A Model of Health Services for Hypertension in Primary Care Unit in Patumthani Province

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Objective: *To determine an appropriate, cost-effective and sustainable model of health services for prevention and control of hypertension in a primary care unit.*
Study Design: *Operational research.*
Material and Method: *The presented study was to develop a model that utilized health personnel, village health volunteers (VHVs) and family health leaders (FHLs) to improve health services to prevent and control hypertension in three primary care units (PCU) in Patumthani Province. The model was designed to include two intervention groups (Group I, II) and a control group (Group III). In Group I (Bangdaeu 1), health personnel, VHVs and FHLs took part in the design of services to help prevent and control hypertension, while in Group II (Bangkayang) and Group III (Banklang), only health personnel and VHVs participated. Five hundred and forty villagers participated in the present study, with an approximate equal number in each group. The project included training of persons involved in the project at the beginning with subsequent designs of community-based interventions (Part I), cost effectiveness study (Part II), and assessment of participation of VHVs and FHLs' impact and project's sustainability (Part III).Three measurements on various outcome variables were done at baseline (Measure 1), right after community- based activities were implemented (Measure 2) and at the end of project (Measure 3) by Cochran's Q test.*
Results: *Group I showed a steadily improving trend in outcome variables such as high level of knowledge were higher in Measure 2, 3 than Measure 1, (11.6%, 89.9%, 100% respectively). The trend in Group II showed a defection at Measure 3 (5.7%, 50.9%, 43.4%). However, an improving trend in Group III was also observed, but less obvious than in Group I (8.1%, 21.7%, 24.8%). Determining the costs for the real program effects showed that Group I model is most cost-effective, with least unit cost per a unit of improvement. Result from Part III showed that the project is sustainable if obstacles found in the present study could be removed.*
Conclusion: *The present study demonstrates the effects of community-based approaches by VHVs and FHLs, with support from health personnel with a high prospect of sustainability and transferability to other areas.*

Keywords: *Hypertension, Prevention, Control, Primary care unit*

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Circulatory diseases (ICD codes I00-I99) are important public health problems. They account for the top three leading cause of death in Thailand[1]. Hypertension is an important risk factor for the diseases[2]. Hypertension, as a disease, is a silent killer[3] that claims more than 50% of the people, most of whom do not have any major symptom of hypertension until detected during health check-up or late in disease progression course when severe symptoms or complications develop. As a chronic disease, hypertension demands continuous care to keep blood pressure under control. The World Health Organization also advocates self-care including avoidance of risk factors for non-pharmacologic treatment of hypertension. Behavioral change and lifestyle modification[4,5] are important means to control hypertension.

A few care models have been developed and tested for hypertension prevention and control, based in several settings. The Department of Medical Services

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(DMS) and the Patumthani Hospital, a tertiary care hospital in central Thailand, of the Ministry of Public Health jointly developed and tested a facility-based model for hypertension prevention in primary care units in Patumthani Province in 2002[6]. The model development included cost-effectiveness[7] and sustainability assessment. The present study reports summative evaluation[8] of the model.

Material and Method

This is an operational study to develop and evaluate the model of hypertension care in primary care units in Patumthani Province. The evaluation is based on two cross-sectional studies, i.e. pre-test and post-test evaluations. The study protocol was approved by the Ethical Review Committee for Research in Human Subjects of the Ministry of Public Health, Thailand.

The present study was divided into three parts, Part I (August 2002-July 2003), Part II (October-December 2004), and Part III (November 2005-April 2006).

Study population

Persons of 18-59 years, who live in the catchment areas of three primary care units (PCUs) of Patumthani Province, are the target group population of this model. The three PCUs are Bangdeau 1 (Group I), Bangkayang (Group II), and Banklang (Group III). Group I and II are intervention groups and Group III is the control group. The Group I was taught by trained health personnel, VHVs and FHLs. The Group II was taught by trained health personnel and VHVs. The Group III was interviewed only by trained health personnel.

Models in the present study utilized both village health volunteers (VHVs) and family health leaders (FHLs). VHVs are defined as villagers who volunteer to provide health education and disseminate health information on good health behaviors and disease prevention and control to other people in the villages and FHLs. FHLs are defined as a member in a family who serves as the contact person in the family for VHVs and other health personnel. FHLs relay information from VHVs and other health personnel to support good behavioral practices and lifestyles of other family members, especially hypertensive patients as shown in Fig. 1.

