EFFECTIVENESS OF INTEGRATED HEALTH LITERACY AND SELF-MANAGEMENT MODEL FOR HYPERTENSION CONTROL IN URBAN COMMUNITY, NAKHONRATCHASIMA PROVINCE, THAILAND

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for the Degree of Doctor of Philosophy Program in Public Health
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ประสิทธิผลของโปรแกรมผสมผสานความแตกฉานทางสุขภาพและการจัดการตนเองสำหรับ
การควบคุมโรคความดันโลหิตสูงในชุมชนเขตเมือง จังหวัดนครราชสีมา ประเทศไทย

นางสาวิตรี วิษณุโยธิน

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาสาธารณสุขศาสตรดุษฎีบัณฑิต
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สาวิตรี วิษณุโยธิน : ประสิทธิผลของโปรแกรมผสมผสานความแตกฉานทางสุขภาพและการจัดการตนเองสำหรับการควบคุมโรคความดันโลหิตสูงในชุมชนเขตเมือง จังหวัดนครราชสีมา ประเทศไทย (EFFECTIVENESS OF INTEGRATED HEALTH LITERACY AND SELF-MANAGEMENT MODEL FOR HYPERTENSION CONTROL IN URBAN COMMUNITY, NAKHONRATCHASIMA PROVINCE, THAILAND) อ .ที่ ป รึ ก ษ า วิทยานิพนธ์หลัก: ศ. นพ. สำลี เปลี่ยนบางช้าง, 185 หน้า.

บทนำ ความดันโลหิตสูงที่ควบคุมไม่ได้ส่งผลประมาณครึ่งหนึ่งต่อการเสียชีวิตทั้งหมดจากโรคหัวใจและโรคหลอดเลือดสมอง มีการนำหลายวิธีการมาใช้ในการดูแลความดันโลหิตสูงที่ควบคุมไม่ได้ จากการทบทวนพบมีการศึกษาโปรแกรมผสมผสานความแตกฉานทางสุขภาพและการจัดการตนเองเพื่อดูแลความดัน โลหิตสูงที่ควบคุมไม่ได้ในเขตชุมชนเมืองน้อย ดังนั้นงานวิจัยนี้มีวัตถุประสงค์เพื่อวัดประสิทธิผลของโปรแกรมผสมผสานดังกล่าวต่อความดันโลหิตสูงที่ควบคุมไม่ได้เปรียบเทียบกับการดูแลรักษาแบบปกติในเขตชุมชนเมือง จ.นครราชสีมา ประเทศไทย

ระเบียบวิธีการศึกษา การศึกษาครั้งนี้เป็นการวิจัยกึ่งทดลองระหว่างเดือนมกราคม พ.ศ. 2560-มีนาคม พ.ศ. 2561 ในพื้นที่รับผิดชอบของหน่วยบริการปฐมภูมิจากสองหน่วยในเขตชุมชนเมือง จ.นครราชสีมาประเทศไทยถูกเลือกให้เป็นกลุ่มทดลองหนึ่งหน่วยและกลุ่มควบคุมอีกหนึ่งหน่วย ผู้ป่วยความดันโลหิตสูงที่ควบคุม ไม่ได้ในแต่ละหน่วยบริการจะถูกสุ่มแยกหน่วยละ 67 ราย โดยมีจำนวนผู้ป่วยความดันโลหิตสูงที่ควบคุม ไม่ได้แห่งละ 63 ราย เข้าร่วมในกลุ่มทดลองและ 60 ราย เข้าร่วมในกลุ่มควบคุม กลุ่มทดลองจะได้รับโปรแกรมผสมสานโดยมีฐานมาจาก 20 ประเด็นของรูปแบบการดูแลด้านความแตกฉานทางสุขภาพและการจัดการตนเอง กลุ่มควบคุมได้รับการดูแลรักษาแบบปกติ เก็บข้อมูลโดยใช้แบบสัมภาษณ์ที่มีความเที่ยงและความน่าเชื่อถือก่อนการทดลอง 3 เดือนและ 6 เดือน การวัดความดัน โลหิตช่วงเช้าโดยอสมที่บ้านต่อเนื่อง 7 วันนำมาใช้ในการวัดระดับความดันตัวบนและตัวล่างที่บ้านก่อนการทดลอง 3 เดือนและ 6 เดือน การวัดระดับสารชีวเคมีในเลือดก่อนการทดลองและ 6 เดือน วิเคราะห์ข้อมูลโดยสถิติเชิงพรรณนา สถิติที่ใช้ในการเปรียบเทียบข้อมูลก่อนการทดลองคือ ไคสแควร์ Fisher's Exact test independent-t test และ Wilcoxan-Mann-Whitney test และเปรียบเทียบค่าเฉลี่ยความแตกต่างของผลลัพธ์ในการเปลี่ยนแปลงระหว่างกลุ่มด้วยการวิเคราะห์การถดถอยเชิงเส้นแบบพหุโดยการควบคุมปัจจัยกวนนำมาใช้

ผลการศึกษา กลุ่มทดลองที่ได้รับโปรแกรมผสมผสานความแตกฉานทางสุขภาพและการจัดการตนเองครบ 6 เดือน มีความเปลี่ยนแปลงความดันโลหิตตัวบนลดลง 9.6 (95% CI; 5.2,14.0) mmHg ความดันโลหิตตัวล่างลดลง 6.2 (95% CI; 4.0, 8.2) mmHg และดัชนีมวลกายลดลง 0.8 (95% CI; 0.4,1.2) kg/ m2 แตกต่างจากกลุ่มควบคุมอย่างมีนัยสำคัญ(P<.001)ทั้งสามตัวแปร พบคะแนนเฉลี่ยพฤติกรรมการจัดการตนเองในกลุ่มทดลองเพิ่มขึ้น 0.4 (95% CI; 0.3, 0.4) มากกว่ากลุ่มควบคุมอย่างมีนัยสำคัญ (P-value <.001) คะแนนเฉลี่ยความร่วมมือในการรับประทานยาและการพบแพทย์ตามนัดเพิ่มขึ้นในกลุ่มทดลอง 0.6 (95% CI;0.2, 1.0)มากกว่ากลุ่มควบคุมอย่างมีนัยสำคัญ(P-value .004) คะแนนเฉลี่ยความแตกฉานทางสุขภาพสำหรับโรคเรื้อรังในการแลกเปลี่ยนประสบการณ์และการสังเกตตนเองในกลุ่มทดลองเพิ่มขึ้น 1.0 (95% CI; 0.6, 1.4) และ 1.0 (95% CI;0.5, 1.5) อย่างมีนัยสำคัญทางสถิติตามลำดับ (P-value <.001) ทั้งสองตัวแปร ขณะที่LDLในกลุ่มทดลองลดลง 23.8 mg/dL (P-value <.001)อย่างมีนัยสำคัญเมื่อเปรียบเทียบกับกลุ่มควบคุม

สรุป โปรแกรมผสมผสานความแตกฉานทางสุขภาพและการจัดการตนเองน่าจะมีประสิทธิผลในการลดความดันโลหิตสำหรับผู้ป่วยโรคความดันโลหิตสูงที่ควบคุมไม่ได้ในเขตชุมชนเมืองในกลุ่มทดลองเมื่อเปรียบเทียบกับกลุ่มควบคุมโดยการเพิ่มความแตกฉานทางสุขภาพโรคเรื้อรัง การจัดการพฤติกรรมการจัดการตนเอง ความร่วมมือในการรับประทานยาและการพบแพทย์ตามนัด

5879166853 : MAJOR PUBLIC HEALTH

KEYWORDS: HOME BLOOD PRESSURE / PRIMARY CARE / HEALTH LITERACY / SELF-MANAGEMENT BEHAVIORS / ADHERENCE

SAWITREE VISANUYOTHIN: EFFECTIVENESS OF INTEGRATED HEALTH LITERACY AND SELF-MANAGEMENT MODEL FOR HYPERTENSION CONTROL IN URBAN COMMUNITY, NAKHONRATCHASIMA PROVINCE, THAILAND. ADVISOR: PROF. SAMLEE PLIANBANGCHANG, M.D., 185 pp.

Background: Hypertension (HT) response a half of death from heart disease and stroke due to poorly-controlled hypertension. Many strategies have been approached poorly-controlled HT. The integrated health literacy and self-management model led care on poorly-controlled HT in urban area were few on reviewing. This study aimed to determine effectiveness of integrated program for poorly-controlled HT in urban community, Nakhorn Ratchasima, Thailand in experimental group comparing with usual care.

Methods: This was a quasi-experiment during January 2017- March 2018 of The catchment areas of two primary care unit (PCU) in urban area of Nakhorn Ratchasima, Thailand were selected to be one as an experimental group, and another one was a control group. Poorly-controlled HT patients were separately randomized 67 patients for each arm.. There were 63 and 60 poorly-controlled hypertensive patients who enrolled into experimental and control groups consecutively. Experimental group got the integrated program based on 20-items health literate care model (HLCM) and self-management (SM). Control group received usual care. Data was collected by valid and reliable interviewing questionnaire at baseline, 3-months, and 6-month and morning home blood pressure by village health volunteers for 7 days was applied to measure systolic home blood pressure (SHBP) and diastolic home blood pressure (DHBP) at baseline, 3-months, and 6-month. Biochemistry levels were tested at baseline and 6-month. Data analysis used descriptive statistic, and baseline comparison was analyzed by Chi-square, Fisher's Exact test, independent-t test and, Wilcoxan-Mann-Whitney test. Comparing the mean differences change of outcomes between experiment and control groups by confounders adjusting was analyzed by multiple linear regression.

Results: The experimental group which received the integrated health literacy and self-management model led care for 6 month resulting in reduction of SHBP 9.6 (95% CI; 5.2, 14.0) mmHg, DHBP 6.2 (95% CI; 4.0, 8.2) mmHg, and BMI 0.8 (95% CI; 0.4, 1.2) kg/ m2 comparing with the control group significantly (P<.001). The mean score of self-management behaviors in experimental group increased 0.4 (95% CI; 0.3, 0.4) comparing with the control group significantly (P-value <.001). The mean score of drug and appointment adherence 0.6 (95% CI; 0.2, 1.0) comparing with the control group significantly (P-value .004). The mean score of health literacy for chronic disease: experience sharing and self-observation significantly increased by 1.0 (95% CI; 0.6, 1.4) and 1.0 (95% CI; 0.5, 1.5) with (P-value <.001) both values. Whereas LDL in experimental group reduced 23.8 mg/dL comparing with control group significantly (P-value <.001).

Conclusion: The integrated health literacy and self-management model may effect to decrease blood pressure for poorly-controlled HT in urban community in experimental group comparing with control group by increase health literacy for chronic disease, self-management behaviors, and drug and appointment adherence.

Field of Study: Public Health	Student's Signature	....
Academic Year: 2017	Advisor's Signature	....

ACKNOWLEDGEMENTS

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LIST OF ABBREVIATIONS

AHRQ : Agency for healthcare research and quality

CAD : Coronary artery disease

CCM : Chronic care model

CHD : Coronary heart disease

CHF : Congestive heart failure

COPD : Chronic obstructive pulmonary disease

CSMBS : Civil Servant Medical Benefit Scheme

CVD : Cardiovascular diseases

CUP : Contracting unit of primary care

DAILYs : Disability-adjusted life-years

DHBP : Diastolic home blood pressure

DM : Diabetic mellitus

MFBP : Field morning blood pressure

GFR : Glomerular filtration rate

HBP : Home blood pressure

HBPM : Home blood pressure monitoring

HDL : High density lipoprotein

HLCM : Health literate care model

HLUPT : Health literacy universal precautions toolkit

HSRI : Health Systems Research Institute

HT : Hypertension or high/raised blood pressure

IHD : Ischemic heart disease

ITT : Intention to treat

IOM : Institute of Medicine

LDL : Low density lipoprotein

MY : Muangya

MPN : Multicomponent proactive nursing

NaCl : Sodium chloride

NCD : Non-communicable diseases

NHES : Thai health examination survey

NVS : Newest vital sign

PCU : Primary care unit

REALM : Rapid estimate of adult literacy in medicine

SCT : Social cognitive theory

SEA : South-East Asia

SHBP : Systolic home blood pressure

SLT : Social learning theory

SM : Self-management

SSS : Social Security Scheme

S-TOFLA: Short test of functional health literacy in adults

UC : Universal Coverage Scheme

VHV : Village health volunteer

YLLs : Years of life lost
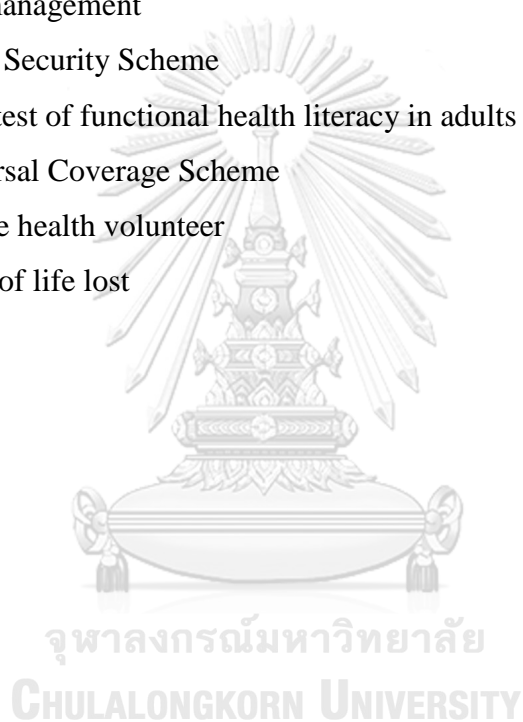
CHAPTER I

INTRODUCTION

This study was designed to evaluate the effectiveness of integrated health literacy and self-management model for hypertension control in urban community, Nakhon Ratchasima, Thailand. Background and rationale, research objectives, research questions, research hypothesis, conceptual framework, and operational definitions were included in this chapter.

1.1 Background and Rationale

Globally, adults aged ≥ 25 who had been diagnosed hypertension or high/raised blood pressure (HT) was around 40% in 2008. The HT prevalence, undiagnosed HT, untreated HT, and uncontrolled HT were higher in low and middle-income countries than high income countries[1]. Nearly three fourth of worldwide hypertensive population lived in developing countries and the HT prevalence was higher in urban areas comparing with rural area in the same country [2]. Consequently, HT is the major risk of cardiovascular diseases (CVD) which resulted in coronary heart disease (CHD), congestive heart failure (CHF), stroke, renal failure, and peripheral arterial disease[3]. A total number of deaths from NCD were 38 million that charged roughly 68% of occurred-worldwide death in the same year. CVD was leading cause of NCD death in 2012. HT is account for approximately 9.4 million global death every years[4]. HT response ≥ 45% of death from heart disease and 51% of death from stroke[1]. The estimated numbers of death from ischemic heart disease (IHD), stroke, and HT, and disability-adjusted life-years (DALYs) in 2012 were higher than in 2000. In 2008, HT prevalence of adult population in South-East Asia (SEA) was 36.6 %[5]. Less than 50% of the subjects were aware that they had hypertension. Among those who were aware, about half were on treatment. More than half of those who were on treatment had their blood pressure levels controlled at least 140/90 mmHg[6]. The estimated number of death from NCD in SEA was 7.9 million which 55% of total death was[7]. Based on Thai Health Examination Survey (NHES), HT prevalence in NHES I (1991-1992), NHES II (1996-1997), NHES III (2003-

2004), NHES IV (2008-2009, and NHES V (2012-2014) were 5.4%, 11.6%, 22.0%, 21.4%, and 24.7 respectively [8-11]. In 2014 survey, 69.8% of those who had HT were unaware of having HT. Of those HT patients who aware of having HT were able to control their blood pressure only 36.6%[12]. Additionally, the hospitalization from NCD in Thailand significantly increased[13]. The estimated number of deaths from NCD in 2010 was nearly 400,000 [7]. Stroke and IHD specific death rates from 2002 to 2014 were double [14] and HT accounted as the second order of cause of death in 2009[15].

Due to the risk of cardiovascular disease doubles with each incremental increase in blood pressure of 20/10 mmHg[6], poorly-controlled HT is the challenge especially systolic hypertension which is the main etiology of uncontrolled hypertension patients[16]. Many strategies have been used to approach poorly-controlled HT, which can be concluded into; 1. Self-monitoring, 2. Educational interventions directed to the patient, 3. Educational interventions directed to the health professional, 4. Health professional (nurse or pharmacist) led care, 5. Organizational interventions that aimed to improve the delivery of care, 6. Appointment reminder systems[17].Team-based care interventions for hypertension presented the effect of education on BP medication which decreased 8.75/3.60 mmHg. Moreover, the other strategies had large effects on SBP reduction; 9.30 mm Hg for treatment recommendation by pharmacist, 4.80 mm Hg for nursing intervention, 4.00 mm Hg for using a treatment algorithm[18]. In addition, multidisciplinary team approach to improve hypertension control in an urban underserved practice involving physicians, pharmacists, and registered nurses resulted in 51.6%-67.4% increased control rates, decreased stage 2 hypertension percentage, and rising of overall adherence[19]. Patient-centered care was applied to approach underserved primary care hypertension patients and it was observed that the large SBP reduction occurred among uncontrolled hypertension patients[20]. A multicomponent proactive nursing (MPN) program significantly improved blood pressure of elderly patients of primary care units in Thailand, SBP mean in experimental group decreased from baseline at 3 months -18.7 mmHg and at 6 months -15.5 mmHg [21]. Peer-delivering self-management was another strategy comparing educational seminar by professional to support hypertension significantly, which reduced SBP -3.4 mmHg and -5.4 mmHg

respectively without significant difference between both group [22]. Similarly, self-titration intervention presented that self-management succeeded by training to monitor BP and self-titrate medication[23]. Whereas educational interventions were unlikely associated with large net reductions in blood pressure, either to health professionals or patients, does not appear to be associated with large net blood pressure reductions as well[17].

Health and Literacy is an important asset for a living. The low health literacy person had worse health status and pass a way faster than it should be [24-27]. Furthermore, primary care clinicians and entire multidisciplinary team have a limited time spending adequate explain diagnoses, treatment, and recommendation. There were few tools and resources available to primary care. Assessment health literacy tools were created such as Rapid Estimate of Adult Literacy in Medicine (REALM), Short Test of Functional Health Literacy in Adults (S-TOFLA), and Newest Vital Sign (NVS). Ask Me 3^{TM}, the teach back method, and motivational interviewing shown some evidence to improve communication with low health literacy patients. These and environmental change can improve patient quality and patient safety[28]. Institute of Medicine (IOM) also agreed that health literacy depend on relationship between individual skills with health context, health system, health care system, education, social, and culture in home, workplace and community[29]. Wagner proposed the chronic care model (CCM) which is a systematic approach to improving health service delivery[30]. Although CCM has been wildly used, it was insufficient for patient engagement and there was need for health care provider to approach all patients with the assumption that they are at risk of not understanding information, thus health literate care model (HLCM) was built by the 2010 Agency for Healthcare Research and Quality (AHRQ) Health Literacy Universal Precautions Toolkit. It represents comprehensively, synergistically, proactively, and a practical systems framework to adapt to all patients' health literacy challenges. Therefore HLCM could reduce duplication and inefficiency and also improve patient's understanding of and engagement in health care[31]. Additionally, self-regulation behaviors leads self-efficacy and enhancing to engage in self-management (SM) behaviors. Self-regulation is based on the social learning theory (SLT)/social cognitive theory (SCT) including goal-setting, self-monitoring and reflective thinking, decision-making, planning and

action, self-evaluation, and management of physical, emotional and cognitive responses associated with health behavior change [32]. The integrated program between comprehensive organization improvement and self-management on poorly-controlled HT in urban area were few on reviewing. The comprehensive program was created based on the integration of HL concept, CCM, SM concept. This study aims to determine effectiveness of integrated health literacy and self-management model on poorly-controlled HT in urban area (MY 4 CUP) of Nakhon Ratchasima Province, Thailand.

1.2 Research Questions

Does the integrated health literacy and self-management model effectively improve outcomes on poorly-controlled HT patients in urban area, Nakhon Ratchasima, Thailand?

