

EFFECTS OF A MULTICOMPONENT PROACTIVE NURSING PROGRAM ON BLOOD PRESSURE CONTROL AT A 6-MONTH FOLLOW-UP AMONG HYPERTENSIVE OLDER PERSONS IN COMMUNITY

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ABSTRACT: The hypertension problem is still existed in older population and limited success of controlling blood pressure (BP) around the world. A longitudinal study of 100 hypertensive older patients in two primary care clinics in Nakhon Si Thammarat, Thailand during June to November 2011, was conducted to evaluate the effectiveness of a multicomponent proactive nursing (MPN) program compared with routine care in improving blood pressure control. The participants were enrolled on criteria basis and matched pair to divide equally to the experimental or the comparison groups (50/group). The 3-month MPN program based on the Chronic Care Model was developed by literature review comprises multi-components targeted at patients and a proactive nursing care team. Data were collected at pre-intervention, three and six months and were analyzed by MANOVA. Results indicated that the participants in the experimental group had significantly different means of systolic pressure and pulse pressure at three month ($p < .001$) and six months ($p = .004$) between the groups. The percentage of participants maintaining blood pressure control was also significantly greater in the experimental group at three months ($p < .001$) and at six months ($p = .005$) than the control group. The findings indicated that the MPN program effectively improved the BP control in community-dwelling elder.

Keywords: Multicomponent Proactive Nursing Program, Older persons, Hypertension, Blood Pressure Control

INTRODUCTION

Hypertension (HTN) is a common problem with a rising prevalence among older persons. Additionally, there has been limited success in controlling blood pressure (BP) worldwide [1-6]. The major underlining cause has been reported on the older patient adherence to the regimen necessary to control the condition as it was often low and current control rates are at 50% [7]. In Thailand, the number of older Thai persons who identified as achieving BP target was 21.7 to 37.3% [8]. Therefore, control of HTN remains a significant problem for a large group of older persons.

HTN in older person showed different characteristics from HTN in nonelderly subjects. Isolated systolic HTN and increased pulse pressure (the difference between systolic BP and diastolic BP) are distinctive features of HTN in older persons [9] and predicts for cardio and cerebrovascular diseases among older persons [10]. The pathophysiology of HTN in older person is characterized by increased total peripheral vascular resistance, decreased compliance of large and medium-sized arteries,

decreased in cardiac output and circulating blood volume, and increased fluctuation of BP. As a result of an age-related decrease in baroreceptor function decreased blood flow, and dysfunction of autoregulation in important target organs, such as the brain, heart and kidney [9]. Therefore, HTN in older person must be treated with particular caution, and in recognition of above mentioned pathophysiological characteristics of high BP in this age group. Especially, the older persons 60-79 years of age, a community-based epidemiological analysis showed a significantly higher prevalence of cardiovascular disease than those with optimal and normal BP [11].

Effective BP control can be achieved in most people with HTN through lifestyle modification and antihypertensive drugs. Recent studies suggest that nurse-administered self-management interventions can have positive economic impact and improve BP control compared with usual care [12, 13]. The literature reviewed reported that various interventions established in both hospital-based and community-based care aim at improving BP control and behavioral changes among adult and older persons [14]. Nurse led care may be a promising way of improving control in patients with HTN,

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with the majority of randomized control trials being associated with improved BP control, but these interventions require further evaluation [15].

There was an urgent need for robust evidence for the effectiveness of nurse-led hypertension management in primary care [16]. However, deliver HTN management requires a proactive orientation in order to meet the goal of long-term BP control, community nurses should integrate with collaborative work with others involving in the service [17].

As a result, the quasi-experiment study was designed to determine a 3-month multicomponent proactive nursing (MPN) program for older hypertensive patients, could improve the number of individuals that achieve and maintain BP control in older hypertensive patients. Comparisons between the assigned participants in the experimental and the comparison groups were done at three and six months.

MATERIALS AND METHODS

Participant

A six-month, prospective, longitudinal study was conducted at two district health promotion centers in Nakhon Si Thammarat in the southern part of Thailand. The centers provide services for hypertensive patient were selected by simple random samplings with random number during June to November, 2011. The nurse researcher reviewed the records of HTN patients at the clinics resulted in the inclusion of patients. The inclusion criteria were: 1) age 60 to 79 years at the time of the initial screening, 2) known case HTN defined as a systolic BP (SBP) of ranging 140 to 160 mm Hg and /or diastolic BP (DBP) of ranging 90 to 100 mm Hg on any two clinic visits at least a year while taking antihypertensive medication; 3) dwelling in their residence with primary family caregiver; 4) good cognitive function was assessed using Mini Mental Status Examination (MMSE, Thai version 5) [18] good physical function was examined by the Chula ADL Index. Older hypertensive patients who were unable to participate in all intervention sessions were excluded.