There were 540 randomly selected people in the three groups, each of which had an approximately equal size. Interventions in Group I were carried out by health personnel, VHVs and FHLs, while those in Group II were carried out by health personnel and VHVs using the guideline as shown in Fig. 1 as a method for the present research. In the control group (Group III) were interviewed only by trained health personnel. In Part III, the former study population was only 465 persons left because of moving to other places and the age cut-off point of the present study were 18-59 years old.

Outcome variables of the present data include knowledge, attitude, behaviors (eating[9], smoking, and alcohol drinking), and body mass index[10]. Body mass index (BMI) is defined as body weight (in kilogram) divided by height (in meter) squared.

A standardized questionnaire[6] was developed to measure the outcome variables in two levels[11].

Body Mass Index (BMI) normal range[12] = 18.50-24.99 kg/m^2

Part I (August 2002 – July 2003)

Guideline of the Procedures[13] is shown in Fig. 1.

A baseline measurement of outcome variables was carried out in August 2002 (Measure 1). At the beginning of the present study in mid 2002, health personnel in the areas where the three PCUs serve were vigorously trained by the researchers on approaches to prevent and control hypertension using VHVs and FHLs. The researchers and health personnel then later trained VHVs and FHLs on possible interventions for prevention and control of hypertension over a year. Interventions used in Groups I and II included several community-initiated activities such as exercise clubs, health parks, and self-help groups. The outcomes variables were measured one year after the intervention activities had been initiated (Measure 2).

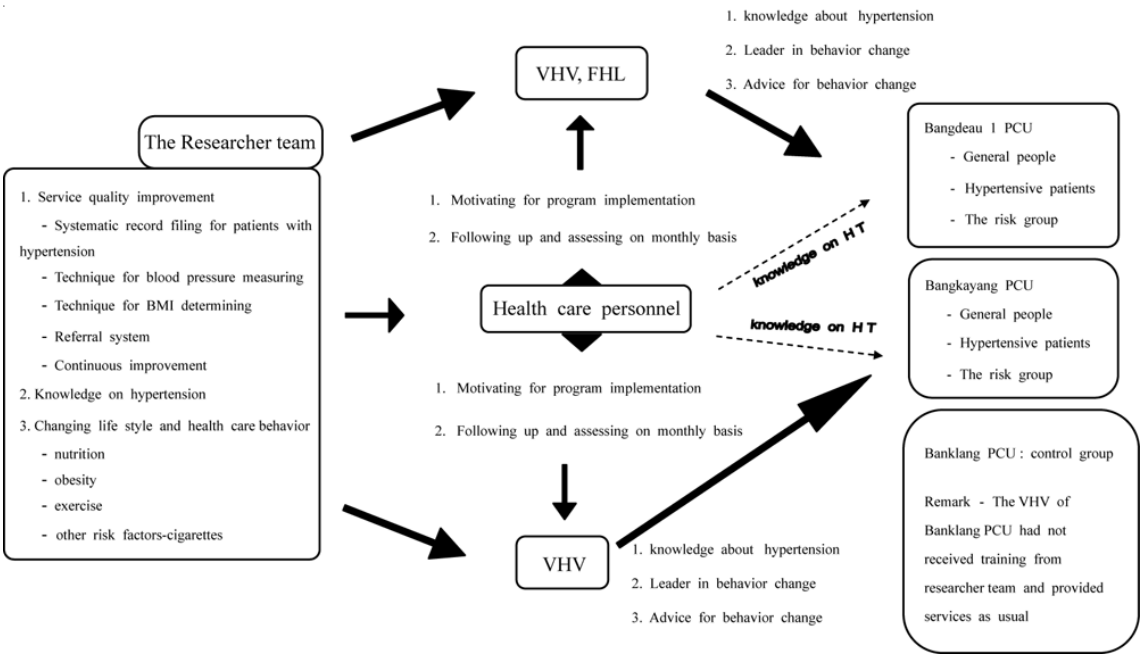
After this, two intervention groups filled this hypertension program into their routine work.