1.3 Research Objectives

General Objective

To evaluate the effectiveness of integrated health literacy and self-management model on improvement of poorly-controlled HT comparing between experiments and controls in urban area, Nakhon Ratchasima, Thailand.

Specific Objectives

1) To constructed the appropriated program for poorly-controlled hypertension patients in urban community based on HLCM and SM theories.

2) To explore the baseline of demographic, process outcomes (lifestyle and management knowledge and health literacy for chronic diseases), functional outcomes (self-management behavior and adherence), and clinical outcomes (blood pressure, body mass index, waist circumference, and biochemistry level) of experimental group and control group among poorly-controlled hypertension patients in urban community. To compare baseline data between experimental group and control group.

3) To compare change of process, functional, and clinical outcomes within/between experiments and controls of poorly-controlled hypertension patients in urban community.

1.4 Research Hypothesis

The poorly-controlled HT who receive integrated health literacy and self-management model will have more improvement of clinical, functional, and process outcomes than the poorly-controlled HT who do not receive integrated program.

1.5 Conceptual Framework

This study employed quasi-experiment research design to determine the effectiveness of integrated health literacy and self-management model on improvement of poorly-controlled HT in urban community under accountability of MY 4 CUP in Muang district, Nakhon Ratchasima, Thailand. The conceptual framework of this study is shown in Figure 1.

Experimental group got integrated health literacy and self-management model

Demographic characteristic
-Age
-Gender
-Marital Status
-Education level
-Household Income
-Occupation
-Health Insurance
-Smoking history
-Alcoholic drinking history
-Medical conditions
-Medication administration

Control group got usual care

Outcomes
-Main outcomes
Clinical Outcomes:
HBP (SHBP/DHBP)
-Secondary outcomes:
1. Process Outcomes:
    1.1 Lifestyle and management knowledge
    1.2 Health Literacy for Chronic Diseases
2. Functional Outcomes:
    2.1 Self-management behaviors
-healthy diet
-regular exercise
-monitoring blood pressure
    2.2 Adherence
-Appointment non-adherence
-Medication non-adherence
3. Clinical Outcomes:
    3.1 BMI (kg/m2)
    3.2 WC (cm)
    3.3Biochemistry level
-LDL cholesterol,
-HDL cholesterol,
-Triglycerides,
-Albuminuria,
-GFR

Figure 1 The conceptual framework

1.6 Operational Definitions

1.6.1 Integrated health literacy and self-management model: refer to the program which is constructed based on the integration of HL concept, CCM, SM concept. Firstly, involved stakeholder defined needs of health system improvement in experimental are based on HLCM. Then the program was constructed and revised by all stakeholders in first phase in this study. This integrated program comprised activities as following 1) established a collaborative team; 2) installed software; 3) provided the HT CPG; 4) created a picture book; and 5) produced a two-day workshop to increase HT self-management using a music video that encouraged self-care. Which a two-day workshop was implemented in the early of the second phase. After that, poorly-controlled HT did HBPM supporting by VHVs for 6-months. They got two home visits by their family nurse at a 4-months for a first visit and a 6-months for second visit.

1.6.2 Dependent variables: refer to clinical, functional and process outcomes. The poorly-controlled HT patients got the integrated program, which the two-day activities would increase level of lifestyle and management knowledge and health literacy for chronic diseases. Therefore lifestyle and management knowledge and health literacy for chronic diseases were named process outcome. They supposed to have the better level of process outcomes then they would perform HBPM supporting by VHVs for 6-months and they got two home visits from family nurses. These should lead them to have the better of self-management behavior and adherence. Thus both self-management behavior and adherence were functional outcomes. If the poorly-controlled HT patients have higher level of functional outcomes than previous, these might lead the better controlled SBP/DBP. Raised blood pressure is an intermediate risk factors of chronic diseases (heart disease, stroke, cancer, chronic respiratory diseases, and diabetes)[33]. However, this study mainly focused on SHBP/DHBP change which were defined as the main clinical outcomes. Overall, this integrated program should firstly improve process outcomes. Then the better level of process outcomes should enhance the better functional outcomes. Eventually, the better clinical outcomes would be effected from functional

outcomes. The description of clinical outcomes, functional outcomes, and process outcomes were as below.

      1) Clinical outcomes: refer to SHBP/DHBP, BMI, WC, and biochemical factors containing low density lipoprotein (LDL)/ high density lipoprotein (HDL)-cholesterol (mg/dL), triglycerides (mg/dL), Albuminuria, and Glomerular filtration rate (GFR)

      2) Functional outcomes: refer to self-management behaviors and adherence.

      3) Process outcomes: refer to lifestyle and management knowledge and health literacy for chronic diseases

      4) Morning field blood pressure (MFBP): refers to the value of pressure from heart contraction and relaxation in order to supply every body organs. Taking blood pressure measurement, the individual needs to sit privately and quietly on a chair in comfortable room. Three measurements were performed by VHVs for 7 days. The average of the second and third values of in each day of 7 days, 14 values were calculated to be a representative of SHBP/DHBP at that time. The field morning blood pressure change was followed in mmHg of individual until ending of the study. Controlled HBP means HT patient who has average SHBP<135 mmHg, and average DHBP<85mmHg measuring, which were used similar to home blood pressure monitoring (HBPM) [34, 35].

      5) Home blood pressure monitoring (HBPM): refers a self-management tool which poorly-controlled HT patients measure the value of pressure from heart contraction and relaxation in order to supply every body organs by themselves in their home twice in the morning and twice in the evening every day for 6 months[34, 35], except the day of MFBP measurement. HBPM is taking blood pressure measurement by the individual sit privately and quietly on a chair in comfortable room.

      6) Body mass index (BMI): refers to result the individual's weight and height which family nurse measured by standard material. The researcher brought those results to calculate each BMI of sample by the below formula.

$$\text{BMI} = \frac{\text{mass (kg)}}{(\text{height(m)})^2}$$

BMI was firstly categorized as 5 categories as following; Underweight (<18.5 kg/ m^2), Normal (18.6-22.9 kg/ m^2), Overweight/Pre-obese (23-29.9 kg/ m^2), Obesity stage I (30-34.9 kg/ m^2), Obesity stage II (≥35 kg/ m^2) based on the Steering Committee of Regional Office for Western Pacific Region of WHO (WPRO 2000), the International Association for the Study on Obesity and the International Obesity Task Force (IOTF) proposed the appropriateness of the classification of obesity in Asia in 2000. Secondly, the researcher followed BMI change in kg/ m^2 of individual until ending of the study.

7) Waist Circumference: was determined by measure at the end of several consecutive natural breaths, at a level parallel to the floor, midpoint between the top of the iliac crest and the lower margin of the last palpable rib in the mid axillary line**.** The normal value was equal or less than 90 cm. and 80 cm for male and female in orderly[36]. WC was firstly categorized into normal and higher than normal by combination from subgroup analysis in each sex. Secondly, the researcher followed WC change in cm of individual until ending of the study.

8) Biochemistry level: refers to the results level of blood and urine as following; LDL/HDL-cholesterol (mg/dL), triglycerides (mg/dL), Albuminuria, and GFR. The researcher followed biochemistry level change in each type unit of individual until ending of the

- LDL was divided into normal (≤ 130 mg/dL) and higher than normal (>130 mg/dL).

- HDL for female was categorized into normal (≥ 50 mg/dL) and lower than normal (< 50 mg/dL). HDL for male was categorized into normal (≥ 40 mg/dL) and lower than normal (< 40 mg/dL).

- Triglyceride was divided into normal (≤ 150 mg/dL) and higher than normal (>150 mg/dL).

- GFR calculating by modification of diet in renal disease (MDRD) used to define patient into 5 stages of chronic kidney disease; stage I GFR≥ 90 ml/min/1.73m2, stage II GFR=60-89 ml/min/1.73m2, stage III GFR=30-59 ml/min/1.73m2, stage IV GFR=15-29 ml/min/1.73m2, stage V GFR <15 ml/min/1.73m2.

- Albuminuria has 3 categories as normoalbuminuria (albumin/ creatinine ratio (ACR < 30 mg/gcreatinine), microalbuminuria (ACR = 30-300 mg/gcreatinine), and macroalbuminuria (ACR >300 mg/gcreatinine)

9) Life style and management knowledge: refer to general hypertension knowledge, lifestyle and medication management, and measurement and treatment goals which measure by the hypertension evaluation of lifestyle and management (HELM) scale[37]. Lifestyle and management knowledge total score was 10, knowledge was categorized into low (<6), moderate (6-7), and high ($\geq$8)[38].

10) Health literacy: refers to the level of literacy and potential literacy, and self-care of chronic patients (experience sharing and self-observation) by applying self-administered questionnaire of Thai's health literacy level which constructed by Health Systems Research Institute (HSRI) of Thailand[39]. The total score of literacy and potential literacy was 4 and was divided into poor (1.1 - 2.0), fair (2.1 - 3.0), and good (3.1 - 4 .0). The total score of self-care of chronic patients was 10 but HSRI was not categorized into any group[39].

11) Self-management behaviors: refer to participants' perception about the importance of healthy diet, regular exercise, and monitoring blood pressure; frequency of self-management behaviors including how often salt is added to meals, frequency and intensity of exercise, and how often participants check their blood pressure[40]. The maximum score for self-management behaviors was 3; participants were grouped into inadequate (1-1.67), moderate (1.68-2.34) and adequate (>2.34)[41].

12) Adherence: Adherence had 2 sub-categories as medication non-adherence[42] and appointment non-adherence[43]. Medication non-adherence scale measures patients medication-taking behavior by a self-report questionnaire with yes or no questions, except the last question that have five alternatives (never or rarely/once in a while/sometimes/ usually/all the time). Appointment non-adherence had 3 categories as every time, sometime, and never. Appointment and medication adherence questionnaires were constructed in Thai context. The total score of drug and appointment adherence was 8, and was categorized into high (8), moderate (6 to 7), and low (score <6)[42, 43].

1.6.3 Independent Variables

1) Age: was determined as the age in complete years of a participant at the first time of interview.

2) Marital status: refers to a participant's marital status and categorized as:

Single refers to a person who is not married.

Married refers to a person married customarily or legally and currently living with the husband/wife.

Separated refers to a participant who has been married but is no longer living with his/her partner; they have not been divorced.

Divorced refers to a participant who has been married but is no longer living with his/her partner; they have been formally divorced.

Widowed refers to a participant whose husband/wife has died.

Cohabiting with an un-married partner refers to a de facto relationship in which a participant is living with a partner although they are not legally married.

3) Education level: refers to the highest level of education in which the participants may have passed an examination or successfully completed a course requirement. It is categorized as: university, diploma, high school, primary school, and no education.

4) Occupation: occupation is defined as the job of the participant. It is categorized as: government employee/government enterprise employee, private business, laborer, student, private sector employee, un-employed, and other.

5) Health insurance: refers to insurance against the risk of incurring medical expenses among individuals and this study recognizes three schemes in Thailand: civil servant medical benefit scheme (CSMBS), social security scheme (SSS), universal coverage scheme (UC); a no health insurance is the fourth category.

6) Smoking history: refer to the self-reporting of smoking which divided into never smoking, ever smoked, and currently smoking.

7) Drinking history: refer to the self-reporting of alcoholic drinking which divided into never drinking, ever drank, and currently drinking.

8) Medical conditions: refer to the chronic diseases which they had as osteoarthritis, peptic ulcer, chronic obstructive pulmonary disease (COPD), diabetic mellitus (DM), asthma, coronary artery disease (CAD), dyslipidemia, renal disease, chronic bronchitis, arrhythmia, and cerebrovascular disease.

9) Medications administration: refer to currently administration of antihypertensive medications which patients were order from the doctor to manage by preparation and reminder.

CHAPTER II
LITERATURE REVIEW

The purpose of this study is to evaluate the effectiveness of integrated health literacy and self-management model on improvement of poorly-controlled HT comparing between experiments and controls in urban area, Nakhon Ratchasima, Thailand.

The reviewed literature of the study has been organized as follows:

2.1 Situation of Hypertension (HT) and Non-Communicable Diseases (NCD)

2.2 Determinants and Risk Factors of NCD and HT

2.3 Hypertension

2.4 Factors Associated Poorly-Controlled Hypertension

2.5 Interventions for Poorly-Controlled Hypertension

2.6 Health Literacy and Hypertension

2.7 Chronic Care Model

2.8 Chronic Care Model and Health Literacy

2.9 Self-Management and Self-Management Supports

2.10 Program Development

2.1 Situation of Hypertension (HT) and Non-Communicable Diseases (NCD)

Global Situation

Adults aged ≥ 25 who had been diagnosed hypertension or high/raised blood pressure (HT) was around 40% in 2008. The HT prevalence, undiagnosed HT, untreated HT, and uncontrolled HT were higher in low and middle-income countries than high income countries[1]. Nearly three fourth of hypertensive population in the world lived in developing countries and the hypertension prevalence was higher in urban areas comparing with rural areas in the same country[2]. The HT prevalence

increases because of the population growth, ageing, and behavioral risk factors, such as tobacco use, harmful use of alcohol, unhealthy diet, lack of physical activity, excess weight, and persistent stress[1]. Consequently, HT is the major risk of CVD which resulted in CHD, CHF, stroke, renal failure, and peripheral arterial disease[3]. In some age groups, the risk of cardiovascular disease doubles with each incremental rising in BP of 20/10 mmHg, starting from 115/75 mmHg[6]. In case of hypertensive complications, households often spend money on health care which resulting in catastrophic health expenditure due to long term conditions. Expenditure on CVD accounted for 20% of total health expenditure and the annual loss was 4% of gross domestic product relating to the major NCD in low and middle-income country[1]. Additionally, poorly-controlled HT significantly related with higher drug cost and more physician visit[44].

Cardiovascular diseases were leading cause of NCD death in 2012. A total number of deaths from NCD were 38 million that charged roughly 68% of occurred-worldwide death in the same year. Likewise, HT is account for approximately 9.4 million global death every years[4]. Moreover, HT response $\geq$ 45% of death from heart disease and 51% of death from stroke[1]. The estimated numbers of death from IHD, stroke, and HT in 2012 were higher than in 2000. HT had the globally estimated of thousand years of life lost (YLLs) 18,874 and 22,914 for the year 2000 and 2012 respectively. Disability-adjusted life-years (DALYs) estimated and top-5 of DALYs for HT, IHD, and stroke of the years 2000 and 2012, those had increased picture as well as YLLs of HT[5].

South East Asia Situation

The estimated number of death from NCD in SEA was 7.9 million which 55% of total death was. Of 7.9 million deaths. In addition, 3.6 million people died from CVD accounting as 25% of all deaths[8]. Raised blood pressure or hypertension is a major risk factor for coronary heart disease and ischemic as well as hemorrhagic stroke. Number of deaths from NCD in 2012 of Thailand was the second range of SEA[7]. In 2008, HT prevalence in SEA adult population was 36.6 %.The highest prevalence was 42.0% in Myanmar but the lowest prevalence was in Thailand as 34.2%[8]. Some countries like India, Indonesia, and Myanmar, indicated an increasing trend in the prevalence of hypertension. The information was available in four of the

eight countries, less than 50% of the subjects were aware that they had hypertension. Among those who were aware, about half were on treatment. More than half of those who were on treatment had their blood pressure levels controlled at least 140/90 mmHg[6]. The percentage of Thai hypertensive patients who aware of their hypertensive status was 56.6%, 48.6% was on treatment, and 20.9% had controlled-blood pressure. The estimated numbers of death in SEA from IHD, stroke, and HT in 2012 were higher than in 2000. Additionally, IHD and stroke were top-5 causes of YLL and DALYs in both years as well as worldwide picture [5].

Thailand Situation

The estimated number of deaths from NCD in 2010 was nearly 400,000 [7]. HT specific death rate obviously reduced during 2003-2007 but it rose again between 2008 and 2009[45]. Stroke and IHD specific death rates from 2002 to 2014 were double[14]. In 2009, a comparative risk assessment of health burden attributable to modifiable risk factors showed that HT accounted 42,133 deaths as the second order of cause of death. Tobacco smoking, high cholesterol, high body mass index (BMI), and alcohol use accounted for 50,710, 28,795, 26,014, and 22,672 deaths consecutively. Of total DALYs in males, nearly 30 % attributed to alcohol using and smoking. About 17% of total DALYs in female attributed to high BMI, HT, and high blood cholesterol[15]. NCD was in top twenty leading causes of DALYs in both 1999 and 2004[46]. In 2009, NCD was the main in top ten cause of death in Thailand[7].

Based on Thai Health Examination Survey (NHES), HT prevalence in NHES I (1991-1992), NHES II (1996-1997), NHES III (2003-2004), NHES IV (2008-2009, and NHES V (2012-2014) were 5.4%, 11.6%, 22.0%, 21.4%, and 24.7 respectively [8-11]. HT rate per 100,000 population rose during 1992-1999 and it decreased in 2000, and then it constantly increased during 2001-2010[45]. In 2014, there was a few change, which the prevalence of HT among adults male and female were 22.9% and 19.9% in orderly[47]. For NHES III (2003-2004), 69.8% of those who had HT were unaware of having HT. Of those HT patients who aware of having HT were able to control their blood pressure only 36.6%[12]. NHES IV (2008-2009) pointed that 60% of male HT and 40% of female HT were not diagnosed[7]. NHES V (2012-2014) presented that 54.2% of male HT and 35.2% of female HT were not diagnosed[11]. In spite of increase the percentage of treated and controlled

hypertension from 9% in 2003-2004 to 21% in 2008-2009 [48] and to 30% in 2012-2014[11], the hospitalization from NCD in Thailand significantly increased during 1985-2006 [13] and the HT admission rates per 100,000 per year was around sixteen fold rising from 99.2 (1992) to 340.99 (2002) and to 1570.6 (2012)[49]. HT patients were admitted 17.9 % of total hospitalization in 2011[7].

Table 1 Prevalence of hypertension from NHES 1-5 in Thailand

Items of Prevalence	Prevalence (%)				
	NHES 1 (1991-1992)	NHES 2 (1996-1997)	NHES 3 (2003-2004)	NHES 4 (2008-2009)	NHES 5 (2012-2014)
Total Prevalence	3.4	11.6	22.0	21.4	24.7
Non-Diagnosed	na	na	71.4	50.3	44.7
Diagnosed and Non-Treated	na	na	5.0	8.7	6.1
Diagnosed and Treated	na	na	23.6	41.1	49.2
-Uncontrolled BP	na	na	15.0	20.2	19.5
-Controlled BP	na	na	8.6	20.9	29.7

na: non-assessment

Health Region 9 consists of Nakorn Ratchasima, Chaiyapoom, Buriram, and Surin provinces which have had the rising prevalence of cerebrovascular and heart diseases during 2014-2017. Muang District is the center of the Nakorn Ratchasima province with total population was 4 69,682 in 2014. Muangya 4 CUP (MY4 CUP) was responsible for about sixty-six thousand people in the central part of Muang district. The HT prevalence of MY4 CUP has been steadily rising, and the prevalence in 2016 was 1.6 times of the prevalence in 2007. Nearly half of those HT patients in MY 4 CUP who were treated were controlled patients during 2007-2013. However, the percentage of controlled patients in MY 4 CUP were 36.84, 33.93, and 25.43 in 2014, 2015, and 2016 orderly. While the admission per 100,000 population rate of stroke in MY 4 CUP has been increasing during 2012-2016.