The sample size was calculated based on a significance level of 0.05 and a power of 0.80. Thirty-seven patients [19] were required in both the experimental and comparison groups. A previous, similar study reported an attrition rate of 20% [20]; therefore, at least 45 patients were required for each group. Initially, 114 patients on criteria basis agreed to enroll in the study. They were match for gender (male or female), presence of diabetes mellitus (DM) (non DM or have DM), and type of

medication (or MDD: Medication Daily Dose divided < 1, 1-2, and > 2 tablets/day). Prospectively, participants were divided into an experimental group and the control groups, 57 in each group.

Multicomponent Proactive Nursing Program

The multicomponent proactive nursing program was developed based on the Chronic Care Model [21] for delivering quality of care to older hypertensive patients in order to improve BP control. The model was developed from evidence-based practices. The assumption of the model was to promote nursing care partnership and personalized self-management plan by patient, care provider and public health care team with proactive home visit systematic intervention [22]. The program content was divided into three parts. The first part comprised three small group interactive education sessions in a private setting to promote self-management in managing HTN. The content included meal planning, appropriate physical activity, and proper use of medicine. The second part involved the principal researcher and community health volunteers visiting each patient twice in each month at their own residence. The third part involved team members monthly meetings consisted of public health officer and community health volunteers, were held with the nurse researcher to discuss any identified patient problems, possible solutions and coordination of required medical care; to conduct individualized proactive home visit plan and to evaluate BP control rate over three months. The program included three parts as depicted in Table 1.

A multicomponent proactive nursing program manual and a patient education manual, "Self Management for Older Hypertensive Patients in Community", were developed by the nurse researcher to educate the patients in the experimental group. The multicomponent proactive nursing program and manuals were approved by seven experts: one internal medicine specialist, one public health specialist, three academic nurses who are experts in chronic management in older patients in community, and two expert nurses who worked in chronic care clinic in primary care settings.

Data collection

The present study approved from The Research Ethics Committee of Tha Sala hospital where the study was conducted. Informed written consent was obtained from all patients before data collection. The objectives, processes of the study, and the right to refuse or withdraw at any time from the study without affecting healthcare service were explained.

Table 1 Summary of the intervention procedures

Timing	MPN Program	Participant
1 st wk	Interactive group education	Community health nurse
2 nd wk	- Medication session	Health volunteer
3 rd wk	- Exercise session	HTN older persons
	- Diet control session	Family caregiver
	(HTN self management knowledge test after each session)	
1 st to 12 th wk	- Perform Self management behavior at home	HTN older persons
	- Self management behavior daily record	Family caregiver
2 nd , 6 th , 10 th wk	Home visit	Community health nurse
	- Physical assessment to detect common problem in elder with HTN	HTN older persons
	- Monitor medication adherence	Family caregiver
	- Provide specific care need	
3 rd , 7 th , 11 th wk	Home visit	Health volunteer
	- Promote health behavior	HTN older persons
	- Follow up reminder	Family caregiver
	- Hotline consultancy with nurse	
4 th , 8 th , 12 th wk	Team meeting	Community health nurse
	- Staff training	Health volunteer
	- BP control evaluation	Public health officer
	- Proactive care plan	
	- Reward for participants in BP control target	

Patients' confidentiality was maintained throughout the study. The data collection began after the ethical committee had approved the study. The nurse researcher asked for permission to make initial contact with patients who met the inclusion criteria. The demographic data were obtained by trained research assistants at baseline, including age, gender, marital status, religious, educational level, and sufficient of family income, were obtained using a structured questionnaire. Participants' height, body weight, and body mass index (BMI) pulse, waist hip ratio (WHR), SBP, pulse pressure, were also measured. Health history (reported medical conditions) was obtained from participants' medical records available in the institution's clinic including duration of HTN, type of medication, and presence of diabetes.

Blood pressure was measured at baseline, at three-month and at six-month, based on a standardized protocol of the European Society of Hypertension-ESH and European Society of Cardiology-ESC guidelines [23] with automatic Omron calibrated cuff. At each schedules clinic visit, over 3 month, a research assistant who was blinded to the patient's group assignment obtained two BP measurements. The first BP measurement was obtained after patients were seated and rested for at least five minutes. The second was obtained 30 seconds after the first. The mean of the values was used as the outcome for that time point.

Data analysis

Descriptive statistics were computed to summarize the patients' demographic data. The outcome

difference between the experimental and the comparison groups was examined using the independent sample t-test (for interval data) and Chi-square test (for categorical data) at baseline. The multivariate analysis of variance (MANOVA) was conducted to examine the difference in the mean of BP control with a significance level set less than .05.