Part II (October – December 2004)

A cost-effectiveness study was carried out to compare costs (operating costs and programming cost) of the program and the outcomes of the program in knowledge, eating behaviors and physical activities.

Part III (November 2005 – April 2006)

This part was carried out to assess sustainability of the program. About three years after the program commencement, the third round of measurement of outcomes variables (Measure 3) took place in November 2005. In addition, levels of participation of VHVs and FHLs in Groups I and II were assessed by



Remark - VHV = Village Health Volunteer, FHL = family health leader, PCU = primary care unit, H T = hypertension

Fig. 1 Guideline for Implementation: A Model of Health Services for Hypertension in Primary Care Unit in Patumthani Province

evaluation of satisfaction of hypertensive patients and other people in each group. In addition, focus group discussions were held among health personnel, representative of VHVs, and FHLs to collect their opinions regarding success, failure, and applicability of this kind of program in this and other wider contexts.

Statistical analysis

Cochran's Q-test was used to compare outcome variables in the three groups at three points in time, i.e. at time of Parts I, II and III. A p-value of less than 0.05 was considered significant difference.

Results

The demographics of Groups I, II, and III are shown in Table 1. It was found that the majority of the study population had some similarity in demographic data obtained such as were female (64.7%, 64.8%, 61.7% respectively), 40-49 years old (33.1%, 39.0%, 29.9%), married status (71.2%, 82.4%, 65.3%), worker (54.7%, 47.8%, 43.7%). The difference was education, Group I finished secondary level 49.6%, Group II, III finished primary level 60.4%, 38.3%, income per month, Group I earned 20,000-29,999 Baht 30.9%, Group II, III earned less than 10,000 Baht, 50.3%, 52.1% respectively.

The comparison of outcome variables of Group I, II, III are shown in Table 2. It was found that:

Knowledge - Group I, III showed an increasing trend in Measure 2, 3 significantly but Group III was less obvious than Group I (11.6%, 89.9%, 100% and 8.1%, 21.7%, 24.8% respectively). Group II showed an increasing trend in Measure 2 but declined at Measure 3 significantly (5.7%, 50.9%, 43.4% respectively).

Attitude - All three groups showed no difference in Measure 1, 2, 3.

Dietary pattern - Group I showed a significant increasing trend in Measure 2, and 3 (33.3%, 83.3%, 99.3%). Group II showed a significant increasing trend in Measure 2 but a significant decline at Measure 3 (37.1%,53.5%, 45.3%) However, Group III showed a significant decline at Measure 2, and 3 (32.9%, 30.4%, 14.3%).

Physical activity - Group I showed a significant increase in Measure 2 but a significant decline at Measure 3 (15.2%, 68.1%, 30.4%). Group II, III showed no difference in Measure 1, 2, 3.

Table 1. Demographic characteristics of 3 PCUs

Demographic characteristics	Group I N (%)	Group II N (%)	Group III N (%)
Gender			
Male	49 (35.3)	56 (35.2)	64 (38.3)
Female	90 (64.7)	103 (64.8)	103 (61.7)
Age (years)			
≤ 29	33 (23.7)	18 (11.3)	36 (21.6)
30-39	35 (25.2)	31 (19.5)	43 (25.7)
40-49	46 (33.1)	62 (39.0)	50 (29.9)
50-59	25 (18.0)	48 (30.2)	38 (22.8)
Marriage status			
Single	34 (24.5)	13 (8.2)	46 (27.5)
Married	99 (71.2)	131 (82.4)	109 (65.3)
Widowed	5 (3.6)	11 (6.9)	9 (5.4)
Divorced	1 (0.7)	4 (2.5)	3 (1.8)
Education			
No education	0	3 (1.9)	0
Primary level	43 (30.9)	96 (60.4)	64 (38.3)
Secondary level	69 (49.6)	43 (27.0)	58 (34.7)
Diploma	14 (10.1)	7 (4.4)	24 (14.4)
Bachelor degree	13 (9.4)	8 (5.0)	12 (7.2)
Not specified	0	2 (1.3)	9 (5.4)
Careers			
Doing chores	19 (13.7)	46 (28.9)	16 (9.6)
Agriculturing	6 (4.3)	0	1 (0.6)
Free lance/worker	76 (54.7)	76 (47.8)	73 (43.7)
Trading/personal business	10 (7.2)	22 (13.8)	42 (25.1)
Government/public company staff	25 (18.0)	7 (4.4)	14 (8.4)
Unemployed	1 (0.7)	4 (2.5)	6 (3.6)
Others	2 (1.4)	4 (2.5)	15 (9.0)
Income month (Baht)			
< 10,000	26 (18.7)	80 (50.3)	87 (52.1)
10,000-19,999	9 (6.5)	61 (38.4)	54 (32.3)
20,000-29,999	43 (30.9)	13 (8.2)	21 (12.6)
30,000-39,000	30 (21.6)	3 (1.9)	2 (1.2)
≥ 40,000	31 (22.3)	2 (1.3)	3 (1.8)
The number of family's members			
1-2 person (s)	7 (5. 0)	9 (5. 7)	21 (12.6)
3-4 persons	69 (49.6)	86 (54.1)	87 (52.1)
5-6 persons	58 (41.7)	52 (32.7)	52 (31.1)
more than 7 persons	5 (3.6)	12 (7.5)	7 (4.2)