2.2 Determinants and Risk Factors of NCD and HT

Globalization, urbanization and population ageing were the underlying socioeconomic, cultural, political, and environmental determinants of chronic diseases. These influenced common modifiable risk factors (unhealthy diet, physical inactivity, and tobacco use) and non- modifiable risk factors (age and heredity) of chronic diseases. Both modifiable and non-modifiable risk factors induced intermediate risk factors (raised blood pressure, raised blood glucose, abnormal blood lipids, and overweight/obesity) resulting in chronic diseases (heart disease, stroke, cancer, chronic respiratory diseases, and diabetes)[33]. Likewise, the increase of HT prevalence in SEA have been being driven by an ageing population and adverse changes in risk factors such as tobacco use, decreased physical activity, and inappropriate diet, especially an increase in salt consumption[6]. Smoking significantly rose CVD risk and all-cause mortality in HT patients; also, it had the effect on blood pressure category[50]. A study in Thailand revealed that people who were female or age ≥60 years were more likely to be hypertension. People who lived in the south and the north of Thailand were less likely to be hypertension than living in Bangkok[51]. Whereas a 4-years (2005-2009) cohort study in Thai opened- university students found that men had higher incidence of hypertension than women. Current smoking and regular drinking in men and having partner in women raised risk of hypertension. Additionally, age, BMI, and comorbidities related with hypertension in both sexes. But economic and education were not associated hypertension[52]. The surveys 1,079 volunteers at one district in Thailand reported that male gender, advance age (from 40-69 years old), over weight and/or obesity, and alcoholic drinking significant associated with BP increase[53].

2.3 Hypertension

Pathophysiology

Arterial pressure is determined by cardiac output and peripheral resistance. A high NaCl intake has potential role to elevate arterial pressure. Additionally, norepinephrine, epinephrine, and dopamine bind α and β adrenergic receptor, these

binding regulate blood pressure. The α1 receptor elicit vasoconstriction in smooth muscle cell and increase sodium reabsorption at renal tubular. The α2 is activated by catecholamine which allow negative feedback and inhibit norepinephrine release. Myocardial β1 receptor activation results in cardiac output rising by stimulating rate and strength of cardiac contraction and β1 stimulate renal renin release also. Epinephrine activates β2 receptor, this causes smooth muscle relaxation and vasodilation. HT often relates with increase sympathetic outflow both normal-weight and obese individual. Moreover, arterial pressure is regulated by renin-angiotensin-aldosterone system. Angiotensin II causes vasoconstriction and aldosterone retains sodium. Renin secretion is stimulated by decrease of NaCl transportation at loop of Henle, decrease renal afferent arteriole pressure, and β1 adrenoreceptor stimulation. Renin is converted to Angiotensin I and II. Besides, arterial vascular diameter and its resistance compliance are the imperative determinants of arterial pressure. Atherosclerosis stiffens arteries leading HT and lower vascular compliance causes high SBP and wide pulse pressure. Additionally Na^+-H^+ exchange induces HT via two mechanisms. Firstly, sodium entry rising may cause vascular tone increase by stimulate Na^+-Ca^{2+} exchange and whereby augmenting intracellular calcium. Secondly, pH increasing enhances calcium sensitivity for increased contractility which giving intracellular calcium concentration[54].

Pathologic Consequences

Heart: hypertensive heart disease is the most common cause of death in HT patients. Structural and functional adaptation of heart cause left ventricular hypertrophy (LVH), CHF, abnormal blood flow from atherosclerotic of coronary and microvascular disease, and cardiac arrhythmias. LVH risks CHD, stroke, CHF, and sudden death[54].

Brain: increased blood pressure is the strongest risk factor of stroke, which due to infarction 85%. Stroke incidence increases progressively with elevated blood pressure level especially SBP in patients > 65 years. HT also associated cognitive impairment and dementia may be due to infarction[54].

Kidney: kidney causes HT by diminished sodium excretion, excessive renin production, and over-activity of sympathetic nervous system. In contrast, HT influences renal injury and end-stage renal disease (ERSD). The higher blood pressure

and the longer of exposure increase risk of renal damage. Renal risk associated to SBP than DBP. [54].

Peripheral arteries: after long-standing increased blood pressure, atherosclerosis arises in blood vessels of heart, brain, kidney, and lower extremities. Lower extremities stenosis may be asymptomatic occurrence but intermittent claudication is a common of peripheral artery disease (PAD)[54].

Diagnosis

Assessment HT patients should include history taking, physical examination, and screen for CVD risks, comorbidities, complications , secondary causes, and life styles to determine the potential intervention. Most of HT patients have no specific symptoms therefore measurement of blood pressure is a standard method to diagnose HT. Before taking blood pressure measurement, the individual needs to sit privately and quietly on a chair in comfortable room. Two measurements should be taken at least. HT is defined as systolic and/or diastolic blood pressure (SBP and/or DBP) consistently >95th percentile for age, sex, and height which the unit of SBP and DBP is mmHg. HT are classified as normal blood pressure (SBP<120 and DBP<80), prehypertension (SBP 120-139 or DBP 80-89), hypertension (stage I (SBP 140-159 or DBP 90-99) and II (SBP $\geq$ 160 or DBP $\geq$ 100)), and isolated systolic hypertension (SBP $\geq$ 140 and DBP <90)[54]. Nowadays, HT diagnosis should be based on clinic BP measured on at least two different occasions. Home BP monitoring (HBPM) and ambulatory BP monitoring (ABPM) were recommended to use complementary with clinic BP for diagnosis of HT.[34, 35] However, a study revealed that HBPM had superiority comparing with clinic BP measurement in diagnosis of poorly-controlled HT, assessment of antihypertensive drug effects and patients 'compliance and HT control. HT.[35]

Treatment

Lifestyle intervention: Implication lifestyle modification is for both the prevention and the treatment of HT. Health promoting lifestyle is recommended for prehypertension and HT patients as an adjunct to drug therapy. In short-term trials, weight loss and controlled- NaCl diet prevented the HT development. The effective dietary modifications in order to reduce blood pressure are weight loss, decreased NaCl intake, increased potassium taking, moderation of alcoholic drinking, and a

general healthy diet pattern. Mean body weight loss 9.2 kg results in reduction SBP as 6.3/DBP as 3.1 mmHg. Regular physical activity enhances weight loss, reduces blood pressure, and lowered overall CVD risks[54]. Limited NaCl intake 4.4-7.4 g leads to lowered blood pressure 3.4-4.9/ 0.9-2.9 mmHg; however, the individual has various sensitivity of blood pressure reduction to NaCl[54]. Nacl reduction associated with urinary Nacl excretion decrease and SBP reductions between 1 and 4 mm Hg. There was no sufficient power to exclude clinically important effects of reduced dietary salt on mortality or CVD morbidity[55]. Potassium and calcium have conflicting antihypertensive effects. Alcoholic consumed reduction affects blood pressure decrease. The Dietary Approaches to Stop Hypertension (DASH) trial presented the lower blood pressure in 8-weeks by a diet high in fruits, vegetables, and low-fat products in a high-normal blood pressure person or mild HT patient[54].

Pharmacologic therapy: antihypertensive drugs are recommended to patients who have blood pressure ≥140/90 mmHg. Reducing SBP by 10-12 mmHg and DBP by 5-6 mmHg have relevant to relative risk reduction within 5 years of treatment initiation 35-40% of stroke, 12-16% of CHD, and CHF risk reduces by 50%. Controlled HT is the most effective intervention to delay HT-related kidney disease progression. After placebo effects correction, most available antihypertensive drugs decrease SBP by 7-13 mmHg and DBP by 4-8 mmHg. Combination of drugs and complementary antihypertensive mechanisms are needed to reach blood pressure goal[54]. Based on JNC 8, in general population aged ≥60 years, antihypertensive drugs starting was recommended if SBP ≥150 mmHg or DBP ≥90 mmHg with gold target as SBP< 150 mmHg and DBP<90 mmHg. In general population aged < 60 years, the BP target is SBP < 140 mmHg and DBP< 90 mmHg. Likewise, the population aged ≥ 18 years with chronic kidney disease (CKD) or with DM have the same target. The first line drugs or the second line drugs were thiazide-type diuretic, calcium channel blocker (CCB), angiotensin-converting enzyme inhibitor (ACEI), and angiotensin receptor blocker (ARB)[56].

2.4 Factors Associated Poorly-Controlled Hypertension

The cross-sectional study of urban African-Americans with severe, poorly-controlled hypertension revealed the associated factors of appointment non-adherence including lack of health insurance, insurance without medication coverage, inadequate hypertension knowledge, experience of side effects, not finishing high school, high cost of discharge medications, belief that medication do not work, medication non adherence, perceived self-reported barriers to appointment attendance included forgetfulness, transportation, trouble getting through at the doctor's office, and feeling that appointments are not helpful[43]. Likewise, A study of elderly in urban primary care practiced pointed that self-perception adherence was associated with higher BP[57]. Male sex, black race, Hispanic ethnicity, only 0 or 1 health care visit per year, and lower of having diabetes mellitus as co-morbidity were associated with uncontrolled HT. The most common for poorly-controlled BP was lack of treatment even having awareness of patients. The second uncontrolled HT was those inadequate treated with only 1 or 2 medications. Of those, 85%-90% had at least 2 visits per year. This was therapeutic inertia which was a major contributor to poor-controlled BP[58]. There was a large international study, which elevated SBP, DBP, and uncontrolled hypertension associated with increasing body mass index (BMI), waist circumference (WC), LDL-cholesterol, triglyceride, HbA1c, and C-reactive protein (CRP). But HDL-cholesterol was not related with blood pressure level[59]. A cross-sectional study in 559 non-diabetic hypertensive patients in outpatients departments illustrated 16.6% (albumin-creatinine ratio (ACR) 17 to 299 mg/g in males and 25 to 299 mg/g in females). Body mass index $\geq$30 (OR=2.24, 95% CI: 1.33-3.76) and dihydropyridine calcium channel blockers (DCCB) use (OR=1.92, 95% CI: 1.22-3.02) were more likely had elevated urinary albumin excretion. The poorly-controlled HT was observed more frequently in subjects with increased level of albuminuria[60]. It was observed that systolic hypertension is the main etiology of uncontrolled hypertension patients[16].

2.5 Interventions for Poorly-Controlled Hypertension

Multidisciplinary team approach to improve hypertension control in an urban underserved practice involving physicians, pharmacists, and registered nurses resulted in 51.6%-67.4% increased control rates, decreased stage 2 hypertension percentage, rising of overall adherence, and the higher percentage of control rates in resistant hypertension patients [19]. Likewise, a systematic review of the potency of team-based care interventions for hypertension presented the effect of education on BP medication which decreased 8.75/3.60 mmHg. Moreover, the other strategies had large effects on SBP reduction; 9.30 mm Hg for treatment recommendation by pharmacist, 4.80 mm Hg for nursing intervention, 4.00 mm Hg for using a treatment algorithm. There was no significant differences between the nursing and pharmacy studies[18]. Similarly, a non-randomized, retrospective comparison study of poorly-controlled hypertension approach between taking care by clinical pharmacy specialists (CPSs) and registered nurses case management (RNCM) with patient aligned care teams (PACT) model comparing with physician- directed RNCM. Both models similarly reduced blood pressure[61]. Systematic review and meta-analysis of randomized controlled trials shown that community pharmacists had important roles as giving patients education, managing of prescribing and safety problems associated with medication, and giving lifestyle advice. These roles led significant decrease 6.1 (3.8-8.4) mmHg of SBP and 2.5 (1.5-3.4) mmHg of DBP[62]. Similarly, a multicomponent proactive nursing (MPN) program significantly improved blood pressure comparing with control of elderly patients of primary care units in Thailand. The SBP mean in 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[21].Patient-centered care was applied to approach underserved primary care hypertension patients. Physicians were trained to provide five specific behaviors: 1) elicit the full spectrum of patients' concerns; 2) probe patients' hypertension knowledge and beliefs; 3) monitor adherence and identify barriers; 4) assess adherence related lifestyle and psychosocial issues; 5) elicit commitment to therapeutic plan. Patients were asked by trained community health workers (CHWs) to think about any changes they wanted to make regarding interactions with their

physicians; allowed patients to practice disclosing concerns, asking questions, and stating preferences; provided pocket–sized diaries for patients to record their appointments, medications, and questions; and helped patients identify sources of support for their new behaviors and strategies to overcome anticipated problems. The preparing for clinic visits with a listing of concerns were reinforced by telephone follow up. The results illustrated the more patient-centered care in experimental group than control but there was no significant SBP decrease in experimental group. However, it was observed that the large SBP reduction occurred among uncontrolled hypertension patients[20]. Similarly, a cluster randomized trial aiming to control BP in low-income patients in Argentina illustrated that community health worker-led home intervention, get online education and standard treatment from primary care physician, and text-message to 18 centers for 18 months significantly decreased SBP and DBP by 19.3 mmHg and 12.2 mmHg in experimental group and usual care orderly. The reduction difference was 5.4 mmHg and the different proportion of controlled HT patients rising was 20.6% comparing between intervention and usual care. Specifically, community health workers were trained to be a coach for patients and family members about HBPM, drug adherence and lifestyle modification[63].

HBPM has been used for diagnosis and HT control for many decades in developed countries. Superiority of HBPM comparing with clinic measurement in uncontrolled HT diagnosis, antihypertensive drug assessment, compliance improvement, and HT control were defined. HBPM is one useful intervention which was proved to be lowering BP effectively. Medication compliance was improved by HBPM especially when combining with other adherence strategies. HBPM would be very effective for HT control because of avoidance of white-coat hypertensive treatment and the better HT control[64].

A systematic review pointed many interventions directly significantly improved medication adherence. Improving knowledge of medication occupied the potential value in improving adherence with anti-hypertensive therapy. However, most interventions did not focus on multiple diseases[65]. In contrast, the previous systematic review of RCTs of interventions to increase adherence to blood pressure lowering medication in ambulatory setting shown that patient educational intervention alone appeared largely unsuccessful. Simplification of dosing increased adherence

ranging from 8 to 19.6 per cent in seven out of nine studies but there was inconclusive evidence for the effect of motivational and more complex interventions. Seven out of 58 interventions presented effect on both adherence and blood pressure[66].

A randomized trial of peer-delivering self-management comparing educational seminar by professional to support hypertension significantly reduced SBP 3.4 and 5.4 mmHg respectively: however; there was no difference of SBP level between 2 groups[22]. Self-titration intervention presented that self-management succeeded by training to monitor BP and self-titrate medication. Overall mean BP decreased over the 12 months; SBP decreased by 18.3 mm Hg while DBP decreased by 7.7 mm Hg[23]. Self-management program was constructed for Thai hypertensive patients at risk for stroke with four phases; problem assessment, need identification, preparation for self-management, practice for self-management, and evaluation self-management phases resulted in the significant higher blood pressure control in the experimental group (36%) which was more than the control group (8%)[67].

Overall, HT control in community needs a rigorous approach and the range of interventions can be concluded as; 1. Self-monitoring, 2. Educational interventions directed to the patient, 3. Educational interventions directed to the health professional, 4. Health professional (nurse or pharmacist) led care, 5. Organizational interventions that aimed to improve the delivery of care, 6. Appointment reminder systems. The vigorous antihypertensive drug therapy was shown to decrease blood pressure (weighted mean difference (WMD) -8.0 mmHg, and diastolic blood pressure (WMD) -4.3 mmHg) for three strata of entry blood pressure, and all-cause mortality in a single large RCT- the hypertension detection and follow-up study. Self-monitoring intervention related with moderate net reductions in systolic blood pressure (weighted mean difference -2.5 mmHg) and diastolic blood pressure (weighted mean difference -1.8 mmHg). Educational interventions were unlikely associated with large net reductions in blood pressure. Although caring by nurses and pharmacists intervention may effected blood pressure reduction. There was need to do further evaluation as similar as appointment reminder systems. In conclusion, an organized system of registration, recall and regular review allied to a vigorous stepped care approach to antihypertensive drug treatment were the most likely way to improve the control of high blood pressure. Health professional (nurse or pharmacist) led care and

appointment reminder systems requires further evaluation. Education alone, either to health professionals or patients, does not appear to be associated with large net reductions in blood pressure[17].

2.6 Health Literacy and Hypertension

Literacy and Health Literacy Definitions

Health and Literacy is an important asset for a living. The words " Health literacy" was firstly used in 1972 and it has been shown in the literature review since early 1990 for studying and spread using around the world until nowadays. The studies found that the ones who were low expert in health often had the low understanding and the low health service utilization. They had less chance for a good health and had more health risk behavior. They lesser take care themselves and they were more be admitted in the hospital than who had higher health literacy. The low health literacy person had worse health status and pass a way faster than it should be [24-27]. The United Nations Educational, Scientific and Cultural Organization (UNESCO) admitted the various dimensions of literacy meaning and defined literacy as ability of searching, understanding, meaning, creative thinking, communication, calculation, and apply information in different contexts. More than that, literacy related to individual continuity learning in order to develop knowledge, potential, and participation in community and society levels[68]. Health literacy depend on relationship between individual skills with health context, health system, health care system, education, social, and culture in home, workplace and community [29, 69]. Therefore literacy is different from health literacy. Literacy is essential basic skills for social achievement whereas health literacy requires more skills including skills of seeking, evaluation, and integrate the information of various context. Moreover, there are needs of knowing the health-related vocabulary and health system culture [25, 68, 70]. Health literacy associated the different of knowledge and health behavior[71]. Reviewing literatures found that the meaning of health literacy similar to is the ability of people in accessibility, understanding, evaluation and applying the information for making decision in health care, promote health and prevent the diseases [24-27, 68, 70, 72, 73].Likewise, Health Education Division, Department of Health Service Support of Thailand defined health literacy as the ability and skills of information accessibility,

understanding, analyzing, practice evaluation, self-management and ability to advice individual, family, and community for good health [74].

Overall, antecedents of health literacy composed of population demographic, psycho and social, culture, literacy, personal characteristic, experiences that relate to illness and health care system. Having the health literacy led to the consequences as the better person health condition, the decrease of health expenses, the increment of healthy knowledge, the decrease average length of admission in the hospital, the decrease frequency of health service access [70, 75-77]. Although the different concepts of health literacy resulted in the several of measurements and instruments [71, 78, 79], the study of many countries revealed that the related-factors of health literacy were age, sex, education and socioeconomic status and the health literacy of their population needed to be improved [71, 80-84]. Therefore, health literacy was one in many factors that affects to the result of health and social [78]. Table 2 presented level of health literacy and educational goal by contents and outcomes [27, 78].

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Table 2 Level of health literacy and educational goal

Health literacy level and educational goal	Contents	Outcomes	
		Individual benefit	Community/social benefit
Functional health literacy: communication of information	Transmission of factual information on health of risks and health service utilization	Improved knowledge of risks and health services, compliance with prescribed actions	Increased participation in population health program (screening immunization)
Interactive health literacy: development of personal skills	As above and opportunities to develop skills in a supportive environment	Improved capacity to act independently on knowledge, improved motivation and self-confidence	Improved capacity to influence social norms interact with social groups
Critical health literacy: personal and community empowerment	As above provision of information on social and economic determinants of health and opportunities to achieve policy and/or organizational change	Improved individual resilience to social and economic adversity	Improved capacity to act on social and economic determinants of health, improved community empowerment

Health Literacy Measurement

According to various concept of health literacy, there were many measurements of health literacy. It can be concluded in 2 categories based-on self-report and task-performance or into 3 dimensions as 1) measure literacy and health literacy in health care unit by reading recognition test, reading comprehension test, and self-reported 2) measure literacy by using health contents as a tool. 3) measure health literacy[78]. Health literacy associates with individual and health context thus to evaluate needs measurement of individual character within health care service system. Measurement tool which were widely used for individual capability evaluation were REALM and Test of Functional Health Literacy in Adults (TOFHLA). Both tests had highly relationship to each other and can be employed to predict knowledge, behaviors, and results[78, 79], but there were not enough to assess understanding of health information. Therefore Health Activities Literacy Scale (HALS) was constructed. HALS has entire questions which covers all health promotion, health protection, disease prevention, health care and maintenance, and systems navigation. TOFHLA was shorten to be S- TOFHLA. Besides, NVS was the test of reading food label by answering 6 questionnaires[71, 78, 79]. The health literacy test tools development faced many challenges such as 1) easily use and define the person who has low literacy 2) multi-dimensions measurement 3) widely be used (mostly be used in USA) 4) REALM, TOFHLA, and S-TOFHLA are the gold standard tools to be compared with new innovated-tool. However, the three tools were limited to test all dimensions and no one know the appropriate weight of each dimension[78]. Europe developed the European Health Literacy Survey Questionnaire (HLS-EU-Q-) for general population by involving the reviewed main health literacy contents. However, HLS-EU-Q had limitation to measure health literacy of specific disease[80]. The result of a systematic review of performance-based versus self-reported measures of health literacy and numeracy pointed that there was no different of relationship between performance-based and self-reported health literacy for four of six outcomes(self-reported diabetes, stroke, hypertension, and a physician-completed rheumatoid arthritis disease activity score)[85]. Thailand was aware the importance of health literacy so the appropriate health literacy measurement tool was built by concept mapping method as similar as Victoria state of Australia. There were the targets as

general population, chronic disease patients, and disability patients. Each of target would be defined which issue he/she needs to be improved[86].