RESULTS

Participant characteristics

In this study, initially 114 patients were enrolled, but 100 patients completed the study (93.63% retention), divided 50 patients in each group. Of the 14 people not retained, seven were in each group. The baseline characteristics and illness situation of both groups were similar (Table 2). A large percentage of the participants were women (76%). The participants had an average age of 69±5.3 years and over half of them were married and were Islamic. Most participants (77%) completed elementary school, and had monthly household incomes of 5,500 Thai baht or \$US184 with sufficiency. The duration since they were diagnosed with HTN was 5.5±3.5 years. Most (62%) did not have diabetes. For their current medication, 76% were taking two antihypertensive medications daily. Compared to the comparison group at baseline, the experimental group had no difference in initial mean pre-intervention BP (150/82 mm Hg) (Table 2).

Blood pressure control

At post-test, the results from MANOVA indicated that the experimental group had a statistically

Table 2 Participant characteristics at baseline (n=100)

Characteristics	Comparison group (n=50)		Intervention group (n=50)		<i>t/χ²</i>	<i>p-value</i>
	n	%	n	%		
Age (years)					1.09	.30
60 – 69	27	54	31	62		
70 – 79	23	46	19	38		
Range = 60-79, M±SD = 68.9±5.3						
Gender					0.00	1.00
Female	38	76	38	76		
Male	12	24	12	24		
Status					6.62	.06
Single	1	2	3	6		
Married	35	70	24	48		
Widow/divorce/ separate	14	28	23	46		
Religious					1.46	.28
Buddhist	19	38	25	50		
Islam	31	62	25	50		
Education					4.83	.25
No literate	9	18	6	12		
Elementary	39	78	38	76		
High school	1	2	4	8		
Diploma/Bachelor	1	2	2	4		
Income					2.63	.11
Insufficient	17	34	24	48		
Sufficient	33	66	26	52		
Range = 500-14,500 baht, M±SD = 5518.1±2885.4						
BP (mm Hg) (M±SD)						
Systolic	149.6±6.2		149.9±6.1		-.61	.54
Diastolic	84.0±10.2		80.2±8.4		1.68	.10
Duration of HTN (years)					-1.88	.06
1-5	35	70	20	40		
6-10	13	26	24	48		
> 10	2	4	6	12		
Range = 1-17, M±SD = 5.5±3.5						
Type of medication					0.00	1.00
1 agent	4	8	4	8		
2 agents	38	76	38	76		
3 or more agents	8	16	8	16		
Presence of DM					0.00	1.00
Non DM	31	62	31	62		
Have DM	19	38	19	38		

Note: HTN: Hypertension, BP: Blood Pressure, DM: Diabetic Mellitus

Table 3 Differences in blood pressure control between the experimental and comparison groups (n = 100)

Time Point	Comparison group(n = 50)		Intervention group (n = 50)		<i>F</i> test	<i>p-value</i>
	M±SD	Mean Change	M±SD	Mean Change		
Systolic BP (mm Hg)					21.44	.000
Baseline	149.3±6.1	-	150.1±6.2	-		
3 months	142.3±14.2	7.0	131.4±9.6	18.7		
6 months	141.0±12.7	8.3	134.6±11.3	15.5		
Pulse Pressure (mm Hg)					8.85	.004
Baseline	65.7±11.9	-	69.6±10.3	-		
3 months	61.1±14.7	4.6	58.2±10.5	11.4		
6 months	54.1±9.5	11.6	59.4±8.3	10.2		

Note: MANOVA test *F*(1,98); BP: Blood pressure; Significant level at *p*< .05

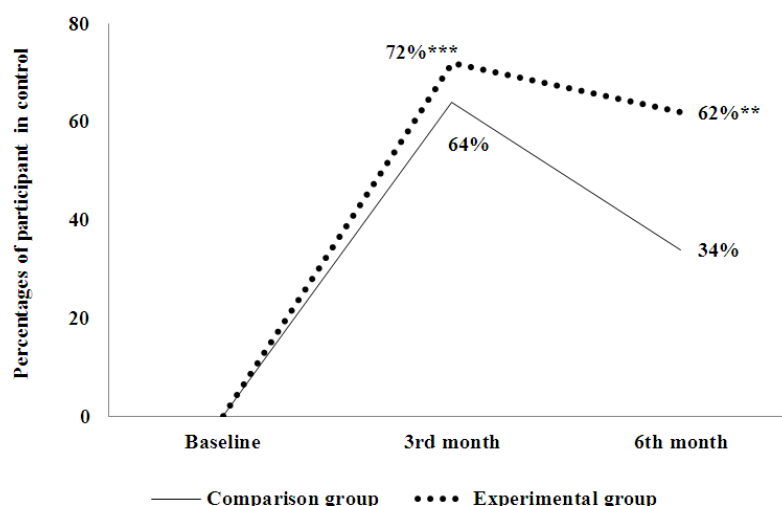


Figure 1 The present study showed effect of MPN program on percentages of participant in both the experimental group who achieved in BP control ** $p < .01$, *** $p < .001$ compared with comparison groups at the same time point using χ^2 test.

