blood Pressure			0.269 [a]
130 – 140 mmHg	10 (27.8)	11 (32.4)	
> 140 mmHg	26 (72.2)	23 (67.6)	
($\bar{x}$ = 153.15, S.D.=14.47, min=130.00, max=197.00)		($\bar{x}$ = 149.24, S.D.=14.91, min=130.00, max=196.00)	
Baseline Diastolic Blood Pressure			0.415[a]
≤ 80 mmHg	32 (89.0)	29 (85.3)	
81 – 90 mmHg	2 (5.5)	4 (11.8)	
> 90 mmHg	2 (5.5)	1 (2.9)	
($\bar{x}$ = 75.07, S.D. = 8.08, min = 62.00, max = 101.50)		($\bar{x}$ = 73.38, S.D. = 9.13, min = 60.00, max = 94.00)	
Duration of Hypertensive Illness			0.376[a]
≤ 10 years	26 (72.2)	18 (52.9)	
> 10 years	10 (27.8)	16 (47.1)	
($\bar{x}$ = 8.69, S.D. = 4.18, min = 2, max = 16)		($\bar{x}$ = 9.68, S.D. = 5.02, min = 2, max = 20)	
Anti-Hypertensive Drugs*			
Diuretics	3 (8.3)	7 (20.6)	
Calcium channel blockers (CCBs)	24 (66.7)	25 (73.5)	
Angiotensin Converting Enzymes Inhibitors (ACEIs)	14 (38.9)	18 (52.9)	
Angiotensin receptor blockers (ARBs)	16 (44.4)	9 (26.5)	
Beta-blockers	16 (44.4)	12 (35.3)	
Vasodilators	11 (30.6)	11 (32.4)	
History of Illness			0.282[b]
Only Hypertension	9 (25.0)	5 (14.7)	
Hypertension with co-morbidity	27 (75.0)	29 (85.3)	
Diabetes Mellitus	6 (22.2)	10 (34.6)	
Hyperlipidemia	9 (33.3)1	3 (44.8)	
DM with Hyperlipidemia1	2 (44.5)	3 (10.3)	
Glaucoma/Gout/Malignant Neoplasm of Breast	0 (0.0)	3 (10.3)	
CVD Risks			
2 Factors	6 (16.7)	11 (32.4)	
3 Factors	15 (41.7)	17 (50.0)	
4 Factors	13 (36.1)	5 (14.7)	
5 Factors	2 (5.6)	1 (2.9)	
Alcohol Consumption			0.498[b]
No	32 (88.9)	30 (88.2)	
Yes	4 (11.1)	4 (11.8)	
Smoking			0.204[b]
No	35 (97.2)	31 (91.2)	
Yes	1 (2.8)	3 (8.8)	
Secondhand Smoke Exposure			0.932[b]
No	32 (88.9)	30 (88.2)	
Yes	4 (11.1)	4 (11.8)	

[a] = *t*-test, [b] = Chi-square testing

* = Patients may take more than one drug per person

TABLE 4. The results of self-management behavior for prevention of CVD between the experimental and control groups at pre- and posttest.

Self-Management Behavior for Prevention of CVD	Pretest			Posttest		
	Experimental Group mean (SD)	Control Group mean (SD)	*P*-value	Experimental Group mean (SD)	Control Group mean (SD)	*P*-value
Total scores	78.08 (9.43)	79.24 (7.95)	0.583	106.14 (14.43)	83.21 (8.17)	<0.001
Dietary	22.31 (5.12)	21.82 (3.22)	0.637	29.83 (5.17)	22.68 (3.34)	<0.001
Physical activity	10.72 (3.41)	11.44 (4.33)	0.442	17.89 (5.38)	11.85 (3.38)	<0.001
Medication adherence	16.78 (2.03)	17.62 (2.05)	0.089	18.11 (2.86)	17.97 (1.78)	0.805
Avoidance of CVD risks	15.72 (1.81)	15.24 (2.38)	0.337	17.39 (2.20)	16.35 (2.09)	0.047
Home-BP monitoring	12.56 (3.30)	13.12 (2.46)	0.424	22.92 (4.33)	14.35 (2.60)	<0.001

Independent *t*-test

TABLE 5. Results on changes in systolic blood pressure between the experimental and control groups at the pre- and posttest.