Improving Quality of Care in Primary Care Setting

Low health literacy means that you may not being to communicate with your care provider to understand your health conditions, consider different treatment options, and make decision to manage your health problem. Low health literacy is the better predictor of health status than socioeconomic, employment, race, and gender. Nowadays, society is complex system and health care service delivery is emphasized on disease oriented, cost effectiveness, and cost containment. Human element has been less focused therefore there is need for interaction and understanding not only to make informed health decision but also to manage a chronic illness at home. Primary care clinicians and entire multidisciplinary team have a limited time spending adequate explain diagnoses, treatment, and recommendation. Whereas some patients have different culture and language, some patients have multiple chronic conditions. These are factors that challenge health care providers to achieve the optimal level of communication between clinician and patient in a limited time. To improve the quality of care and patient health outcomes, building of patient-clinician relationships and communication need for change. Clinicians need to be trained to communicate with patients and patients need asking skills to ask clinicians questions for some explanations if they do not understand. However, not all patients want to be a part of decision making process. They need to be told and even they do not decide to follow the clinician's recommendation plan, they still are able to understand and to do those if they want to. There were few tools and resources available to primary care. Assessment health literacy tools were created such as REALM, S-TOFLA, and NVS. Ask Me 3™, the teach back method, and motivational interviewing shown some evidence to improve communication with low health literacy patients. These and environment change can improve patient quality and patient safety[28].

Hypertension and Health Literacy

Health literacy is clearly dependent upon levels of fundamental literacy and associated cognitive development. Individuals with undeveloped skills in reading and writing will not only have less exposure to traditional health education, but also less

developed skills to act upon the information received[27, 78] . The evidence pointed that knowledge improvement of one's condition may improve the adherence to lifestyle changes and medication of patient. The education material has not always been written at an appropriate reading level, which is one of the major barriers to improving patient knowledge of cardiovascular disease. The information about the disease and general knowledge of how to care for oneself to keep the disease controlled are often problems in patients with poor HL. Patients with hypertension and poor HL are less likely to understand which blood pressure readings are high. A patient's level of HL is a better predictor of his hypertension knowledge than his duration of diagnosed hypertension, years of school completed or age. The low numbers of patients with poor HL skills knew the relationship between exercise, dietary salt and body weight and their blood pressure[87]. The hypertensive and coronary patients in urban primary care units who had low level of health literacy (REALM $\leq$ 44) were more likely to be uncontrolled BP 1.75 times than who had higher REALM score. The lower self-reported adherence also associated the uncontrolled BP[88]. In contrast, a cross-sectional study in primary care patients revealed that 3-point increase of the Brief Health Literacy Screen scores related with 0.74 mmHg higher SBP and 0.30 higher DBP[89]. Another study shown that there was no association between health literacy using REALM to measure and antihypertensive regimen adherence and using the Hill-Bone Compliance Scale[90]. Thailand did the research based on ground theory and used psychometric method to test tool validity for testing HL in general population, chronic disease patients and disability people. The tool is useful to evaluate, develop program or policy of HL for Thai people. Two main items of health literacy in this tool are important issues in public health which are self-care of chronic patients; 1. Experience sharing, and 2. Self-observation[86]. A study of HL level of village health volunteers (VHVs) by using the same tool found that the VHVs score of both items were higher than average results of country survey level[91].

A non-randomized prospective cohort trial of 525 uncontrolled hypertensive patients was conducted with a practice based multi-level intervention designed using the principles of health literacy in 24 months in primary care setting. At 12 months and 24 months, the low and higher health literacy groups had significantly decrease in

mean SBP but there was not significantly different of the between group[92]. A systematics review of interventions in primary care to improve health literacy for chronic disease behavioral risk factors found that 52 intervention studies were identified. There were 73% of all studies that many different intervention types and settings associated with change in health literacy, and 75% of studies related to change in smoking, nutrition, alcohol, physical activity and weight (SNAPW). More low intensity interventions which were 43% of studies reported significant positive outcomes for SNAPW compared with high intensity interventions (33% of studies). More interventions in primary health care than the community were effective in supporting smoking cessation whereas the reverse was true for diet and physical activity interventions[93]. Hypertension recommendation pamphlet was produced considering the literacy and translation to be appropriate for Indo-Asian population in Canada. It was acceptable and can raised the understanding of hypertension[94]. Likewise, a family practice BP tracking diary for home reading with educational booklet was created by The Canadian Hypertension Education Program (CHEP). The effectiveness of these tools comparing with the standard approach of a hypertension information leaflet on BP-related knowledge, attitudes and behaviors of hypertensive family practice patients were evaluated. Both had positive effects on the patients' knowledge significantly, but patients did not frequently realize that usually more than one drug plus lifestyles modification were necessary to decrease BP[95]. Coronary artery disease patients who received educational program via booklet plus video had greater knowledge and health behavior than patients who get via booklet. More than that, patients who had lower HL benefited as much as higher literacy patients[96].

Tools to Boost Health Literacy and Communication Skills

The validated tools as NVS, REALM-SF, and TOFHLA were recommendation for low HL screening. There are many tools to help professional to address HL problems such as AHRQ Health Literacy Toolkit, communication course for providers, and "Ask Me 3™" campaign. Moreover, there are many strategies to help patients with limited health literacy for instance warmly greet each patient, use plain language, limit content, use visual aids, provide encouragement, assess recall and comprehension, and take step to provide additional patient support. "Teach Back" method is important technique of assess recall and comprehension strategy

because 80 % of medical information received is forgotten by patients immediately. For providing information to patient, technique of limit content strategy needs to be limited only 3-5 key points of content[97]. Additionally, a complex array of communication difficulties which may affect health outcomes, was common among patients with poor health literacy. Professional and public awareness of the HL issue need to be increased. There are six steps to enhance understanding among patients with low health literacy that physicians can take to improve communication with their patients as following; 1. Slow down and take time to assess patients' health literacy skills, 2. Use "living room" language instead of medical terminology, 3. Show or draw pictures to enhance understanding and subsequent recall, 4. Limit information given at each interaction and repeat instructions, 5. Use a "teach back" or "show me" approach to confirm understanding. 6. Be respectful, caring, and sensitive, thereby empowering patients to participate in their own health care[98]. Furthermore, effective communication is a fundamental of patient safety and the safety patients can be assured with mitigating the negative effects of low HL and ineffective communications on patient care. For health care encounter and transition, communication require applied-technique to enhance understanding among patients such as "teach back", "show back", drawing, models, device demonstration, encourage patients to ask, using plain language and clear communication, probing understanding. For self-management, essential parts of self-management are addressing special needs, providing self-management education, calling outreach to adhere self-management regimen, and better preparing self –management chronic condition by applying CCM[99].

One intervention which improve communication between patients and health care providers is "Ask Me 3[TM]". This approach is an educational program to enhance patients and families ask 3 simple questions to their providers for the better understanding their health conditions and what they need to do for health conditions improvement. The 3 specific question are following: 1) what is my main problem? 2) what do I need to do? 3) why is it important for me to do this? National Patient Safety Foundation (NPSF) pointed that communication between patients and practitioners can reduce potential error and patient safety. If patients understand their instructions, they make fewer mistake when taking their medicine or in preparing of medical

procedure. Therefore they get well sooner or are able to manage their chronic health conditions. "Ask Me 3^{TM}" was designed by health literacy experts who intended to help patients become more active member in their health care team[100]. It was found that "Ask Me 3^{TM}" may be a useful tool to increase patient engagement in their own care, improve satisfaction level in each visit, and get the better of patient-provider communication[101]. Likewise, African-American patients who got Ask Me 3^{TM} pamphlet had higher satisfaction than the control group[102]. The study of using "Ask Me 3^{TM}" among individual attending health screening showed that those who used the tool found it helpful for reminding when they came follow up [103]. Additionally, a half of Hispanic parents in the pediatric practices asked the questions during their child's recent visit; however, only 20% of them used Ask Me 3^{TM} in six months later[104]. Novant applied Ask Me 3^{TM} by multidisciplinary team to answer all three questions during educational process, and teach back method was integrated into implementation. Both methods were a fundamental of the communication to patients about their conditions, and their personalized care plans with patient's awareness of his/her condition. More than that the top twelve medical conditions were selected to build patient education materials and focus sheets[105].

2.7 Chronic Care Model

IOM pointed the attributes of the quality gap to (1) the rising demands on medical care due to the rapid increases in chronic disease prevalence and the complexity of the underlying science and technology; and (2) the inability of the system to serve these demands according to poorly organized delivery system and constraints in using modern information technology[106]. Wagner proposed the chronic care model (CCM) which is a systematic approach to improving health service delivery. CCM purposes to improve the quality of health outcomes for patients. This is based on the philosophy care can be delivered more effectively and efficiently if chronic patients take an active role in their own health and wellness. Mutually, providers are also supported with the necessary resources and expertise to better assist them in managing their conditions[30]. Thus, chronic illness management needs an appropriately organized delivery system linked with complementary community

resources available outside the organization to be effective. Many recent researches have shifted from patients' knowledge of disease and treatment to patients' skills and confidence to manage themselves therefore, providers' team must have the expertise to give not only medical care but also appropriate behavioral management. CCM can be used as a guide to change organization system in diverse size and financial structure [107].
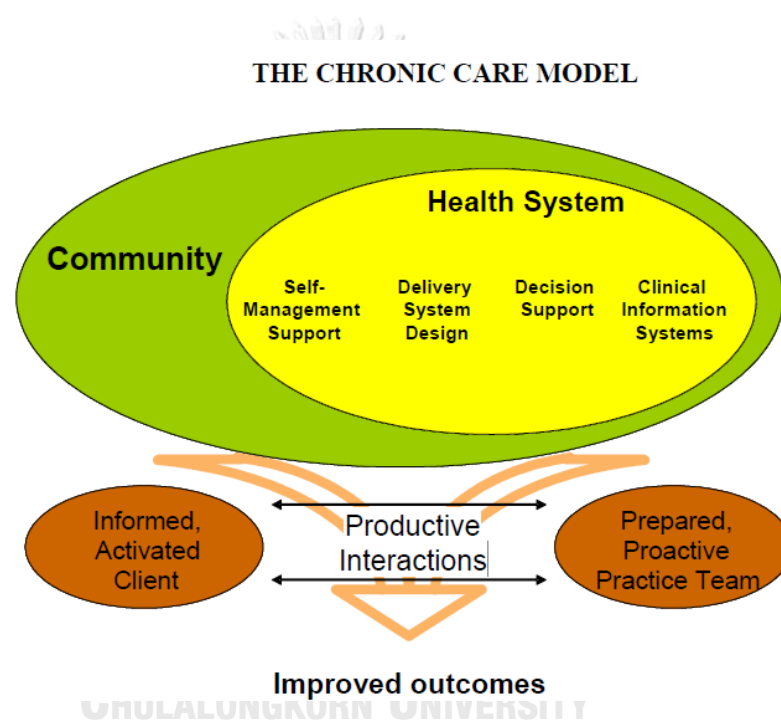
Figure 2 The chronic care model

An individual practice setting is in the health system (HS) which in turn is itself situated in the community. The other four elements within the Health System, namely self-management support (SMS), delivery system design (DSD), decision support (DS), and clinical information systems (CIS) are grouped together. The greatest effort and attention should be focused on these four elements[30].

Community

This element requires those within the health system to form durable, useful partnerships with other organizations and entities within the wider community. This is

imperative as the health system alone cannot lead the management of chronic conditions in isolation. Community organizations can assist the health system by advocating for policies for the better care; develop interventions to approach gaps in current services, encourage their participants to attend self-management programs and finally offer helpful resource material.

Health System

This element underlines the need to create a culture within the health system which promotes safe and high quality of chronic illness care. All colleges of the organization need to be motivated and ready for change. Improving care delivery ways was proposed including the promotion of multidisciplinary teamwork, alignment of incentives and improving care coordination across organizations.

Self-Management Support

True self management involves the patients' central role in managing their health and illness - fostering a sense of responsibility for their own health. The provider is encouraged to use effective assessment tools and counselling techniques such as motivational interviewing or health coaching to explore behavior change. Tools such as goal setting and individual care plans or health and wellness plans are used to assist the patients to plan for the change. The provider may provide emotional support and further education at this time.

Delivery System Design

This element is all about effective teamwork and roles are defined and delegated to team members, managing practice around planned care, providing case management for complex patients and ensuring regular follow up of them as a standard procedure. It is about assure each patient gets care as need. Health literacy and cultural competence are important components of this element.

Decision Support

This element needs the embed evidence based guidelines for daily practice. Treatment decisions need to be based on explicit, proven guidelines supporting by research, with the purpose of ensuring that all patients get the appropriate care. The use of specialist expertise and effective teaching methods are also essential components of this element for providers.

Clinical Information Systems

The ability to share information with patients and providers to coordinate care is vital, as is the technology to track individuals, groups and whole populations. The software utilizing means it identifies relevant sections of the community for proactive care and usefulness to prompt guideline based care. Monitoring and evaluation of care to individuals, groups and population is taking into account[30].

Combining all of these elements this model leads to planned 'Productive Interactions' to assures the delivery of critical clinical and behavioral elements of care. This meet the need for patient-centeredness. The aspect of both assists the development of, and results from the creation of, informed activated clients and prepared proactive practice teams. Finally, improved outcomes extend beyond clinical indicators and include factors perceived as important to the patients such as improved quality of life and functional outcomes. Health care cost and reduction of service usage also be monitored[30].

There are four main pillar to implement CCM. First, self-management: patients with spend up to 90 minutes a year with their health care provider and the remainder of the 525,600 minutes in a year they need to look after themselves. All primary care physicians and most medical specialties, needs to incorporate into his or her practice a means for supporting patient self-management. Second, decision support: managing chronic disease requires a number of decisions to be made. Questions to answer include: 1) What lifestyle changes are needed, and is the patient likely to implement them? 2) What initial medications should be used? 3) When should medication be changed, and when should a new medication be added? 4) What other care is needed? 5) Is a referral to a specialist needed for another intervention? Many decision support tools are incorporated into practices such as therapy target establishment, long-term plan development and recording, and reviewing each visit based-on guideline. Third, delivery system design: practices need to take a critical look and ask the following questions: 1) Are all office staff being effectively utilized? 2) Has the staff been trained to appropriately triage phone calls? 3) Are mid-level providers, nurse practitioners and physician assistants being used to the maximum limits of their licensing? 4) Have more efficient methods of seeing patients, such as shared medical appointments, been implemented or considered by the practice?

Fourth, clinical information systems: the electronic medical record, can be an important part of the decision support system. There are the other information systems such as technology to provide reminder or share information[108].

There was a review shown that CCM can improve chronic conditions management. A systematic review the effectiveness of CCM from 77 studies including for improving healthcare practice and health outcomes presented that there was a small number of studies to assess level of implementation of CCM elements in primary healthcare settings. Besides, the most of Randomized Control Trials (RCT) studied in developed countries and focusing on diabetes mellitus (DM). RCT showed the significant change in health outcomes on the following elements; SMS, DSD, CIS, DS, community support (CM), and HS. Two RCTs resulted in the declination in any of the health outcomes measured. One reported a significant improvement in monitoring of symptoms and risk factors was associated with CM and HS. A direct relationship between any combination of CCM elements and improvements to either healthcare practice or health outcomes was doubt[109]. Another systematic review identified barriers and facilitators of implementation across various primary care settings in 22 studies. The main themes were those related to the inner setting of the organization, the process of implementation and characteristics of the individual healthcare providers. There was need to assess organizational capacity and needs before and during the implementation of the CCM, getting a better understanding of health care providers' and organizational perspective as well[110]. Additionally, a systematic review included 38 studies aiming to understand the facilitators and barriers to implementing CCM within a primary healthcare setting from the perspective of healthcare providers and patients. It was found that there were the emerged five primary themes. This systematic review demonstrated that both patients and healthcare providers contributed to the success of the intervention by ensuring appropriate resources to support implementation and sustainability, the acceptability of the intervention. Therefore, healthcare providers need to be prepared for the implementation of a CCM and patients need to be supported to receive care change[111]. A systematic review of CCM program for older adult demonstrated none of 14 studies used Expand Chronic Care Model (ECCM) as their basis intervention, and no outcomes measured at the population or community were reported. Therefore,

there was need to integrate more of clinical program into public and population health strategies[112]. Evidences from 16 reviewed studies presented the effectiveness of CCM on diabetic management primary care practices and private practices in US. leadership induced reorganization resulting in improvement of diabetic care co-ordination. To improved patient outcomes, primary care physicians were trained to deliver evidence-based care, and office-based diabetes self-management education. However, only 7 studies identified strategies to approach community resources and policies[113]. Even though adoption CCM illustrating difficulties, CCM can be easily adopted in any primary care practice, whether a large or small unit[114]. There was no single CCM component can improve outcomes. Incorporating multiple components was imperative to facilitate the better CCM implementation[113].

2.8 Chronic Care Model and Health Literacy

CCM has been wildly used but it was insufficient for patient engagement, and was not explicit health literacy incorporation strategies. Therefore health literate care model (HLCM) was built by incorporated health literacy principles into the CCM as presents in table 3. For each of CCM's elements, an updated "health-literate" version includes relevant tools from the health literacy universal precautions toolkit (HLUPT) and maximizes the potential for system change. The health literacy test tools development faced many challenges. However, the tools were limited to test all dimensions and no one know the appropriate weight of each dimension[78]. If everyone aware and avoid miscommunication by using simple language to communicate and recheck understanding of each patient, may be no need to develop health literacy screening tools[79]. Therefore there is need for health care providers to approach all patients with the assumption as all of them have risk of not understanding information relating to maintain and improve their health. Developed in response to providers' increased awareness of health literacy issues and their inexperience in addressing them, the toolkit consists of twenty brief interventions that provide step-by-step implementation guidance and resources for integrating health literacy into practice. It represents a practical systems framework to adapt to all patients' health literacy challenges comprehensively, synergistically, and proactively. HLCM integrated HLUPT into CCM. HLUPT composed 20 tools as following: 1.

Form a team which lead to implement HL strategies, set target, and monitor results. 2. Assess your practice that how well the patients' HL needs are being met. 3. Raise awareness to educate all staff throughout health system. 4. Tips for communicating clearly 5. The teach-back method presents a pillar of health-literate self-management support. Patients are asked to explain back to providers what they have learned, understanding of their conditions, the available option to them, and intention to perform on the information providing. Provider can match their expectation with patients' understanding. 6. Follow-up with patients 7. Telephone considerations 8. Brown bag medication review including encouraging patients to bring in all of their medicines and dietary supplements and reviewing what all the medicine are for and how to take them properly. 9. How to address language differences 10. Culture and other considerations 11. Design easy-to-read material 12. Use health education material effectively 13. Welcome patients: helpful attitudes, signs 14. Encourage questions 15. Make action plans 16. Improve medication adherence and accuracy 17. Get patient feedback through surveys and other means. 18. Link patients to nonmedical support 19. Medication resources 20. Use health and literacy resources in the community. There are many details which were improved. In the term of patient engagement and care model, the patient-centered medical home and accountable care organization were included as innovative health care delivery model. Therefore HLCM could reduce duplication and inefficiency. HLCM also improve patient's understanding of and engagement in health care. HLCM provide the essential for patients get better comprehension of their choices; advantage from community service that improve wellness, prevention, and chronic care management; optimistic view of their relationships with provider teams; and make informed decisions[31].