Stress reduction - Group I showed a significant increase in Measure 2 but a significant decline at Measure 3 significantly (52.9%, 88.4%,58.7%). Group II showed a significant increase in Measure 2 but a significant decline at Measure 3 (30.8%, 49.1%, 45.9%). Group III showed no difference in Measure 1, 2, 3.

Non-Smoking - Group I showed a significant increasing trend in Measure 2, and 3 (81.1%, 92.7%, 98.5%). Group II, III showed no difference in Measure 1, 2, 3.

Non-Alcohol drinking - Group I showed a significant increasing trend in Measure 2, and 3 (74.0%, 87.0%, 99.2%). Group II showed a significant decreasing trend in Measure 2, and 3 (67.3%, 62.8%, 54.5%). Group III showed no difference in Measure 1, 2, 3.

Table 2. Comparison of outcome variables of 3 PCUs

Variables	Group I	Group II	Group III
Knowledge (high level %)			
M 1	11.6	5.7	8.1
M 2	89.9	50.9	21.7
M 3	100	43.4	24.8
p-value	<0.001	<0.001	<0.001
Attitude (high level %)			
M 1	96.4	95.0	95.7
M 2	97.8	98.1	95.7
M 3	99.3	97.5	95.0
p-value	0.223	0.247	0.953
Dietary pattern (high level %)			
M 1	33.3	37.1	32.9
M 2	83.3	53.5	30.4
M 3	99.3	45.3	14.3
p-value	<0.001	0.006	<0.001
Physical activity (high level %)			
M 1	15.2	21.4	14.3
M 2	68.1	27.7	18.6
M 3	30.4	23.9	18.6
p-value	<0.001	0.368	0.481
Stress reduction (high level %)			
M 1	52.9	30.8	41.2
M 2	88.4	49.1	34.4
M 3	58.7	45.9	37.5
p-value	<0.001	0.002	0.368
Smoking (no smoking %)			
M 1	81.1	83.5	81.9
M 2	92.7	82.3	86.9
M 3	98.5	86.7	85.0
p-value	<0.001	0.170	0.076
Alcohol drinking (no drinking %)			
M 1	74.0	67.3	63.4
M 2	87.0	62.8	65.8
M 3	99.2	54.5	65.2
p-value	<0.001	0.009	0.796
BMI (normal %)			
M 1	65.2	50.9	58.1
M 2	65.9	47.8	62.5
M 3	87.0	39.0	63.1
p-value	<0.001	0.001	0.320

Note: M = Measure

Normal Body mass index - Group I showed a significant increasing trend in Measure 2, and 3 (65.2%, 65.9%, 87.0%). Group II showed a significant decreasing trend in Measure 2, and 3 (50.9%, 47.8%, 39.0%). Group III showed no difference in Measure 1, 2, 3.

Participation of VHVs and FHLs

It was found that:

1. Satisfaction of hypertensive patients and other people in the group with VHVs and FHLs' home health care services are shown in Table 3. Group I, II, III showed 100%, 50.6%, 95.2% respectively.