Achievement of SBP Control	Experimental Group n (%)	Control Group n (%)	*P*-value
Pretest			0.114
Controlled (130-139 mmHg)	5 (13.9)	10 (29.4)	
Uncontrolled (≥140 mmHg)	31 (86.1)	24 (70.6)	
Posttest			
Controlled (<140 mmHg)	29 (80.6)	15 (44.1)	0.002
uncontrolled (≥140 mmHg)	7 (19.4)	19 (55.9)	

Chi-square testing

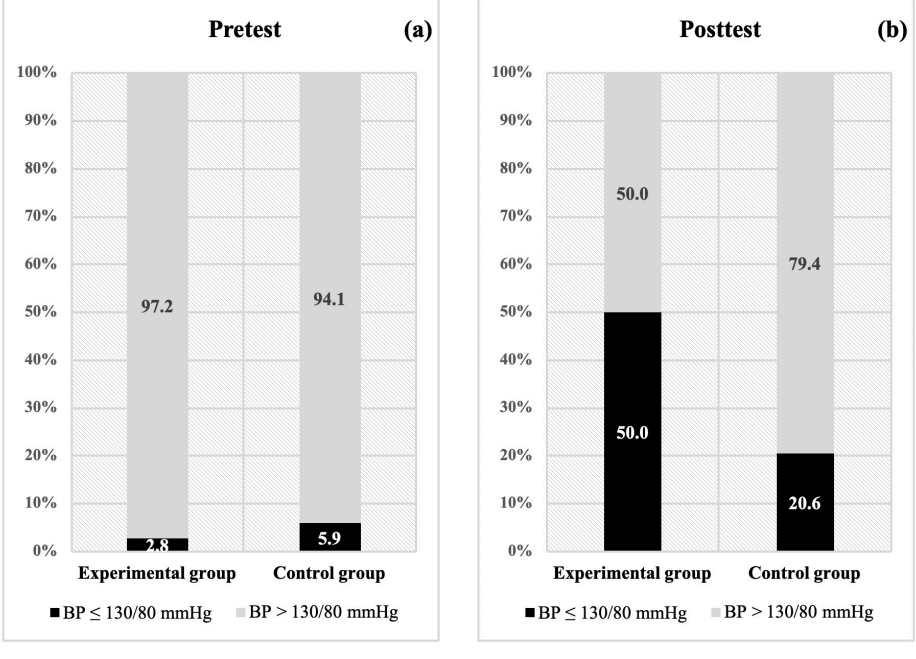

Fig 2. Bar charts illustrating blood pressure control at (a) pretest and (b) posttest in the experimental and control groups.

DISCUSSION

The mean score for the self-management behavior of the participants who took part in the 10-week goal attainment nursing program was significantly higher than that of the control group. A significant intragroup difference in pre-post mean scores was also noted in the experimental group (p-value < 0.05). Furthermore, the experimental group had a considerably higher likelihood to decrease systolic blood pressure than the control group (p-value < 0.05). These findings have positive implications.

Small-group educational activities that facilitated provider-patient interactions were particularly conducive to sharing experiences, perspectives and barriers to engaging in lifestyle changes. The findings are consistent with previous studies on programs for preventing complications in hypertensive patients through knowledge sharing and group discussions.[13,19,20]

During the goal attainment process, nurses provided guidance and feedback in group education. Essential knowledge about dietary intake, physical activity, medication, avoidance of CVD risks and home-BP monitoring were the topics of the lectures. Nurses trained patients by performing demonstrations on self-management: self-assessment, self-monitoring, and self-reinforcement. The most important aspect of the goal attainment process is understanding between nurses and patients. Patients play a role in assessing personal capability and limits in behavior modification. At the same time, nurses repeatedly assess patients. Next, nurses move toward the negotiation step for setting reachable and practical goals. In the aforementioned process, when patients were trying to modify behavior at home, telephone communication was a virtual method for monitoring. Thus, text reminders and follow-up phone calls were given as reinforcements throughout the ten-week period.

The phone calls helped nurses to inquire about the obstacles and problems encountered in behavior modification. If patients were unable to accomplish set goals, this process allowed the nurses and patients to continually interact and share information. The nurses worked as facilitators in guiding patients to adopt more feasible methods. Furthermore, the nurses helped patients by suggesting the setting of more flexible goals such as talking to reduce the frequency of eating brown rice if the practice is not convenient for some meals. The researchers found the follow-up phone calls to build empowerment and self-confidence in patients. The text reminders and phone calls were able to prevent patients from giving up on behavior modification when they were about to fail. On the other hand, when patients are able to meet personal goals, the nurses would offer praise to build self-confidence. Eventually, effective communication helped the patients properly manage behaviors on their own. This activity can benefit healthcare providers in tracking patients immediately and easily while the patients are at home.