Table 3 Relationship between the care model and the health literacy universal
precautions toolkit

Tools	Elements of Care Model					
	Health care organization	Self-management support	Delivery system design	Decision support	Clinical information systems	Community partners
1: Form a team	●					
2: Assess your practice	●					
3: Raise awareness	●					
4: Tips for communicating clearly		●		●		
5: The teach-back method		●		●		
6: Follow-up with patients		●	●		●	
7: Telephone considerations		●	●			
8: Brown bag medication review		●	●	●	●	
9: How to address language differences		●	●	●		
10: Culture and other considerations		●	●	●		
11: Design easy-to-read material		●		●		
12: Use health education material effectively		●		●		
13: Welcome patients: helpful attitudes, signs		●				
14: Encourage questions		●	●	●		
15: Make action plans				●	●	
16: Improve medication adherence and accuracy		●		●	●	
17: Get patient feedback	●	●	●	●		
18: Link patients to nonmedical support		●	●		●	●
19: Medication resources		●			●	●
20: Use health and literacy resources in the community		●	●		●	●

Reference: Koh HK, Brach C, Harris LM, Parchman ML. A Proposed 'Health Literate
Care Model' Would Constitute A Systems Approach To Improving Patients'
Engagement In Care. Health Affairs. 2013;32(2):357-67.

2.9 Self-Management and Self-Management Supports

Definitions, conceptual perspectives, and descriptions self-management (SM) are widely varied. SM is the process of engaging in specific behaviors enhancing a person's ability to manage a chronic illness or risk behaviors, but SM is different across authors and program. SM has been referred to three terms as a process, a program, and an outcome.

A process of SM was defined as self-regulation skills to manage chronic conditions or risk factors including activities such as goal setting, self-monitoring and reflective thinking, decision making, planning for and engaging in specific behaviors, self-evaluation and management of physical, emotional and cognitive responses associated with health behavior change. SM program was interventions which were designed by health care professionals for preparing persons to assume the responsibility for managing their chronic illnesses or engaging in health promotion activities. SM has also been used to describe outcomes reached by engaging in the SM process[32].

Self-care is different from SM, which has been used to refer to performance or activities of daily living for instance eating or bathing. Whereas SM controls and responses for management of chronic conditions or healthy behaviors purposively involving knowledge and beliefs, self-regulation skills and abilities, and social facilitation. Even though interchangeably using of patient education and SM, patient education as a method of providing information associate with outcomes such as increased knowledge, increased satisfaction, or change in readiness to engage in a health behavior. Whilst SM programs enhances development of SM skills and activities designed to facilitate health behavior change, decreased health care costs, and increased quality of life[32].

Self-regulation behaviors leads self-efficacy and enhancing to engagement in SM behaviors. Self-regulation is based on the social learning theory (SLT)/social cognitive theory (SCT) including goal-setting, self-monitoring and reflective thinking, decision-making, planning and action, self-evaluation, and management of physical, emotional and cognitive responses associated with health behavior change. There were 12 common tasks of SM across chronic diseases; specifically, symptom

management, taking medications, recognizing acute episodes, nutrition, exercise, smoking, stress reduction, interaction with health providers, need for information, adapting to work, managing relations, and managing emotions. Knowledge and social support were mentioned as critical to the success of a person's ability to SM[32].

There were many facilitators and barriers to HT self-management in urban African Americans. Family members' support and positive relationships with doctors were identified by patients as facilitators. In contrast, competing health priorities, lack of knowledge about hypertension, and poor access to community resources were barriers. Family members identified several facilitators as their participation in patients' doctor's visits and discussions with patients' doctors outside of visits and barriers were including their own limited health knowledge and patients' lack of motivation to sustain hypertension self-management behaviors[115]. While individuals engage SM, health care professionals provide SM support consisting of education and supportive interventions. The six management skills were identified; specifically problem solving, decision-making, resource utilization, formation of patient-provider relationship, development of an action plan, and self-tailoring. Knowledge was major contribution which related to SM programs and the concept of self-efficacy plays an increasingly important role. The six elements of SM programs were proposed; community resources and policies, health care organizations, SM support, delivery system design, decision support for health care providers, and an electronic clinical information system. However, there was inadequate evidence to support any of these six factors as essential to the success of SM programs[32].

SM support focuses on assisting persons to develop the skills necessary to increase their confidence, provision of necessary equipment and tools, and regular contact with members of the health care team to address problems and acknowledge accomplishments[32]. Self-management education programs (SMEP) vary widely, and it is difficult to identify the most effective self-management program. But SMEP can be broadly grouped into two categories: condition-specific education programs and generic, community-based group education programs. Although self-management is only one element of improved chronic disease care and achieving better chronic disease management in primary care requires more than self-management, self-management support interventions which focus on self-efficacy and behavioral

change appear to be most effective in terms of improving individuals' quality of life and health outcomes and reducing emergency use of health services[116].

Physician-patient communication is important for helping patient to manage their own health. Helping them is more than information exchange by providing navigational help, supporting patient autonomy, and providing guidance and advice. Chronic disease patients must navigate a complex health care system to obtain care; motivate and involve communication to increase self-efficacy and autonomy of taking control their health; and give instruction and recommendation that are patient-focused. Self-management and quality clinical care are dependent on each other. The in-Office program and linked-health coach self-management program employed SCT and social ecological model to enhance maintenance. Both program improved self-efficacy and quality of life[117]. Self-management programs based on SCT were assessed but the evidence is insufficient to conclude about clinical effectiveness of self-management program on enhancing Korean patients' self-efficacy in chronic disease management. However, the structured self-management program based on the four learning strategies in self-efficacy theory (skill mastery, social persuasion, observation learning, and reinterpretation of symptoms) is essential to improve patients' self-efficacy in disease management[118].

The empowerment informatics (EI) framework guides to identify goals of self-management interventions and the outcomes of patient perspectives and empirical outcomes. The EI framework recommend that patients living with chronic illnesses and collaborating nurses can use health-enabling technologies (HET) to support the relationships among patients' behaviors (self-management), patients' unique characteristics and context (health force), and patients' individual goals[119]. Likewise, a nurse-led home visiting intervention for hypertension management proved its effectiveness on all outcomes improvement (hypertension knowledge, blood pressure monitoring, dietary management, medication adherence, and self-confidence in hypertension SM) and in promoting an individual's ability to self-manage hypertensive care among a group of low-income older adults with hypertension[120]. The concept of SM has been developed, tested, and used. Interventions and programs have been designed and tested. SM interventions and programs improve the outcomes

of persons with chronic illness. In conclusion, SM interventions are effective and providing innovative programs for chronic care[32].

2.10 Program Development

Australia developed empirical model for the development of disease management in general practice by using HT as a case study. The methods consisted study context, theoretical and methodological framework, procedures, and stages of empirical investigations. The results revealed a definition of disease management and the development of the Australian disease management approach to hypertension in general practice (ADAGE) program for patients aged 18–75 years who are at risk for major cardiovascular events. A main component of the ADAGE program was an information, communication technology package including an interactive CD-ROM program commissioned for the practitioner's desk top computer by the ADAGE GP, coordinator and nurses. CD-ROM contained the capability to assess risk and changes in risk status, the capability to provide informational material for use during the consultation to assist risk factor modification, the capability to provide practitioners with additional clinical support; and the capacity for intervention tracking and recording keeping. Each patient is referred to a dietician at least one session of advice on healthy eating and physical activity during the course of the program. Non-pharmacological composing healthy eating, physical activity, smoking, alcohol, and relaxation was provided for patients[121]. The practical community-based program was develop for Bangladeshi chronic kidney disease and HT patients by setting out four steps of a six steps model (Step 1: Need assessment, Step 2: Specify change objectives, Step 3: Selecting theoretical method and practical strategies, Step 4: Constructing a program plan, Step 5: Implementation, Step 6: Evaluation), which was based on behavioral theory, relevant research, knowledge of practice and the target patient group[122]. The intervention mapping (IM) protocol describes the iterative path from problem identification to problem solving or mitigation. Each of the six steps of IM comprises several tasks each of which integrates theory and evidence. The six steps and related tasks of the IM process are: 1) Conduct a needs assessment or problem analysis, identifying what, if anything, needs to be changed and for whom; 2)

Create matrices of change objectives by combining (sub-)behaviors (performance objectives) with behavioral determinants, identifying which beliefs should be targeted by the intervention; 3) Select theory-based intervention methods that match the determinants into which the identified beliefs aggregate, and translate these into practical applications that satisfy the parameters for effectiveness of the selected methods; 4) Integrate methods and the practical applications into an organized program; 5) Plan for adoption, implementation and sustainability of the program in real-life contexts; 6) Generate an evaluation plan to conduct effect and process evaluations. Intervention mapping is not a new theory or model; it is an additional tool for the planning and development of health promotion interventions. Although IM is presented as a series of steps, the planning process is iterative rather than linear. Program planners move back and forth between tasks and steps. The process is also cumulative: Each step is based on previous steps, and inattention to a particular step may lead to mistakes and inadequate decisions[123]. The community-based service delivery program for elderly by volunteer presented 3.9 mmHg SBP reduction and more than 20 mmHg mean BP reduction in those who had stage II hypertension. They were trained six chapters: understanding blood pressure and hypertension, the skills of blood pressure measurement, managing blood pressure, counseling and adherence, clerical tasks, and operation of the blood pressure program. The volunteers measured senior center members' BP every other week then data were record on card for each participant. They informed participants of their BP status using color-coded visual aid and uses a protocol to advise participant about the important action steps, such as taking medication regularly and seeking physician[124]. Interdisciplinary HT-focus educational program taught collaborative by a registered by dietician and a pharmacist in community improved participants' knowledge of HT, adherence to medication, and increased exercise[125]. However, there was unclear to what extent community-based program can be effective on prevention and management of CVD[126].

CHAPTER III
RESEARCH METHODOLOGY

This chapter describes the research methodology, which includes research design, study period, study area, study population and sample, sample size, sampling technique, intervention, data collection, data analysis, ethical consideration, limitation, and public health significance.

3.1 Research Design

Quasi-experiment was used. This was an intervention study among poorly-controlled hypertension patients in urban community under accountability of primary care unit (PCU) of Contracting Unit of Primary Care (CUP) Muangya 4 (MY 4) in Muang district, Nakhon Ratchasima province, Thailand.

3.2 Study Period

The study was conducted 15-month period during January 2017- March 2018.

3.3 Study Area

Nakorn Ratchasima province is located in the North-East region of Thailand. The province has the largest area and the second population number in Thailand. It comprised 32 districts with 2.6 million people in 2015 and the Muang district is the center of the province. The total population number of Muang district in 2014 was 4 69,682. The household number was 66,231. The number of hospitals in Muang district is 12: seven public hospitals, and five private hospitals. In addition, a new managerial functional organization was created in the Muang district, namely the Primary Care Network (PCN). The PCN consists of 13CUPs: the four CUPs in Muangya CUP with 33 PCUs are all public; the ninth other CUPs with 13 PCUs are

either public or private. In the early phase, Maharat Nakorn Ratchasima hospital and the health district office worked as supporters of and facilitators for Muangya CUP. The group of primary care units under the governmental district level in Nakhon Ratchasima province is called Mungya CUP, comprising 4 CUPs. The Primary Care Unit (PCU): The PCU is the place where a patient receives holistic care upon first contact with the health care system, before being referred elsewhere within the system. A patient will be given continuing and comprehensive care. The primary care unit is responsible for its catchment area's population's health, emphasizing the dual strategies of promotion and prevention.

Figure 3 Location of Nakorn Ratchasima province in Thailand and Muang district in Nakorn Ratchasima province
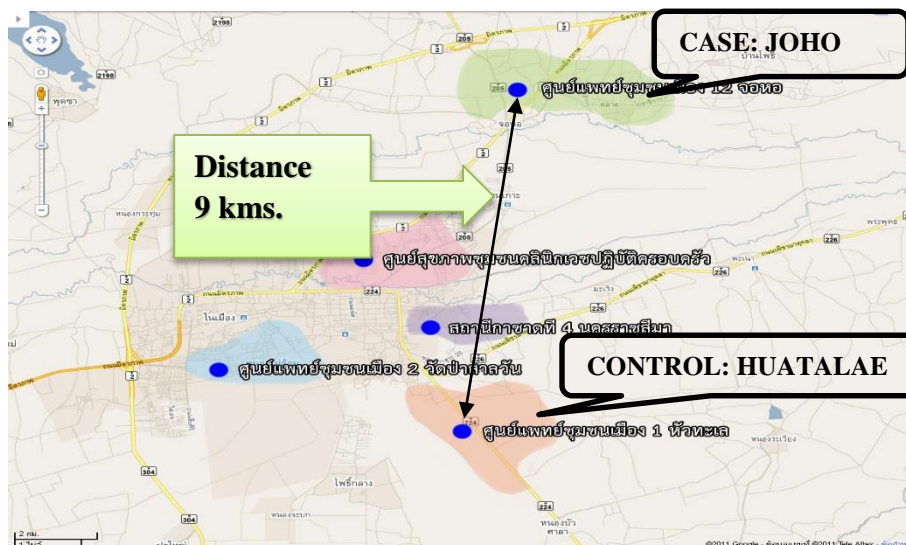
Figure 4 Location of each PCU in MY 4 CUP in Muang district, Nakorn Ratchasima
province

Muangya 4 Contracting Unit of Primary Care (MY 4 CUP) is responsible for
about sixty-six thousand people who live in different urban areas, consisting of five
PCUs. MY 4 CUP is located in the center of Muang district, Nakorn Ratchasima
province. So migration is a major problem to consider. Globalization and urbanization
are essential health determinants. The risk behaviors are eating less fiber or junk food,
less exercise, emotional problems, drinking of alcoholic beverages and smoking;
consequently non-communicable disease such as hypertension and diabetes mellitus.
Respiratory tract infections and gastrointestinal tract infections were the two major
communicable diseases. Additionally, major causes of death are cardiovascular
disease, cerebrovascular disease, and cancer.

3.4 Study Population and Sample

The target populations were poorly-controlled hypertension patients who
registered and live in MY 4 CUP responsible area.

3.4.1 Inclusion Criteria

The selection criteria are as follows:

- Age 30–70 years

- Registered patient
- Diagnosed essential HT with the average BP of last three visits ≥140/90 mm Hg
- Lived in the responsible area at least 1 year.
- Willing to participate in this research
- Can communicate and write effectively in Thai.

3.4.2 Exclusion Criteria

Participants with any of the following conditions are ineligible:

- BP ≥ 200/100 mm Hg
- postural hypotension
- Terminal disease: CVD, CVA, Renal Failure (RF), Cancer
- Psychiatric hospitalization with in the past 2 years
- Pregnant or breast feeding
- Planning to leave area prior to the anticipated end of participation
- Current use medications for treatment of psychosis or manic depressive illness
- Current use weight-loss medications in 3 months prior to first screening visit

3.5 Sample Size

The sample size was calculated by using the following formula for two-sample parallel design for continuous data[127].

$$ n = \frac{2[Z\alpha + Z\beta]^2 \sigma^2}{\Delta^2} $$

When : σ = the standard deviation of SBP = 11.2

Z_α = 1.65 at α = 0.05, Z_β = 0.84 at β = 0.2 (power 80),

Δ = Effect size of mean difference of SBP change between experiment and control=5.5

$$ n = \frac{2\,(1.65 + 0.84)^2 \times (11.2)^2}{(5.5)^2} $$

$$ = 51.4 \ \ (+ 30\% \text{ attrition})^* = 66.8 \ \ \approx 67 $$

The calculated sample size in each group will be at least 67. Thus the total number is 134 participants.

*According to the experience of doing research in Muang district ,Nakhon Ratchasima province , Thailand, the loss follow up rate was around 30%.

3.6 **Sampling Technique**

1. There are 5 PCUs in MY 4 CUP but 1 PCU is charged by Red Cross of Thailand. The inclusion criteria to select an experimental PCUs from the left of 4 PCUs were 1) having the high prevalence of hypertension. 2) having the highest number of population. 3) having sufficient TD3128 providing for patients. The controlled PCU was selected by the similar context including the population, prevalence of HT, health service system, and staffs. The exclusion criteria of PCU selection were 1) be not under charge of Maharat Nakhon Ratchasima hospital such as undercharge of Red Cross. 2) Be not in the center point of urban area where malls, governmental offices, and famous schools were in.

2. The information of the last 3 blood pressure level measurements were retrieved from 43 files of HOSXp database among 2,231 hypertension patients in 2 PCU. The average blood pressure level of each patient was calculated then the 1,029 poorly-controlled hypertension patients were selected from those information who had average clinic BP $\geq$140/90 mm Hg and 190 of those met the inclusion and exclusion criteria as eligible participants.

3. According to limitation of providing of TD3128 and budget, randomization of eligible participants both experimental and control group were done. The 99 and 91 eligible poorly-controlled hypertension patients of experiment and control group respectively, were separately coded and randomized by number in each PCU by excel. With those number to be experiment and control group, 67 participants were in each arm.

4. The eligible poorly-controlled hypertension patients who met inclusion and exclusion criteria were contacted and asked the decision whether he/she decide to join the program or not. Of those 63 of experiment and 65 of control who were contacted, if they decided to be the participant, they were made appointment date for

program meeting and inform consent. If he/she did not join, researcher drew lots to replace.