different SBP and pulse pressure compared with the comparison group at 3 and 6 months, $F(1,98) = 21.44$, $p < .001$ and $F(1,98) = 8.85$, $p = .004$, respectively (Table 3). The mean of the SBP of the experimental group decreased from baseline to 18.7 at 3 months and 15.5 at 6 months; whereas the comparison group decreased from baseline to 7.0 and 8.3, respectively. For the mean of the pulse pressure, the experimental group decreased from baseline to 11.4 at 3 months and 10.2 at 6 months; whereas the comparison group decreased from baseline to 4.6 and 11.6, respectively (Table 2). As shown in Figure 1, the change in the number of participants reaching the BP goal, as recommended by the JNC-7 [24] was also significantly greater in the experimental group at three months (72% vs 62%, $\chi^2(1, N = 100) = 13.04$, $p < .001$) and at six months (64% vs 34%): $\chi^2(1, N = 100) = 7.85$, $p = .005$) compared with the comparison group.

DISCUSSION

Hypertensive older persons in rural area, a MPN program could increase BP control by about 62% to 72%. Participants who received the most attention from this program seemed to have the greatest benefit in terms of reduced SBP and pulse pressure and improved BP control rate. This study provides evidence that a nursing strategy, facilitated changes in HTN. Strengths of this study included its quasi-experimental with comparison group design and robustness after adjustment using matched pair for participant characteristics at baseline by gender, presence of diabetes mellitus, and type of medication.

Our findings of modest changes in clinical characteristics for the entire MPN group was strengthen, particularly given the extensive implementation of goal setting for BP control and encouragement of patients to change their behaviors using group discussion, self-management and reinforcement by a home-visit approach. Both methods are effective in promoting health outcomes [25, 26]. In the present study, patients were provided with the education and skills needed to modify their behaviors through three health behavior workshops, in cooperation with family caregivers and community health volunteers. These methods may have empowered the participants to have more confidence in their abilities to deal with their HTN as well as prompted clinicians to prepare proactive, individualized plans to manage participants not meeting BP goals. Moreover, this study provided support for developing interventions to prepare proactive teams to promote successful self management among participants and improve quality of HTN management. Consistent with the findings of others on BP control [27], such teams fostered communication between clinicians and well-informed patients [28]. Similarly, the previous study of Gary and colleagues [29], who conducted a nurse case manager and a community health worker team on diabetic control among African Americans with type 2 diabetes mellitus indicated that their program could improve diabetic control. Therefore, the nurse researcher and colleagues feel confident that the program was suitable in providing the appropriate action for the corresponding participants with poor control BP.

Previous intervention studies to improve quality of care in HTN reported that self-management interventions which lasted for 2-6 months led to statistically and clinical significant in SBP by 5 mm Hg [30]. The present study is comparable with the reduction in SBP by 19 mm Hg (Table 2). Moreover, this study monitored BP levels monthly and shared clinical information to provide decision-support among team members to improve the process of care and achieve clinical markers of quality of care. Similarly, a trial that shared access by the primary care providers and the patients to a Web-based, color-coded diabetes tracker among adult primary care patients with type 2 diabetes led to significant greater decrease in BP [31]. These findings suggest that some levels of patient partnership in their clinical care are an important element in achieving BP control. Because hypertensive older patient likely need more special support to enhance medication adherence and lifestyle change. Holistic programs, with mutually planned activities between participants and the caregivers, using a variety of techniques have been associated with a large net reduction in BP [32].

CONCLUSION

The findings of this study showed that a MPN program promoted better SBP and pulse pressure and higher BP control for Thai hypertensive older patients. Multicomponent proactive nursing programs should be promoted in primary-care settings by incorporating them into the regular care. In addition, the effects of the intervention however, in a population where most did not have a high level of education and many who were impoverished, should be encouraging for other primary care settings with similar populations. With a broader perspective, interventions can be designed to focus on BP control and other activities to improve the quality of life of hypertensive older persons and/or his/her caregiver. The results are encouraging even though the findings lack international generalizability due to the setting and cultural influences in Thailand. Therefore, further research should replicate the study in a larger sample of poorly controlled hypertensive older patients. Randomly selected participants from several geographical areas are needed to broaden the generalizability of the study.

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