According to the World Health Organization, blood pressure should be controlled at less than 130/80 mmHg[2]. Based on the above standard, the program implemented in the present study was effective. One of the reasons for successful achievement over a period of only ten weeks is that the program not only educated patients on essential CVD contents, but the researchers also guided patients on self-management for behavior modification on their own. From the start of the program, the patients needed to be able to assess potential for change in areas such as intention, ability, time and social support. Next, behavior plans were formed by collaborating with nurses in the goal-setting process. Additionally, when patients stayed at home, the nurses would stay in contact with them during the ten-week period. Therefore, teaching about self-management resulted in patients' ability to maintain blood pressure control (blood pressure < 130/80 mmHg).

The findings of the present study are consistent with the results of previous programs emphasizing behavioral goal-setting in combination with the support of a follow-up system.[21] Furthermore, the process in studies which applied the goal-setting to a primary care unit was effective in decreasing blood pressure.[22,24,25] The present study found that encouragement of blood pressure monitoring at home resulted in more effective blood pressure control. The above finding was found to be related to previous studies that trained patients to monitor blood pressure at home. In addition to taking blood pressure measurements, patients need to either record the measurements correctly in a handbook or send the BP readings to health care providers through electronic data sorting.[7,8]

In conclusion, providing interactions between nurses and patients during follow-up appointments at clinics promotes effective communication on goal-setting for behavior modification. In the beginning, and when goals are asserted clearly, patients can modify behavior in the right direction. Moreover, small group education offers more effective learning for patients by sharing information with one another, because small focus group discussions give patients more confidence about revealing personal information in a group setting than having face-to-face consultations with nurses. Furthermore, demonstrations of behavioral practices such as restricting sodium and fat

consumption, estimating daily recommended amounts of vegetables and planning to increase physical activity facilitate patients' comprehension of the content. In particular, BP-monitoring training helps patients learn about the physical outcomes of behavior modification. Teaching patients to read blood pressure levels from a device enables patients to interpret classification by using a color graph and recording in a handbook. Thus, BP-monitoring is beneficial for nurses in continuing to monitor patients' blood pressure management. In addition, follow-up phone calls allow health care providers to follow up on obstacles and blood pressure trends before the next appointment. Overall, the program implemented in the present study is effective in achieving blood pressure management, particularly in out-patient clinics.

Limitations

The findings of the present study show that the context of a program can decrease systolic blood pressure for participants at posttest. According to the demographics of the primary care unit, a 10-week goal attainment program is compatible with participants who routinely come for follow-up appointments every two to three months. This period can further present changes in lowering blood pressure as in previous studies. However, to promote adherence to maintenance of behavior modification, this program should be extended to interventions lasting at least six months based on behavior modification theory.

CONCLUSION

The hypertensive patients at high-risk for CVD who participated in the 10-week goal attainment nursing program for cardiovascular disease prevention (focused on self-management behavior) displayed significant improvement in achieving BP control. These results indicate that the experimental group had a larger decrease in systolic blood pressure than the control group (91.7% vs. 70.6%).

The findings of this study reveal the benefits of blood pressure control in patients by encouraging communication between nurses and patients on collaborative goal-setting. In particular, physical health in blood pressure was clearly stated from the start of the program. The role of the nurse in this program focuses on guidance regarding appropriate methods tailored for individual patients. Moreover, all goals need to be practicable and reachable for patients. This strategy accordingly leads to patients' success in behavior modification and effective blood pressure management. In addition, in the self-management process, nurses can promote the self-blood pressure monitoring of patients and follow up on obstacles during practice. Continuous blood pressure monitoring obviously presents noticeable trends and is easy for nurses to follow. Thus, nurses can continually promote empowerment through text and follow-up telephone calls. These certainly effect on building confidence in blood pressure control.