     5. Sixty-three participants enrolled in experimental group and sixty participants were in control group. Five participants in control were cut off after the first round of data cleaning due to their age were 71 years old. At the end of program, there were 63 poorly-controlled HT patients who got completed the intervention in experimental group. There were 60 poorly-controlled HT patients in control group.
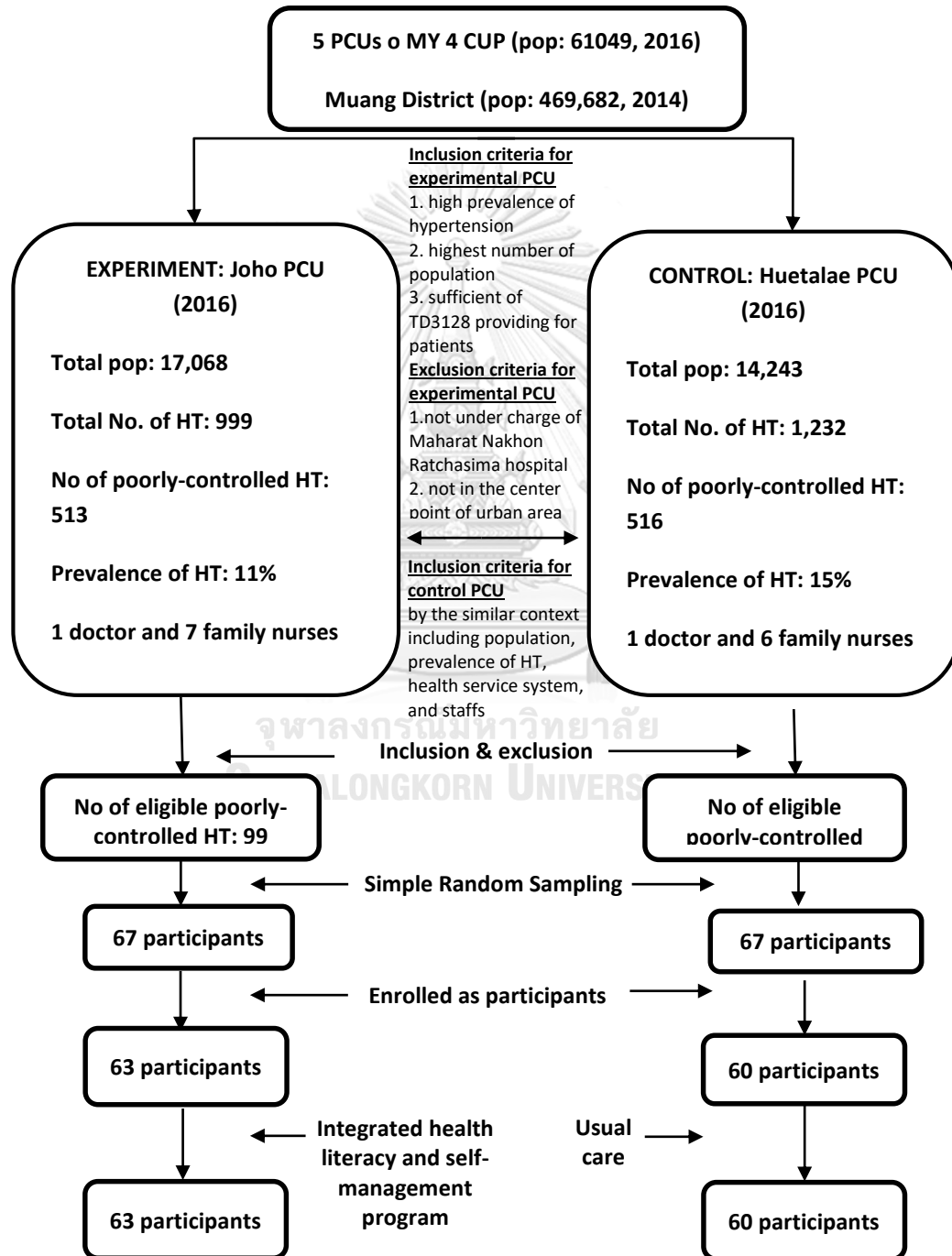
Figure 5 Flow diagram of sampling procedure

3.7 Research Instruments

The measurement tools of this study composed three parts: 1. questionnaire, 2. blood pressure monitor, 3. biochemistry laboratory test. There were 5 parts of questionnaire as following; 1) demographic data, 2) lifestyle and management knowledge[37], 3) health literacy (adapted from self-administered questionnaire of Thai's health literacy level which constructed by Health Systems Research Institute (HSRI) of Thailand)[39], 4) self-management behaviors[40] and 5) adherence[42]. The instruments of data collection in this study were as follows:

3.7.1 Questionnaires to collect data

A questionnaire was used to collect data by face-to-face interview which was provided by research assistants. Questions were originally constructed in English and later translated into Thai, except part 3, which was already in the Thai language. Family nurses and related staff at urban PCUs read the questions and edited them to make the language more comprehensible. After that, the questionnaire was sent to three experts for validity improvement, resulting in a score of 0.8 on the overall item objective congruence (IOC) index. The IOCs of part 1, 2, 4, and, 5 were 0.8, 0.8, 0.9, and 0.7 respectively. There were 17 questions of part 1; 6 questions got IOC as 3/3, 10 questions got IOC as 2/3, and 1 question got IOC 1/3. A last question was deleted from part 1 questionnaire. For part 2, there were 14 questions which half of them got IOC as 3/3. The rest 7 questions got IOC as 2/3. There were 20 questions in part 4 which 13 of them got IOC as 3/3. The rest 7 questions got IOC as 2/3. Two questions were added by experts' recommendation. All IOC of part 5 for 7 questions were 2/3. Thus there was no deleted question in part 2, 4, and 5. After this review, the questionnaire was adjusted and tested for reliability on the 30 poorly-controlled HT patients in nearby PCU where similar context was. The purpose of conducting the pre-test was to detect any unclear statements, or misleading or highly sensitive questions in the research instrument, and to check the questions to ensure the validity and reliability of the questionnaires before it was used on the participants. There were 74 questions, presented as follows: 1) 16 questions on demographic characteristics, 2) 9 questions on lifestyle and management knowledge (8 true/false question and 1 multiple choice; KR-20: .607), 3) 20 questions on health literacy (Cronbach's alpha of

literacy and potential: .960, self-care of chronic patients: .861), 4) 22 questions on self-management behaviors (Cronbach's alpha: .881), and 5) 7 questions on drug and appointment adherence (Cronbach's alpha: .968). The SPSS V22 software (university license) was used to analyze the data. The questionnaires comprised five parts as describe below. Part 1 was measured and collected at baseline, and part 2-5 were measured and collected at baseline, 3-months and 6-month.

Part 1: Demographic data consisted of age, gender, marital status, education level, household income, occupation, health insurance, smoking history, alcoholic drinking history, medical conditions, and medications administration. There were 16 questions.

Part 2: Lifestyle and management knowledge: The hypertension evaluation lifestyle and management (HELM) knowledge scale measures the hypertension knowledge in the context of the chronic care model and demonstrates content and construct validity. The domains include general hypertension knowledge, lifestyle and medication management, and measurement and treatment goals. This scale was appropriate for use among patients with a diagnosis of hypertension for whom the goal was to be active participants in the management of their hypertension[37]. There were 9 questions which were 8 multiple choices and 1 True/False questions.

Part 3: Health literacy had 2 sub-categories and 20 questions as literacy and potential literacy and health literacy for chronic patients or self-care of chronic patients by modifying from self-administered questionnaire of Thai's health literacy level which constructed by HSR of Thailand[39].

Literacy and potential literacy have 7 questions with 4-rating scale.

Health literacy questionnaire is the second part which was self-care of chronic patients' part, which were 2 issues as following; 1) experience sharing, and 2) self-observation. There were 13 questions. The questionnaire was formed of 11 score levels from 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10. 0 means absolutely disagree and 10 means absolutely agree. Participants write √ to choose the level of their agreement. There was no cut of point of self-care of chronic patient's level but the score was compared with average score of chronic patients in Thai national survey[39].

Part 4: Self-management behaviors were measured by a number of hypertension self- care profile (HBP SCP)[40]. There were the similar 22 questions for

different three section of behavior scale, motivation scale, and self-efficacy. The questions have 4-rating scales involving participants' perception about the importance of healthy diet, regular exercise, and monitoring blood pressure; frequency of self-management behaviors including how often salt is added to meals, frequency and intensity of exercise, and how often participants check their blood pressure. Selected part of questionnaires were without the part of motivation and self-efficacy. To be appropriate for Thai context, this part was adjusted from 4 rating-scale to 3 rating-scale based-on biostatistician expert recommendation. There was no cut point of the total score thus 3 categories with equal interval were used as the cut of point to compare between the intervention and control group.

Part 5: Adherence had 2 sub-categories as medication non-adherence and appointment non-adherence. Medication non-adherence scale measured patients medication-taking behavior by a self-report questionnaire with yes or no questions, except the last question that have five alternatives (never or rarely/once in a while/sometimes/ usually/all the time)[42]. Appointment non-adherence question was adjusted from a study[43] under an expert guide. There was 3 categories as every time, sometime, and never. Appointment and medication adherence questionnaires were constructed to be appropriate for Thai context.

Questionnaire was applied to collect data by face-to-face interviewing about 30 minutes to be completed. Lifestyle and management knowledge total score was 10, knowledge was categorized into low (<6), moderate (6-7), and high (≥8)[38]. The total score of literacy and potential literacy was 4 and was divided into poor (1.1 - 2.0), fair (2.1 - 3.0), and good (3.1 - 4 .0). The total score of self-care of chronic patients was 10 but HSRI was not categorized into any group[39]. The total score of self-management behaviors was 3 and was grouped into inadequate (≤2.34) and adequate (>2.34)[41]. The adherence level was calculated with a score sum of points, which were divided into three levels of adherence: high adherence (score 8), medium adherence (score 6 to 8), and low adherence (score < 6) [42].

3.7.2 Instrument for measure clinical outcomes

1) Seven-days MFBP measurement by TD-3128 with the telehealth assisted system was provided to measure BP at home for VHVs. VHVs were selected from each community of both experimental and control study area by a family nurse who

response for a community. To get cooperation from VHVs in this study, a family nurse selected the VHVS who they think that he/she had good attitude, appropriate knowledge, and had experience and good skills on NCD working in community. Then they were refreshed course on the risks, clinical diagnosis, treatment, and complications of HT, and they also were trained to use the TD-3128 .For collecting the average BP at baseline, 3 months and 6 months, the trained VHVs performed measurement of BP three times daily in the morning for each patient for 7 days. BP measurements were taken in patients' homes when they were well rested using the appropriate positioning and suitable BP cuff size. The data from the three measurements were automatically saved in memory of the URIGHT TD-3128 blood pressure monitoring system (ESH 2010 approval of the FORA Care Blood pressure Monitoring System is substantially equivalent to predicate URIGHT TD-3128 blood pressure monitoring system) with support by Connect Diagnostics Co. Ltd. The average of the second and third values of in each day of 7 days was calculated to be a representative from total 14 values of SHBP/DHBP at that time. The data of SHBP/DHBP from MFEP were analyzed to determine the effectiveness of integrated program in this study.

Experiment group	Activities	Time	By	Control group
✓	Baseline MFBP measure	7-days	VHVs	✓
✓	HBPM intervention	Everyday in month 1-3	Uncontrolled HT patients	
✓	At 3-months MFBP measure	7-days	VHVs	✓
✓	HBPM intervention	Everyday in month 4-6	Uncontrolled HT patients	
✓	At 6-months MFBP measure	7-days	VHVs	✓

Figure 6 Morning field blood pressure and home blood pressure monitoring

Only poorly-controlled HT patients in experimental group were trained to measure their BP at home twice daily in the morning and in the evening every day by

the URIGHT TD-3128 blood pressure monitoring system for HBPM[34]. Although HBPM is better for diagnosing uncontrolled HT compared to clinical measurements [64], the data of SHBP/DHBP from HBPM were not taken to analysis for change. To control the quality of SHBP/DHBP measurement, 7-days MFBP by TD-3128 with the telehealth assisted system was used as a SHBP/DHBP data collection instrument in both experimental and control group. Whereas HBPM was used as a tool of self-regulation and self-management for poorly controlled HT patients in experimental group only.

Figure 7 Blood pressure monitor TD-3128

The instruction and schedule were made up to communicate with researcher, research assistants, VHVs of both experimental and control groups' areas, and patients in experimental group in order to easily use and to appoint date for collecting and sending back TD-3128 blood pressure monitoring to upload data. Research assistants synchronized to transfer data into upright telehealth platform/connect telehealth on cloud as schedule. The HBP of the first-one week of the first month at baseline data, 3-months data and 6-months data after the program staring were analyzed for average SHBP/DHBP, which were measured for 7-days MFBP.

2) Biochemistry level was also measured by using results from blood and urine tests for LDL-cholesterol, HDL-cholesterol (mg/dL), triglycerides (mg/dL),

estimated glomerular filtration rate (GFR), and albuminuria. Those blood and urine were test twice at baseline and 6-months of intervention implementation. Those test were sent to medical laboratory which got **MOPH-DMSc-CL01 for** quality assurance approval by Ministry of Public Health.

LDL was divided into normal ($\leq$ 130 mg/dL) and higher than normal (>130 mg/dL).

HDL for female was categorized into normal ($\geq$ 50 mg/dL) and lower than normal (< 50 mg/dL).

HDL for male was categorized into normal ($\geq$ 40 mg/dL) and lower than normal (< 40 mg/dL).

Triglyceride was divided into normal ($\leq$ 150 mg/dL) and higher than normal (>150 mg/dL).

GFR calculating by modification of diet in renal disease (MDRD) used to define patient into 5 stages of chronic kidney disease;

- stage I GFR$\geq$ 90 ml/min/1.73m^2
- stage II GFR=60-89 ml/min/1.73m^2
- stage III GFR=30-59 ml/min/1.73m^2
- stage IV GFR=15-29 ml/min/1.73m^2
- stage V GFR <15 ml/min/1.73m^2

Albuminuria has 3 categories as

- normoalbuminuria (albumin/ creatinine ratio (ACR) < 30 mg/g creatinine)
- microalbuminuria (ACR= 30-300 mg/g creatinine)
- macroalbuminuria (ACR >300 mg/g creatinine)

3.8 Intervention

The program would reflect the criteria of being: evidence based; theoretically sound; acceptable to stakeholders; and testable within a rigorous empirical framework. Therefore the integrated program was based on HLCM and self-management concepts.

3.8.1 Program Description

The integrated health literacy and self-management model was designed to ensure that all stakeholders involve, participate, and mutually design the integrated program in order to create comprehensive program to care poorly-controlled HT patients. Integrated program was developed based on the health literate care model and self-management model for delivering quality of care to poorly-controlled hypertensive patients in order to mainly improve BP control. The model was developed consistent with evidence and patient preferences, mobilizing community resources, promoting high quality care, enabling patient self-management, implementing effectively using patient/population data, and cultural competence care coordination. The assumption of the model was to improve hypertension care system, promote health literacy, and personalized self-management plan by patient, care provider and public health care team with proactive home visit systematic intervention.

Intervention Mapping (IM) was applied to develop program which processes following the six steps of the IM process are: 1) conduct a needs assessment or problem analysis, 2) create matrices of change , 3) select appropriate theory-based intervention methods and translate these into practical applications that satisfy the parameters for effectiveness of the selected methods; 4) integrate methods and the practical applications into an organized program, 5) plan for adoption, implementation and sustainability of the program in real-life contexts, 6) generate an evaluation plan to conduct effect and process evaluations. The program was divided into two phases. However, it was clear that step 1) and 2) have been already set by a researcher. Although step 3) was applied HLCM and SM as main theory, there was necessary to involve opinion sharing of all stakeholders for translation theory into practice effectively. Then step 4)-6) were proceeded. All six steps was modified into two main phases.

Intervention contained two-main phases; 1) first phase was mainly for integrated program development. There were 3 steps 1.1) assessed need from all stakeholders, 1.2) created integrated program, and 1.3) revised program. 2) second phase was divided into 3 steps 2.1) preparation of stakeholders (team, VHVs, and experimental participants), tools, and process of integrated program and data

collection planning, 2.2) Implementation I by two-day workshop, patients' HBPM with VHVs support and 7-days MFBP, and 2.3) patients' HBPM with VHVs support, 7-days MFBP and twice home visit by family nurses.

1) First phases

Four group discussions were conducted in this phase. There were stakeholder who involved these process as following: 2 hypertension patients, 25 village health volunteers (VHVs), 7 family nurses, 3 public health personnel, a pharmacist, and a family doctor.

1.1) Need assessment (2 weeks):

- Review literature was done.

- A first group discussion included all 39 stakeholders to define strengths, resources and potentials of experimental PCU and experimental community including problems based-on 20-items HLCM and hypertension care system improvement. There are 20 elements using to assess and address an organization as following.

1: Form a team

2: Assess your practice

3: Raise awareness

4: Tips for communicating clearly

5: The teach-back method

6: Follow-up with patients

7: Telephone considerations

8: Brown bag medication review

9: How to address language differences

10: Culture and other considerations

11: Design easy-to-read material

12: Use health education material effectively

13: Welcome patients: helpful attitudes, signs

14: Encourage questions

15: Make action plans

16: Improve medication adherence and accuracy

17: Get patient feedback

18: Link patients to nonmedical support

19: Medication resources

20: Use health and literacy resources in the community

1.2) Create program (1 month):

- <u>A second group discussion</u> was constructed to develop Muangya HT information system by involving 11 multidisciplinary personnel and a computer technician.

- <u>A third group discussion</u> was held including all 39 stakeholders in order to criticize and improve HT clinical practice guide line of Muangya Primary Care Cluster (Muangya PCC), HT cartoon picture book, and consultation hotline group.

- <u>A fourth group discussion</u> was conducted including all 39 stakeholders to create an appropriated workshop for self-management.

- Program was created as draft based on HLCM, self-management model and evidence-based HT guideline by involving multidisciplinary team.

1.3) Revised program (2 weeks):

- The 2nd draft of program was twice presented to community in order to reshape appropriately.

- The final program was subsequently written and distributed to all stakeholders.

2) Second phases

2.1) Preparation:

- Team meeting was held involving family doctors, family nurses, health care workers, village health volunteers, hypertensive patients and municipality members and technicians of blood pressure monitoring program.

a) Two informal collaboration teams were established. The first team was designated the "HT team" of the hotline group, which consisted of researcher, cardiologist, family doctors, family nurses, health care workers, and technicians from both experiment and control PCU. This team was responsible for running overall program. The second team was a family care team from the experiment PCU, which closely cared patients following the plan of program. The VHVs established a hotline group, called "Love HT" to communicate, support, and

manage the patients' problems with support from the VHVs, family nurses, and a family doctor.

b) Research assistants and healthcare workers were trained to use the HBPM tool (TD-3128) and the URIGHT Telehealth software to collect, check, retrieve, and present the patients' data. They took TD-3128 to measure their blood pressure at home by themselves and checked their data in telehealth system. The problems of using TD-3128 and software were discussed and solved.

c) Twenty-three VHVs from the experiment PCU received a refresher course on the risks, clinical diagnosis, treatment, and complications of HT. They were also trained to use the TD-3128 and they took TD-3128 to measure their blood pressure at home by themselves. The problems of using TD-3128 was discussed and solved.

They were also trained to ask patients three Thai-modified questions, as follows:

1. What is your main problem in HT control?
2. What does method do you use to solve your problem?
3. Why is this method important for controlling your HT?

d) Simple instructions were created for the experiment participants and the VHVs.

e) Twenty VHVs from the control group were trained to use the TD-3128 only, without the Thai-modified questions. They received a schedule of HBPM.

- Patients' bag with HBPM equipment, instruction guide, information sheet, inform consent form, questionnaire, cartoon book, schedule of HBPM and hypertension note book with advice were prepared for experimental group. Instruction guide, information sheet, questionnaire, and hypertension note book with advice were prepared for controls.

2.2) Implement I (3 month): only experimental group

- Set participants meeting and inform consent separately for experiment and for control group. Taking blood and urine test, and interviewing for baseline data after that.

- Improve the primary care system by providing the HT CPG of the PCC to family doctors and nurses to aid in their decision-making regarding patient

treatment.

- Provide group-based health education on HBPM and self-monitoring during a two-day workshop (see Table 1 for the workshop schedule).

- Instruct patients with poorly controlled HT to use the TD-3128 to complete their daily HBPM twice in the morning and twice in the evening, following the recommended schedule. Poorly-controlled HT take home blood pressure (TD-3128) as recommended schedule.

- To ensure experimental participants complying with self-management behavior, the VHVs completed a home visit or call, provided weekly advice over three months, and asked each patient the three Thai-modified questions on HT control.

2.3) Implement II (3 month): only experimental group

To monitor and evaluate of experimental participants to comply with self-management behavior, home visit by family nurse and group meeting were set in implementation II of phase 2 period.

- FN did a first home visiting base on INHOMESSS-Ask me and teach back method to explore goal setting, self-monitoring and reflective thinking, decision making, planning for and engaging in specific behaviors, self-evaluation and management of physical, emotional and cognitive responses associated with health behavior change. Also, family nurse promoted an individual's ability to self-manage hypertensive care

-Group meeting for discussion any identification of self-management successfulness, problems, and possible solutions was established to conduct appropriate individual care.

- Make a second home visit to follow up reminder, promote health behavior, and empower participant and family.

3.8.2 Usual Care Description

In the control PCU, neither the 20-VHVs nor participants were trained to perform the intervention, except for BP measurements by VHVs at seven days of baseline, 3-months and 6-months. In addition, organizational improvements, based on the HLCM and stakeholder involvement, were not offered to the control PCU. The participants did not receive the two-day workshop on self-management, did not

receive the HBPM tool (TD-3128). The control participants receive home visits or calls from the VHVs for advice as usual, which is not weekly approach.

3.8.3 Responsibilities

FN and public health officer were responsible for:

- Be trained about risks, HT, complications, treatment by medicine and lifestyle modification, research materials and HLCM

- Being research assistants and screened the eligible poorly-controlled HT patients.

VHV are responsible for

- Co-ordinate with Researcher, FN, poorly-controlled HT patients, and community

3.9 Data Collection

Data were collected after participant decided to enroll into the study and finished inform consent process.

Face to face interviewing were used to obtain data from poorly-controlled HT aged 30-70 years in catchment area of 2 PCUs of MY 4 CUP. The entire procedure for data collection consisted of the following steps:

1. Identified and contacted the 2 study sites to obtain permission to conduct the study. The research proposal was submitted and approved by the Institutional Review Boards (IRBs) of Ethical Committee of Maharat Nakhon Ratchasima Hospital Board.

2. The researcher trained a FN and public health officer to be the research assistants for data collection methodology, explaining the purposes of and process used in the study, and the protection of the participants' various legal and ethical rights.