2. Results from focus group discussion.

2.1 VHVs and FHLs could contribute as the leaders to proactive actions in community.

2.2 VHVs and FHLs achieved their self-

Table 3. Satisfaction of study population for VHV and FHL's home health care services

Satisfaction	Group I N (%)	Group II N (%)	Group III N (%)
Satisfy	131 (100%)	79 (50.6%)	158 (95.2%)
No comment	0 (0%)	77 (49.4%)	8 (4.8%)
Sum	131 (100%)	156 (100%)	166 (100%)
Unit cost/person (Baht)	74.89	84.92	-

improvement regarding the knowledge of diseases and skills in giving care continuously to patients and people. In addition, they could be a model for self-care of the people.

2.3 Problems and Obstacles. After the study in Part I, there were no more finance resources for VHVs and FHLs' home health care services. Some VHVs and FHLs forgot their knowledge about hypertension. Some hypertensive patients and persons in the group had no time for this program because of their occupation. Health personnel could not motivate this program to VHVs and FHLs because of a new urgent assignment, epidemic of Avian Flu in 2004 etc.

A health economic study was conducted from October to December 2004[7] to determine the cost effectiveness of each developed service model for prevention and control of hypertension in primary care units in Patumthani Province. The results of the present study indicated that the full implementation (Group I) could improve knowledge and behavior more than only partially (Group II) or no implementation (Group III) of such a program. Throughout the program, the net cost incurred per person was 74.89 Baht as shown in Table 3.

Discussion

The finding of the present study showed that majority of Group I, II, III had similarity in demographics except education and income that Group I had higher than Group II, III. About the majority of Measures 1, 2, and 3 in Group I, they showed a steadily increasing trend, except for physical activity and stress reduction, had an increase at Measure 2, compared to Measure 1, but a later decline at Measure 3; these could be the result of the interventions in Part I of the present study. However, it could also be the result of an increase in general population from awareness-raising activities of public media. The focus group discussions attributed these changes that after Part I of the present study had finished VHVs were lack of financial resources to sustain VHVs' activities e.g. daily allowances for field work, some VHV and FHL forgot the knowledge about hypertension, health personnel had no time for stimulating VHVs, FHLs because they had new, urgent assignments such as the Avian Flu epidemic etc.

The trend in outcome variables in Group II was less obvious, with an increase at Measure 2, compared to Measure 1, but a later decline at Measure 3. The focus group discussions attributed these changes to lack of financial resources to sustain activities of VHVs in the Group II, e.g. daily allowances for field-work. Some VHVs forgot their knowledge about hypertension. Some hypertensive patients and persons in the group had no time for this program because of their occupation. Health personnel could not stimulate this program to VHVs because of new, urgent assignments such as the epidemic of Avian Flu etc.

Not surprisingly, the increasing trend of knowledge was also observed in Group III, albeit much less obvious than seen in Group I. It is most likely due to awareness raising activities from the general public media. The difference in the level of changes between Groups I and III could be attributed to program effects.

If the authors could attribute changes in Groups I and II to program activities, results from the cost effectiveness study in Part II showed that the unit cost per head of population, as adjusted for the level of change, for Group I is the lowest, 74.89 Baht.

Level of participation of VHVs and FHLs in Group I was good because of higher level of education of people in the group. FHLs did not spend money for home health care and they had time for this program.

Conclusion

The present study demonstrates the effects of community-based approaches by VHVs and FHLs, with support from health personnel for prevention and control of hypertension with a high prospect of sustainability and transferability to other areas if supporting some finance for VHVs and FHLs' services and training them at least once a year.