REFERENCES

1. World Health Organization. Cardiovascular diseases (CVDs) Fact sheet. 2017 [cited 25 December 2018]. Available from: http://www.who.int/mediacentre/factsheets/fs317/en/.
2. Whelton PK, Carey RM, Aronow WS, Casey DE, Jr., Collins KJ, Dennison Himmelfarb C, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Hypertension 2018;71(6):e13-e115.
3. Tajeu GS, Booth JN, 3rd, Colantonio LD, Gottesman RF, Howard G, Lackland DT, et al. Incident Cardiovascular Disease Among Adults with Blood Pressure <140/90 mm Hg. Circulation 2017;136:798-812.
4. Nakkling Y, Rawiworrakul T, Tachaboonsearmsak P, Satheannoppakao W. Effect of self-efficacy theory application on diet control, exercise behaviors and blood pressure among older adults with hypertension. Journal of Boromarajonani College of Nursing 2012;28:1-12.
5. Udompittayarat K. Health Education Program Applying Self-Efficacy Theory to Promote Exercise Behavior in Essential Hypertensive Patients. Veridian E-Journal, Silpakorn University (Humanities, Social Sciences and arts). 2014;7:62-72.
6. Kitaoka K, Nagaoka J, Matsuoka T, Shigemura C, Harada K, Aoi W, et al. Dietary intervention with cooking instructions and self-monitoring of the diet in free-living hypertensive men. Clin Exp Hypertens 2013;35:120-7.
7. Kim J, Han HR, Song H, Lee J, Kim KB, Kim MT. Compliance with home blood pressure monitoring among middle-aged Korean Americans with hypertension. J Clin Hypertens (Greenwich) 2010;12:253-60.
8. McManus RJ, Mant J, Haque MS, Bray EP, Bryan S, Greenfield SM, et al. Effect of self-monitoring and medication self-titration on systolic blood pressure in hypertensive patients at high risk of cardiovascular disease: the TASMIN-SR randomized clinical trial. JAMA 2014;312:799-808.
9. Bureau of non-communicable diseases, Department of diseases control, MOPH, Thailand. Guidelines for assessment cardiovascular risk. 1st ed. Bangkok: WVO Office of Printing Mill; 2014.
10. Harris MF, Fanaian M, Jayasinghe UW, Passey ME, McKenzie SH, Powell Davies G, et al. A cluster randomised controlled trial of vascular risk factor management in general practice. Med J Aust 2012;197:387-93.
11. Park YH, Chang H, Kim J, Kwak JS. Patient-tailored self-management intervention for older adults with hypertension in a nursing home. J Clin Nurs 2013;22:710-22.
12. Bureau of non-communicable diseases, Department of diseases control, MOPH, Thailand. A practical guide for health behavioral modification to reduce multiple risk factors on cardiovascular disease. 1st ed. Bangkok: National Buddhism Printing Office; 2010.

13. Kawthaisong C, Dungsong R. Effects of behavioral development program for stroke prevention among hypertensive patients in Chumpuang Hospital (Chumpuang district, Nakhon Ratchasima province). Srinagarind Med J 2014;29:295-303.
14. Cohen J. Statistical power analysis for the behavioral sciences. 2nd ed. Hillsdale, New Jersey: Lawrence Erlbaum Associates; 1988.
15. Faul F, Erdfelder E, Lang AG, Buchner A. G*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behav Res Methods 2007;39:175-91.
16. Chaikul C. Effects of self-management and family participation enhancing program on health behavior and blood pressure among elderly with hypertension [the degree of Master of Nursing Science (adult nursing)]. Prince of Songkla University; 2014.
17. Akhter N. Self-management among patients with hypertension in Bangladesh [the degree of Master of Nursing Science]. Prince of Songkla University; 2010.
18. Morisky DE, Ang A, Krousel-Wood M, Ward HJ. Predictive validity of a medication adherence measure in an outpatient setting. J Clin Hypertens (Greenwich) 2008;10:348-54.
19. Plaiyod J, Panpakdee O, Taikerd C. Effects of a Promoting Self-Care Participation Program on Perceived Self-Care Ability, Body Weight, and Blood Pressure Control in Persons with Hypertension. Ramathibodi Nursing Journal 2012;18: 223-36.
20. Wongsuwan P, Thiangtham W, Paowatana A, Nanthamongkolchai S. Health promotion program for complications preventing among older persons with hypertension in Bangkok metropolitan. Journal of Public Health Nursing 2014;28:145-60.
21. Thanumoh J, Oba N, Tansupasawasdikun S. Effects of Goal Attainment Program on Alcohol Consumption Behaviors and Blood Pressure Level in Hypertensive Patients. Journal of Nursing and Health Sciences 2016;10:96-107.
22. Phangsuput A, Namjuntra R. Effects of a Transaction Program on the Health Behaviors and Blood Pressure Levels of Patients with Hypertension. Thai Red Cross Nursing Journal 2016;9:75-91.
23. Yi SS, Tabaei BP, Angell SY, Rapin A, Buck MD, Pagano WG, et al. Self-blood pressure monitoring in an urban, ethnically diverse population: a randomized clinical trial utilizing the electronic health record. Circ Cardiovasc Qual Outcomes 2015;8:138-45.
24. Spirk D, Noll S, Burnier M, Rimoldi S, Noll G, Sudano I. Effect of Home Blood Pressure Monitoring on Patient's Awareness and Goal Attainment Under Antihypertensive Therapy: The Factors Influencing Results in Anti-HypertenSive Treatment (FIRST) Study. Kidney Blood Press Res 2018;43:979-986.
25. Go AS, Bauman MA, Coleman King SM, Fonarow GC, Lawrence W, Williams KA, et al. An Effective Approach to High Blood Pressure Control: a science advisory from the American Heart Association, the American College of Cardiology, and the Centers for Disease Control and Prevention. J Am Coll Cardiol 2014;63:1230-8.