3. The procedures was explained by the research assistants before the participants were be asked to give their informed consents. Before each participant interviewing, the researcher or a well-trained research assistant explained the purpose of and the process used in the study, as well as ensured the participants that their information would be kept confidential. The researcher and researcher assistances

also informed the participants that some questions was very personal and therefore, the participants had the right to decline to answer or withdraw from participation in the study if they felt that they did not want to continue for any reason.

4. For the questionnaire interviewing, a written informed consent form was given to each participant to read; the form was explained before participants were asked to make any decision as to whether to participate in the study or not.

5. For the questionnaire interviewing, those individuals agreeing to participate in the study was then be asked to sign a formal written consent. For those who could not write, their right thumb print was taken as a symbol that they had agreed to participate in the study. Four public health personnel and 2 nurses from social medicine department of Maharat Nakhon Ratchasima hospital, and 2 family nurses from experimental PCU were trained to face-to-face interview by questionnaire both experimental and control participants. However, the main interviewer were from central organization, social medicine department of Maharat Nakhon Ratchasima hospital. When participants did not present on appointment date, two family nurses from PCU made a new appointment based on patients' convenience for face-to-face interview

6. The participants was interviewed by questionnaire. There were 74 questions which took approximately 30 minutes to complete. If the participants did not understand the meaning of a question, the researcher or the research assistants or the family nurses explained the meaning of the question. If a participant felt uncomfortable answering a question, he/she could omit answering this item.

7. The participant was reassured that their response was confidential, and that no link could be made between any participant and the data contained on their respective completed questionnaire forms. The participants were confirmed that they wished to participate in the study and were assured that they had the right to withdraw from the study at any time.

8. After completion of each data collection, the researcher and assistant checked data for completeness.

3.10 Data Analysis

Data analysis were done by SPSS V22 software (university license) was used to analyze the data to evaluate the effectiveness of integrated program. The program was constructed based on HLCM and SM and was implemented on the poorly-controlled HT patients both demographic and outcomes as following:

1) Clinical outcomes: blood pressure level (SBP/DBP), BMI, WC, and biochemical level (LDL cholesterol, HDL cholesterol, Triglyceride, Albuminuria, GFR)

2) Functional outcomes: SM behaviors (healthy diet, regular exercise, monitoring blood pressure), and adherence (appointment non-adherence, medication non-adherence)

3) Process outcomes: life style and management knowledge, and health literacy for chronic diseases

3.10.1 Descriptive analysis

Descriptive statistics, including frequency, percentage, mean, standard deviation, median, interquartile range, minimum and maximum were used to analyze the participants' demographics, lifestyle and management knowledge, health literacy, self-management behaviors, adherence, and clinical outcomes.

3.10.2 Statistical analysis

1) To compare the experiment and control groups

1.1) Categorical variables: These variables (Sex , BMI, WC, Marital status, Education, Number of family members, Financial status, Occupation, Health insurance, Drinking history, Number of comorbidity, Number of risk of CVD/ CVD, Dyslipidemia, Diabetes mellitus, Renal disease, Number of non-risk of CVD and non-CVD, First Treatment, Drug reminder, Lifestyle and management knowledge, Self-management behavior, Adherence) were tested the difference between experiment and control groups by chi-squared test with statistical significance at $P<0.05$. Fisher's exact test were applied to test the difference between experiment and control groups theses categorical variables (Smoking history, Coronary artery disease, Cerebrovascular disease, Drug preparation) with statistical significance at $P<0.05$.

1.2) Continuous variables were tested normality by Shapiro-Wilk test.

- The independent t-test with statistical significance at P<0.05 was applied the difference between experiment and control groups for continuous variables with normal distribution (Female WC, Male WC, BMI, SHBP, DHBP, LDL, Self-management behavior score).

- The Wilcoxon–Mann–Whitney with statistical significance at P<0.05 was tested the difference between experiment and control groups for continuous variables with non-normal distribution (Age (years), Household income, Individual income, GFR, Female HDL, Male HDL, TG, Albuminuria, Lifestyle and management knowledge, Writing messages for others to understand, Reading comprehension, Talking to others understandably, Heard voices clearly, Clear vision, Daily activities, Going out independently, Experience sharing, Self-observation, Adherence).

1.3) The factors which P-value less than 0.25 were reanalyzed, which were health insurance, smoking history and drinking history, no.of chronic disease and no.of risk CVD/ CVD. Smoking and drinking history were regrouped into binary outcomes. Those were tested the difference between experiment and control groups by Chi-square with statistical significance at P<0.05. No. of chronic disease and CVD disease were tested for the difference between experiment and control groups by independent sample T-test with statistical significance at P<0.05. Only No.of riskCVD/CVD was significant difference between experiment and control groups, P-value=.039

2) Test the effectiveness of this program; intention to treat (ITT) analysis was applied to analyze the program effectiveness. Although 63 experimental participants and 60 control participants did a completed 6-months follow up, there were missing values of dependent variables. The missing values were replaced by the average value of the other time point of the same variable.

2.1) Normality was tested by Shapiro-Wilk test statistic for main outcomes and secondary outcomes (at baseline, 3-months, and 6-months), and for biochemistry levels (at baseline and 6-months).

2.2) Multiple linear regression was used to analyze mean difference of dependents variable (SHBP, DHBP, BMI, WC, Lifestyle and management knowledge, Writing messages for others to understand, Reading comprehension,

Talking to others understandably, Heard voices clearly, Clear vision, Daily activities, Going out independently, Experience sharing, Self-observation, Self-management behavior score, and Adherence).

- Each mean difference of variable at 3-months was calculated by baseline value minus 3-months value, and each mean difference of variable at 6-months was calculated by baseline value minus 6-months value.

- Then each dependent variable was tested by Multiple linear regression with statistical significance at P<0.05 adjusting non-equivalent baseline of Sex, No.of risk of CVD/CVD, and Experience sharing.

2.3) Multiple linear regression was used to analyze mean difference of Biochemical level (GFR, HDL, LDL, TG, Albuminuria).

- Each mean difference of 6-months was calculated by 6-months value minus baseline value.

- Then each dependent variable was tested the difference between experiment and control groups by multiple linear regression with statistical significance at P<0.05 adjusting non-equivalent baseline of Sex, No.of risk of CVD/CVD, and Experience sharing.

3.11 Ethical Consideration

This study was reviewed and approved by the Institutional Review Boards (IRBs) of the Ethical Committee of Maharat Nakhon Ratchasima Hospital. Each participant read and signed a written informed-consent form. Code names were assigned to each participant to protect their privacy and the data was kept confidential. The control PCU will receive the integrated program after the study is completed.

3.12 Limitation

1) There were limitations in the present study. The quasi-experiment design was chosen because there may have been an increased chance of contamination if poorly-controlled HT from only one PCU were randomized into an experiment and control group; however, budget limitations, especially in providing the HBP

measurement tools, prevented the researchers from including more than two PCUs in the study. Although this quasi-experiment design had imbalance of some baseline factors, the covariates were adjusted to better compare the differences in program effects between both groups.

2) According to convenience transportation in urban area, the contamination may occur among participants or even VHVs between experimental group and control group. However, researcher selected the controlled PCU where was roughly far from experimental PCU 9 kilometers in order to control contamination.

3) There were some limitations about the questionnaire that may have led to bias in this study. However, the researcher controlled the bias by means of interview by trained research assistants.

4) According to the intervention design was comprehensive approach, it could not conclude that which factor effects result.

3.13 Public Health Significance

1) Improve the understanding of poorly-controlled HT situation in primary care and urban community.

2) The findings of this study would be able to offer a new practical program to prevent complications of HT.

3) Reduce health expenditure from HT complications

CHAPTER IV
RESEARCH RESULTS

This was a quasi-experiment study which tested the effectiveness of integrated health literacy and self-management model on poorly -controlled hypertension patients in urban community during January 2017- March 2018. There were two phases; the first was program development, the second was program implementation composing two-days workshop, self-management with HBPM and VHVs supports, and two-times of home visit by family nurses. The main outcomes were SHBP and DHBP. Poorly-controlled hypertension patients were recruited 63 and 60 participants from 513 and 516 patients to be participants in experimental group and control group in orderly (Figure 5). Of them, 63 and 60 participants completed 3-months and 6-months follow-up. However, two participants in control group were not available at baseline measurement for 7-consecutive days HBPM by VHVs because of running private business. On 3-months follow-up, two participants in control group could not provide BMI and WC measurement. And one of them did not get HBPM from VHVs also according to going abroad. There was no reason from the other one. On 6-months follow-up, the experimental missing data of two participants were similar to 3-months follow-up with different reasons. One patient got accidental trauma. The other had cerebrovascular accident. There were three measurement tools of this study as following; face-to-face interviewed questionnaire, blood pressure monitor, biochemistry laboratory test. Characteristics or independent variables were collected only baseline. The dependent variables were collected three times at baseline, 3-months follow-up, and 6-months follow-up except biochemical level results were collected at baseline and 6-months follow-up.

4.1 The first phase results

The integrated health literacy and self-management model

Four group discussions involving all stakeholders resulted in identifying the needs of and improvements to HT care system based on the 20-item HLCM.

There were 39 stakeholders who involved these process as following: 2 hypertension patients, 25 village health volunteers (VHVs), 7 family nurses, 3 public health personnel, a pharmacist, and a family doctor. Seven features of the HT care system were found to be appropriate as following; 6) follow-up with patients, 7) telephone considerations, 9) how to address language differences, 10) culture and other considerations, 13) welcome patients: helpful attitudes, signs, 18) link patients to nonmedical support, and 19) medication resources. The other features were improved through the following activities: 1) established a collaborative team; 2) installed software to support HBPM; 3) provided the HT CPG to healthcare personnel so they can make better care decisions; 4) created a picture book to increase awareness, knowledge, and self-management practices among HT patients; and 5) produced a two-day workshop to increase HT self-management using a music video that encouraged self-care (Table 6).

Table 4 Two-days workshop schedule

Day 1 Sessions	Objectives	Activities and media
Ice-breaking activity: "Know you, Know your HT"	– Enhance the relationship between patients with poorly controlled HT and VHVs in each community; – Clarify the schedule of the whole program.	1. Assign patients into 5 groups by community. VHVs in charge of each community acted as facilitators, along with the assigned research assistants. 2. The patients introduce themselves then sing and dance together to the music video "Know HT." 3. Introduce the researchers, research assistants, family doctors, family nurses, and VHVs. Also, review the program and its objectives.

Table 5 Two-days workshop schedules (Continued)

Day 1 Sessions	Objectives	Activities and media
Participatory lecture: "Preparing for Self-management"	– Improve knowledge about HT, the Dietary Approach to Stop Hypertension (DASH) program and exercises, stroke risk, enhanced compliance with antihypertensive medication, and self-management skills; – Increase awareness of self-care to control HT.	4. Watch the videos on silent death and HT, then play the question-and-answer game. 5. Provide the "Know HT" picture book with lyrics to the "Know HT" music video to HT patients and their family members so they can read it and sing the song at home (see the QR codes below). 6. Watch the video on HT treatment, then play the question-and-answer game.
Group-based learning	– Foster understanding of blood pressure and interpretation; – Ensure the patients are able to measure blood pressure and plan for self-management.	7. Watch the video on HT definition and interpretation, then play the question-and-answer game 8. Each group takes their individual blood-pressure measurements with guidance and instruction from the VHVs and research assistants. 9. Clarify the blood-pressure measurement schedule together.

Table 5 Two-days workshop schedules (Continued)

Day 2 Sessions	Objectives	Activities and media
Case-based and group-based learning about living with HT	– Increase patients' awareness of self-regulation and management; – Ensure the patients are able to evaluate their self-management behaviors involved in BP control.	1. An expert patient shares their background as well as their self-observation, self-regulation, and self-management techniques, then the patients play the question-and-answer game. 2. Each patient is paired with another patient, then the pairs share their experiences of living with HT and how to observe and control HT. The pairs then share the lessons they learned from their partner to their group. The most valuable stories are selected to share with all the patients. 3. The researchers summarize the patient's tips and tricks for self-managing HT.

Table 5 Two-days workshop schedules (Continued)

Day 2 Sessions	Objectives	Activities and media
Group-based practices for self-management	– Ensure the patients are able to practice the 3E2S activities (3E: exercise, eating, and emotion; 2S: stop smoking and stop drinking alcohol), take antihypertensive medications regularly, take medications for symptom management, and recognize acute episodes.	4. Each group practices at each station for 30 minutes, then rotates to another station until all five stations have been visited, as follows: Station 1: Exercise for HT patients; Station 2: Eating a low-salt and low-fat diet; Station 3: Control emotions, stop smoking, and stop drinking alcohol; Station 4: Antihypertensive medications; Station 5: Emergencies and complications.
Group discussion, goal setting, and resources for achieving goals	– Share problems; – Set self-goals; – Determine appropriate activities for self-management and regulation.	5. Conduct a group discussion on "problem assessment and need identification" to share goals for promoting self-management in controlling HT. 6. Each patient writes in a personal notebook about their problems, self-management, and self-regulation. 7. Sing and dance to the "Know HT" music video, then receive encouragement from the facilitators to engage in self-management.

QR code: CPG and music video   **QR code: HT picture book**

4.2 The second phases results

4.2.1 Sociodemographic characteristics

Baseline data from table 5-7, the ratios of male: female were nearly 1:1 and 1:3 in experimental group and control group respectively. Most of participants in both groups had overweight/obesity and higher level than standard level of WC. Female WC mean in experimental group was insignificantly higher than control group but it was similar for male in both group. (Table 14) Two-third of both groups had married/co-inhabiting status, primary school or lower of educational level, and enough income. For family member number, two-third of both groups had 1-4 family member per household. About half of participants in both groups was unemployed. Almost of both experimental and controlled participants had UC scheme, and did not smoke cigarette or drink alcohol beverage. In term of comorbidity, most of participants in both groups had at least one comorbidity and half of them had at least two comorbidities. Experimental group had non-significant higher percentage of risks of CVD/ CVD than control group. Percentage of hyperlipidemia and diabetes mellitus were the first and second comorbidity in orderly, and were higher in control group than experimental group. Most participants of both groups got the first treatment at primary care unit and administrated drug preparation and drug reminder by themselves.

Table 8 revealed that only one-fourth of both group had high level of lifestyle and management knowledge. Two-third of both group had adequate self-management behaviors. Less than half of both group adhered of appointment and drug taking, and experimental group had higher percentage than control group.

To sum up briefly from table 5-8 , the comparison of categorical parameter between both groups were not different in term of BMI, WC, marital status, education, number of family member, financial status, occupation, health insurance, smoking history, drinking history, comorbidity, first treatment, drug preparation, drug reminder, lifestyle and management knowledge, self-management behaviors, and adherence; except sex.

Table 9-13 showed the results of non-normality variables. The median age of experimental group was 61.0 years old, which was slightly lower than control group. The median household income of experimental group was insignificantly lower than control group as well as individual income. Medians GFR level of both groups were the second stage of chronic kidney disease. Both median of female and male HDL were normal but control group had slightly better level than experimental group in both sexes. Although TG median level of experimental group was in normal limited and of control group was higher than standard level, both values were very close to standard level. Albuminuria levels of both groups were in normal level. In term of lifestyle and management knowledge, the median scores of both group were moderate level but the experimental score was higher than control score. For literacy and potential literacy, both groups' median scores of talking to others understandably, hearing voices clearly, clear vision, daily activities, and going out independently was 3 except writing message for other to understand and reading comprehension. Therefore literacy and potential literacy was fair level in both groups but writing message for other to understand and reading comprehension were poor level. Both two issues' median score about experience sharing and self-observation of self-care of chronic patients were minimal higher in experimental group than control group, but only experience sharing had significant difference between experimental and control groups. However, there was significantly different for experience sharing (P-value .047). Adherence of both groups were medium level; however, the median score in experimental group was slightly higher than control group. In conclusion, there was no difference between both groups for non–normality variables.

Table 14 presented the normality variables. The mean female WC and male WC were higher than standard level. The mean WC in experimental female was 92 cm., which was insignificantly higher than the control females. The means of male

WC were nearly 96 cm. in both groups. Also, the average of BMI in both groups were about 27.5 kg/ m^2, which were overweight/pre-obese stage. The average of SBPH, DBPH, and LDL in experimental group were higher than control group significantly. Whereas the average scores of self-management behaviors were at the same level.

Table 5   Baseline characteristics of poorly controlled HT patients in urban area
between experiment and control group (categorical variables)

Characteristics	Experiment (63)		Control (60)		P-value
	Number	%	Number	%	
Sex					.018 [a]
Male	31	49.2	17	28.3	
Female	32	50.8	43	71.7	
BMI (kg/ m2)					.432 [a]
Normal	10	16.7	7	11.7	
Overweight/obese	50	83.3	53	88.3	
WC (cm.)					.883 [a]
Normal	14	22.2	14	23.3	
Higher than normal	49	77.8	46	76.7	
Marital status					.339 [a]
Married/co-inhabiting	44	69.8	37	61.7	
Single, separated, divorced, or widowed	19	30.2	23	38.3	
Education					.326 [a]
Primary school or lower	49	77.8	42	70.0	
High school or higher	14	22.2	18	30.0	
Number of family members					.626 [a]
1-4 persons	34	54.0	35	58.3	
5-14 persons	29	46.0	25	41.7	

Notes: [a] chi-squared test; [b] Fisher's exact test.

Abbreviations: kg, kilogram; m, meter; cm, centimeter.

Table 6 Socio-economic status, health care scheme, smoking and drinking history, and number of comorbidity baseline of poorly controlled HT patients in urban area between experiment and control group (categorical variables)

Characteristics	Experiment (63)		Control (60)		P-value
	Number	%	Number	%	
Financial status					.624 [a]
Not enough income or have debt	17	27.0	18	31.0	
Enough income	46	73.0	40	69.0	
Occupation					.937 [a]
Unemployed	30	47.6	29	48.3	
Employed/private business	33	52.4	31	51.7	
Health insurance					.201 [a]
Non-UC	10	15.9	5	8.3	
UC	53	84.1	55	91.7	
Smoking history					.253 [b]
Current Smoking	4	7.3	1	1.9	
Smoked	17	30.9	12	23.1	
Never smoking	34	61.8	39	75.0	
Drinking history					.124 [a]
Current drinking	18	30.5	10	17.9	
Ever Drinking	18	30.5	14	25.0	
Never drinking	23	39.0	32	57.1	
Number of comorbidity					.310 [a]
None	11	17.5	6	10.0	
1	23	36.5	19	31.7	
≥ 2	29	46.0	35	58.3	

Notes: [a] chi-squared test; [b] Fisher's exact test.

Abbreviations: UC, universal coverage scheme.

Table 7 Comorbidity, first treatment, and drug administration baseline of poorly
controlled HT patients in urban area between experiment and control group
(categorical variables)

Characteristics	Experiment (63)		Control (60)		P-value
	Number	%	Number	%	
Number of risk of CVD/ CVD					.086 [a]
None	14	22.2	6	10.0	
1	25	39.7	21	35.0	
≥2	24	38.1	33	55.0	
Comorbidity					
Dyslipidemia	36	57.1	44	73.3	.060 [a]
Diabetes mellitus	29	46	35	59.3	.142 [a]
Renal disease	7	11.1	6	10	.841 [a]
Coronary artery disease	2	3.2	4	6.7	.432 [b]
Cerebrovascular disease	3	4.8	1	1.7	.619 [b]
Number of non-risk of CVD and non-CVD					.763 [a]
None	49	77.8	48	80.0	
≥1	14	22.2	12	20.0	
First Treatment					.431 [a]
Centered/private hospital	8	12.7	5	8.3	
Primary care unit	55	87.3	55	91.7	
Drug preparation					.113 [b]
By other	0	0.0	3	5.0	
Self-administration	63	100.0	57	95.0	
Drug reminder					.738 [a]
By other	4	6.3	5	8.5	
Self-administration	59	93.7	54	91.5	

Notes: [a] chi-squared test; [b] Fisher's exact test.

Abbreviations: CVD, cardiovascular disease.