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รูปแบบการบริการทางสาธารณสุขสำหรับโรคความดันโลหิตสูงในศูนย์สุขภาพชุมชนจังหวัดปทุมธานี

จิรพร เกตุปรีชาสวัสดิ์, นุชนาท บุญต่อเติม, ปรารถนา ยศพล

วัตถุประสงค์: *เพื่อหารูปแบบการบริการทางสาธารณสุข เพื่อการป้องกันและควบคุมโรคความดันโลหิตสูงที่เหมาะสมคุ้มค่าและยั่งยืนกับศูนย์สุขภาพชุมชน*

วัสดุและวิธีการ: *เป็นการศึกษาเชิงปฏิบัติการ โดยประเมินผลรูปแบบการบริการทางสาธารณสุขเพื่อการป้องกัน และควบคุมโรคความดันโลหิตสูง ซึ่งดำเนินการโดยบุคลากรสาธารณสุข อาสาสมัครสาธารณสุขประจำหมู่บ้าน (อสม.) และแกนนำสุขภาพประจำครอบครัว (กนค.) ในศูนย์สุขภาพชุมชน (ศสช.) 3 แห่งในจังหวัดปทุมธานี โดยแบ่งเป็นกลุ่มทดลอง 2 กลุ่ม (กลุ่มที่ 1 และ 2) และกลุ่มควบคุม 1 กลุ่ม (กลุ่มที่ 3) กลุ่มที่ 1 (บางเดื่อ 1) ดำเนินการโดยบุคลากรสาธารณสุข อสม. และ กนค. กลุ่มที่ 2 (บางขะแยง) และกลุ่มที่ 3 (บ้านกลาง) ดำเนินการโดยบุคลากรสาธารณสุข และ อสม. ได้คัดเลือกประชากรกลุ่มเป้าหมายจาก ศสช. ทั้ง 3 แห่ง จำนวน 540 คน โดยคัดเลือกจำนวน เท่า ๆ กัน โดยประมาณในแต่ละกลุ่ม โครงการได้แบ่งเป็น 3 ส่วน ส่วนที่ 1 เริ่มด้วยการอบรมประชากรกลุ่มเป้าหมายด้วยกิจกรรมในชุมชนตามที่กำหนด และให้การดูแลติดต่อกันเป็นเวลา 1 ปี ส่วนที่ 2 ได้ศึกษาความคุ้มค่าของโครงการฯ ส่วนที่ 3 ได้ประเมินผลกระทบจากการมีส่วนร่วมของอสม. และ กนค. และความยั่งยืนของโครงการฯ ได้มีการวัดผลผลิต 3 ครั้ง ได้แก่ วัดครั้งที่ 1 เมื่อเริ่มต้นโครงการ วัดครั้งที่ 2 ทันทีที่ทีมวิจัยเลิกดำเนินกิจกรรมในชุมชน และครั้งที่ 3 เมื่อจบโครงการ และวิเคราะห์ข้อมูล โดยการทดสอบของ Cochran ที่ p-value น้อยกว่า 0.05*

ผลการศึกษา: *พบว่า กลุ่มที่ 1 มีแนวโน้มของผลผลิตที่ดีขึ้น เช่น คะแนนความรู้ระดับสูง วัดได้ครั้งที่ 1, 2, 3 ร้อยละ 11.6, 89.9 และ 100 ตามลำดับ กลุ่มที่ 2 มีแนวโน้มผลผลิตลดลงในการวัดครั้งที่ 3 เช่น คะแนนความรู้ระดับสูง วัดได้ร้อยละ 5.7, 50.9 และ 43.4 ตามลำดับ กลุ่มที่ 3 มีแนวโน้มของผลผลิตที่ดีขึ้น แต่น้อยกว่ากลุ่มที่ 1 เช่น คะแนนความรู้ระดับสูง วัดได้ร้อยละ 8.1, 21.7 และ 24.8 ตามลำดับ ในเรื่องความคุ้มค่าของรูปแบบการบริการฯ พบว่า กลุ่มที่ 1 มีความคุ้มค่าที่สุดและใช้ต้นทุนต่อหัวน้อยที่สุด ผลการศึกษาในส่วนที่ 3 แสดงว่าโครงการจะยั่งยืนได้ถ้าสามารถขจัดอุปสรรคที่พบในการศึกษานี้*

สรุป: *การศึกษานี้ ได้แสดงถึงผลการดำเนินกิจกรรมในชุมชน เพื่อป้องกันและควบคุมโรคความดันโลหิตสูง โดย อสม. และ กนค. ซึ่งมีการสนับสนุนจากบุคลากรสาธารณสุข พร้อมทั้งแสดงถึงความยั่งยืนของการดำเนินกิจกรรม และสามารถขยายไปยัง ศสช. อื่นได้*