Table 8 Lifestyle and management knowledge, self-management behavior, and
adherence baseline of poorly controlled HT patients in urban area between
experiment and control group (categorical variables)

Characteristics	Experiment (63)		Control (60)		*P-value*
	Number	**%**	**Number**	**%**	
Lifestyle and management knowledge					.294 [a]
Low	19	30.2	25	43.9	
Moderate	27	42.9	19	33.3	
High	17	27.0	13	22.8	
Self-management behavior					.914 [a]
≤2.34	25	41.0	22	40.0	
>2.34	36	59.0	33	60.0	
Adherence					.319 [a]
Non-adherence	34	54.8	37	63.8	
Adherence	28	45.2	21	36.2	

Notes: [a] chi-squared test; [b] Fisher's exact test.

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Table 9   Age, income, and GFR baseline of poorly controlled HT patients in urban

area between experiment and control group (non-normality variables)

Characteristics	Experiment (63)	Control (60)	*P-value*
Age (years)			.091
Mean (SD)	59.7 (7.7)	61.9 (6.5)	
Min-Max	35.0-70.0	39.0-70.0	
Median	61.0	63.5	
I.Q.R	8.0	9.0	
Household income (Baht/year)			.123
Mean (SD)	198514.3 (192384.9)	254698.2 (211567.9)	
Min-Max	7200.0-972000.0	7200.0-864000.0	
Median	140000.0	204000.0	
I.Q.R	228000.0	288000.0	
Individual income (Baht/year)			.291
Mean (SD)	55490.0 (71824.2)	61786.6 (58532.3)	
Min-Max	7200.0-360000.0	7200.0-240000.0	
Median	31200.0	43800.0	
I.Q.R	64800.0	88800.0	
GFR (ml/min/1.73m$^{2)}$)			.459
Mean (SD)	80.4 (18.4)	75.8 (24.1)	
Min-Max	29.0-113.0	5.0-115.0	
Median	83.0	80.5	
I.Q.R	24.0	26.8	

Notes: The Wilcoxon–Mann–Whitney was applied to test.

Abbreviations: SD, standard deviation; I.Q.R, inter quartile range; GFR, estimated glomerular filtration rate; ml, milliter; min, minute; m^2 , square meter.

Table 10 HDL, TG, and albuminuria baseline of poorly controlled HT patients in
urban area between experiment and control group (non-normality variables)

Characteristics	Experiment (63)	Control (60)	*P-value*
Female HDL (mg/dL)			.431
Mean (SD)	59.8 (16.7)	59.8 (10.4)	
Min-Max	39.0-109.0	38.0-78.0	
Median	56.5	60.0	
I.Q.R	18.0	17.0	
Male HDL (mg/Dl)			.885
Mean (SD)	52.3 (12.3)	52.4 (10.0)	
Min-Max	28.0-88.0	34.0-67.0	
Median	50.0	52.4	
I.Q.R	11	18.5	
TG (mg/dL)			.599
Mean (SD)	206.5 (197.3)	181.1 (97.9)	
Min-Max	61.0-1188.0	66.0-697.0	
Median	147.0	159.5	
I.Q.R	152.0	62.5	
Albuminuria (mg/gcreatinine)			.568
Mean (SD)	87.8 (160.9)	70.7 (127.1)	
Min-Max	3.0-826.0	1.4-515.1	
Median	17.6	15.5	
I.Q.R	98.1	33.7	

Notes: The Wilcoxon–Mann–Whitney was applied to test.

Abbreviations: SD, standard deviation; I.Q.R, inter quartile range; TG, triglycerides; HDL, high density lipoprotein; ml, milliter; mg/dL, milligram per deciliter; mg/gcreatinine, milligram per a gram of creatinine.

Table 11 Lifestyle and management knowledge, writing messages for others to understand and reading comprehension baseline of poorly controlled HT in urban area between experiment and control group (non-normality variables)

Characteristics	Experiment (63)	Control (60)	*P-value*
Lifestyle and management knowledge (point)			.115
Mean (SD)	6.3 (2.0)	5.8 (1.9)	
Min-Max	0.0-9.0	1.0-9.0	
Median	7.0	6.0	
I.Q.R	3.0	2.0	
Health Literacy for Chronic Diseases			
Literacy and Potential Literacy			
Writing messages for others to understand			.232
Mean (SD)	2.3 (0.9)	2.1 (1.0)	
Min-Max	1.0-4.0	1.0-4.0	
Median	2.0	2.0	
I.Q.R	1.0	2.0	
Reading comprehension			.156
Mean (SD)	2.6 (0.7)	2.4 (1.0)	
Min-Max	1.0-4.0	1.0-4.0	
Median	3.0	2.0	
I.Q.R	1.0	1.0	

Notes: The Wilcoxon–Mann–Whitney was applied to test.

Abbreviations: SD, standard deviation; I.Q.R, inter quartile range.

Table 12 Talking to others understandably, heard voices clearly, clear vision, and
daily activities baseline of participants with poorly controlled HT patients in
urban area between experiment and control group (non-normality variables)

Characteristics	Experiment (63)	Control (60)	*P-value*
Health Literacy for Chronic Diseases			
Literacy and Potential Literacy			
Talking to others understandably			.089
Mean (SD)	2.8 (0.7)	3.1 (0.8)	
Min-Max	2.0-4.0	2.0-4.0	
Median	3.0	3.0	
I.Q.R	1.0	1.8	
Heard voices clearly			.606
Mean (SD)	3.0 (0.6)	3.0 (0.7)	
Min-Max	2.0-4.0	2.0-4.0	
Median	3.0	3.0	
I.Q.R	0.0	1.8	
Clear vision			.391
Mean (SD)	2.7 (0.6)	2.8 (0.7)	
Min-Max	2.0-4.0	2.0-4.0	
Median	3.0	3.0	
I.Q.R	1.0	1.0	
Daily activities			.354
Mean (SD)	2.9 (0.7)	3.0 (0.8)	
Min-Max	2.0-4.0	1.0-4.0	
Median	3.0	3.0	
I.Q.R	1.0	1.8	

Notes: The Wilcoxon–Mann–Whitney was applied to test.

Abbreviations: SD, standard deviation; I.Q.R, inter quartile range.

Table 13 Going out independently, experience sharing, self-observation, and
adherence baseline of poorly controlled HT patients between in urban area
between experiment and control group (non-normality variables)

Characteristics	Experiment (63)	Control (60)	*P-value*
Health Literacy for Chronic Diseases			
Literacy and Potential Literacy			
Going out independently			.786
Mean (SD)	3.0 (0.8)	3.1 (0.8)	
Min-Max	1.0-4.0	1.0-4.0	
Median	3.0	3.0	
I.Q.R	1.0	1.0	
Health Literacy for Chronic Diseases			
Self-care of Chronic Patients			
Experience sharing			.047
Mean (SD)	8.1 (1.7)	7.5 (1.7)	
Min-Max	2.6-10.0	1.0-10.0	
Median	8.4	7.8	
I.Q.R	2.4	2.6	
Self-observation			.125
Mean (SD)	8.1 (1.5)	7.8 (1.4)	
Min-Max	4.0-10.0	3.8-10.0	
Median	8.1	7.8	
I.Q.R	2.3	1.6	
Adherence (point)			.289
Mean (SD)	7.2 (1.0)	7.0 (1.1)	
Min-Max	3.0-8.0	4.0-8.0	
Median	7.5	7.0	
I.Q.R	1.1	1.6	

Notes: The Wilcoxon–Mann–Whitney was applied to test..

Abbreviations: SD, standard deviation; I.Q.R, inter quartile range.

Table 14 WC, BMI, SHBP, DHBP, LDL, and self-management behavior baseline of
poorly controlled HT patients in urban area between experiment and control
group (normality variables)

Characteristic	Experiment (63)		Control (60)		*P-value*
	Mean	**SD**	**Mean**	**SD**	
Female WC (cm.)	92.0	12.5	88.0	9.7	.119
Male WC (cm.)	96.9	10.3	96.4	11.1	.856
BMI (kg/ m^2)	27.7	4.8	27.5	4.0	.809
SHBP (mmHg)	134.7	13.3	128.9	13.4	.019
DHBP (mmHg)	80.6	8.2	75.9	7.5	.002
LDL (mg/dL)	121.1	29.7	105.7	33.5	.009
Self-management behavior score	2.4	0.2	2.4	0.2	.753

Notes: The independent t-test was applied to test.

Abbreviations: SD, standard deviation; WC, waist circumference; BMI, body mass
index; SHBP, systolic home blood pressure; DHBP, diastolic home blood pressure;
kg, kilogram; m, meter; cm, centimeter; mmHg, millimeters of mercury; LDL, low
density lipoprotein; mg/dL, milligram per deciliter.

4.2.2 Effects of the integrated health literacy and self-management model on SHBP, DHBP, BMI, WC, process outcomes, and functional outcomes

Table 15 reveled change of clinical outcomes from the effects of an
integrated health literacy and self-management model, which were as following;
SHBP, DHBP, BMI, and WC. Table 15 displayed clinical outcomes' change which
mean SHBP in experiment continuously decreased from 135.7 at baseline to 130.2
and 127.0 mmHg at 3-months and 6-months follow-up respectively. In contrast, mean
SHBP in control group at 3 point of times were nearly similar. The adjusted mean
difference of SHBP between 2 groups at 3-months from baseline was significantly
decrease 6.8 mmHg (P=.001). There was 9.6 mmHg (P<.001) significant reduction of
adjusted mean difference between 2 groups at 6-months from baseline. Likewise,

mean DHBP in experimental group continuously decreased from baseline 81.1 mmHg to 77.5 and to 75.8 mmHg at 3-months and 6-months follow-up in orderly. In opposition, mean DHBP 3-months and 6-months follow-up in control group was slightly rising from baseline. The mean DHBP differences between 2 groups of 3-months and 6-months from baseline statistical significant decreased 4.6 mmHg (P<.001) and 6.2 mmHg (P<.001) respectively. BMI mean in experimental group decreased from baseline 28.2 kg/ m^2 to 27.9 kg/ m^2 at 3-months and to 27.7 kg/ m^2 at 6-months; oppositely, mean BMI in control group increased from baseline 27.5 kg/ m^2 to 28.0 at 6-months follow-up. The mean differences in BMI between 2 groups at 3-months, and 6-months from baseline were significant reduction 0.8 kg/ m^2 (P<.001) and 0.8 kg/ m^2 (P<.001) orderly. Therefore, there was no change of BMI between 3-months, and 6-months follow up. Although the program was no significant effect on mean difference WC between 2 groups, it was observed that mean WC in experimental group tended to be decrease but mean WC kept on be rising in control group.

Table 16 presented the effects of an integrated health literacy and self-management model on secondary outcomes, which were functional outcomes and process outcomes. There were 2 functional outcomes' change as self-management behavior and adherence. The mean score of self-management behavior steadily increased during 6-months follow up in experimental group but there was no change in control group in a same period of time. Comparing results of mean difference of self-management behavior score between both groups at 3-months and 6-months follow up from baseline increased 0.2 point (P=.001) and 0.4 point (P<.001) from baseline respectively. For adherence score, although a score rose from 7.4 point to 7.6 point during the first 3-months period, this score did not change after that. Whereas the score in control group was similar during the first 3-months period. Then the score slightly decreased. The different mean of adherence score between 2 groups were not different at 3-months but there was significant rising score of adherence 0.6 point (P=.004) at 6-months follow up from baseline.

The process outcome contained lifestyle and management knowledge and two categories in self-care of chronic patients of health literacy for chronic diseases as

experience sharing and self-observation as presented in table 16. Both poorly-controlled HT patients in experimental and control groups tended to gain the higher score of lifestyle and management knowledge during 6-months period of this program. However, there was no significant difference of the mean knowledge score increase between both groups at 3-months and 6-months. In term of health literacy, experience sharing level and self-observation level seemed to rise in both experimental and control groups. In experimental group, the experience sharing level increased from 8.0 point at baseline to 8.6 and 9.1 point at 3-months and 6-months. The experience sharing level in control group increased from 7.3 point at baseline to 7.9 at 3-months but it decreased to 7.7 point at 6-months. For self-observation, the level in experimental group increased from 8.2 point at baseline to 8.8 and 9.3 point at 3-months and 6-months but there was minimal change in control group. There was no significant change difference of experience sharing level and self-observation level between both groups at 3-months from baseline. There was significant increase of experience sharing level and self-observation level 1.0 point (P <0.001) and 1.0 point (P<.001) at 6-months follow up from baseline respectively.

Table 15 Decrease of SHBP, DHBP, BMI, and WC at 3-months and 6-months from
baseline of poorly-controlled hypertension patients in urban area between
experiment and control group

Main outcomes	Time	Experiment (63) mean (SD)	Control (60) mean (SD)	Mean difference of experiment and control groups (95%CI)	P-value
SHBP	Baseline	135.7 (11.9)	128.8 (11.8)		
(mmHg)	3 mo	130.2 (10.3)	132.2 (12.0)	6.8 (2.9, 10.8)	0.001
	6 mo	127.0 (10.4)	129.9 (11.9)	9.6 (5.2,14.0)	<0.001
DHBP	Baseline	81.1 (7.9)	76.1 (7.1)		
(mmHg)	3 mo	77.5 (7.7)	78.0 (6.6)	4.6 (2.8, 6.5)	<0.001
	6 mo	75.8 (7.9)	77.1 (7.3)	6.2 (4.0,8.2)	<0.001
BMI	Baseline	28.2 (4.4)	27.5 (4.1)		
(kg/ m^2)	3 mo	27.9 (4.3)	28.2 (4.7)	0.8 (0.4, 1.2)	<0.001
	6 mo	27.7 (4.4)	28.0 (4.8)	0.8 (0.4, 1.2)	<0.001
WC	Baseline	95.0 (11.7)	91.1 (11.2)		
(cm.)	3 mo	96.0 (12.0)	92.7 (12.0)	1.3 (-1.2, 3.7)	.307
	6 mo	95.9 (11.7)	94.2 (14.0)	2.3 (-0.4, 5.0)	.091

Notes: Multiple linear regression was applied to test with adjusting by sex, number of risks CVD/CVD, and experience sharing.

Abbreviations: SD, standard deviation; WC, waist circumference; BMI, body mass index; SHBP, systolic home blood pressure; DHBP, diastolic home blood pressure; kg, kilogram; m, meter; cm, centimeter; mmHg, millimeters of mercury.

Table 16 Increase of self-management behavior , adherence , lifestyle and
management knowledge , experience sharing , and self-observation at
3-months and 6-months from baseline of poorly-controlled hypertension
patients in urban area between experiment and control group

Secondary outcomes	Time	Experiment (63) mean (SD)	Control (60) mean (SD)	Mean difference of experiment and control groups (95%CI)	P-value
Self-management behavior	Baseline	2.4 (0.3)	2.4 (0.3)		
	3 mo	2.6 (0.3)	2.5 (0.2)	0.2 (0.1,0.3)	0.001
	6 mo	2.7 (0.2)	2.4 (0.2)	0.4 (0.3, 0.4)	<0.001
Adherence	Baseline	7.4 (0.8)	7.0 (1.0)		
	3 mo	7.6 (0.7)	7.0 (1.3)	0.2 (0.1, 0.6)	.171
	6 mo	7.6 (0.7)	6.8 (1.5)	0.6 (0.2, 1.0)	.004
Lifestyle and management knowledge	Baseline	6.4 (0.2)	5.8 (0.3)		
	3 mo	7.6 (0.2)	6.3 (0.3)	0.7 (-0.1, 1.4)	.073
	6 mo	7.5 (0.2)	6.6 (0.2)	0.4 (-0.4, 1.1)	.310
Experience sharing	Baseline	8.0 (1.8)	7.3 (1.7)		
	3 mo	8.6 (1.4)	7.9 (1.5)	0.2 (-0.3, 0.7)	.448
	6 mo	9.1 (1.1)	7.7 (1.6)	1.0 (0.6, 1.4)	<0.001
Self-observation	Baseline	8.2 (1.4)	7.7 (1.4)		
	3 mo	8.8 (2.2)	7.8 (1.6)	0.7 (-0.1, 1.5)	.088
	6 mo	9.3 (0.9)	7.8 (1.3)	1.0 (0.5, 1.5)	<0.001

Notes: Multiple linear regression was applied to test with adjusting by sex, number of
risks CVD/CVD, and experience sharing.

4.2.3 Effects of the integrated health literacy and self-management model on biochemistry level

Table 17 Increase of biochemistry level at 6-months from baseline of poorly-controlled hypertension patients in urban area between experiment and control group

Main outcomes	Time	Experiment (63)	Control (60)	Mean difference of experiment	P-value
		mean (SD)	mean (SD)	and control groups (95%CI)	
GFR (ml/min/ 1.73m^2)	Baseline	80.5 (18.3)	75.8 (24.1)		
	6 mo	80.0 (20.2)	75.1 (24.9)	1.0 (-3.4, 5.3)	.665
HDL (mg/dL)	Baseline	56.1 (15.0)	57.7 (10.7)		
	6 mo	61.7 (18.7)	62.5 (12.2)	1.6 (-2.9, 6.2)	.487
TG (mg/dL)	Baseline	206.5 (197.3)	181.1 (97.9)		
	6 mo	214.0 (235.2)	167.6 (70.6)	6.5 (-49.7, 62.7)	.819
LDL (mg/dL)	Baseline	120.3 (30.1)	107.1 (34.9)		
	6 mo	91.7 (28.9)	101.1 (36.8)	-23.8 (-34.2, -13.5)	<0.001
Albuminuria (mg/gcreatinine)	Baseline	86.8 (159.8)	70.7 (127.1)		
	6 mo	168.0 (412.0)	82.0 (139.3)	78.8 (-3.9, 161.5)	.062

Notes: Multiple linear regression was applied to test with adjusting by sex, number of risks CVD/CVD, and experience sharing.

Abbreviations: SD, standard deviation; I.Q.R, inter quartile range; GFR, estimated glomerular filtration rate; HDL, high density lipoprotein; TG, triglycerides; LDL, low density lipoprotein;; ml, milliter; min, minute; m^2 , square meter; mg/dL, milligram per deciliter.

The results of multiple linear regression was applied to test with adjusting by sex, number of risks CVD/CVD, and experience sharing demonstrated in table 17. The mean difference of LDL between experimental and control group significant decreased by 23.8 mg/dL, P-value <0.001 and 95% CI (13.5-34.2). Although there was significant increase of HDL within experiment and control group, both P-value =.487 but 95% CI was between (-2.9, 6.2). However, there was no change both within group and between groups of GFR and TG level. Although there was no mean different between experimental and control groups, it was observe that albuminuria in experimental group increase significantly more than control group. In conclusion, this program effected on reducing LDL but there was no effects on GFR, HDL, TG and albuminuria level.
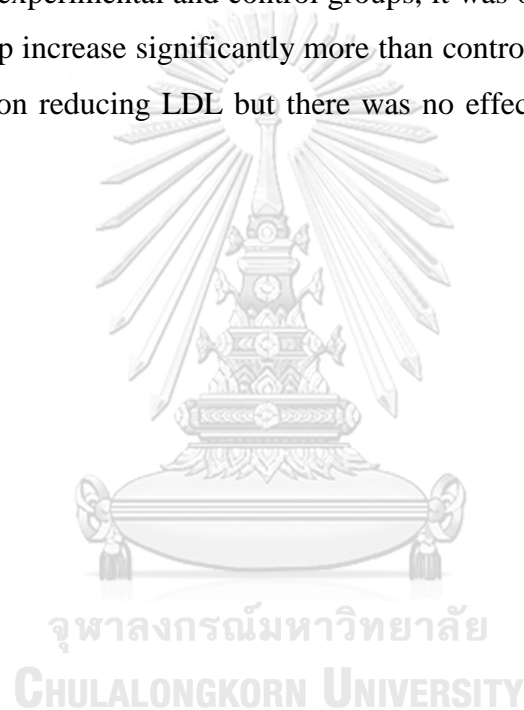
CHAPTER V

DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

This study aimed to evaluate the effectiveness of integrated health literacy and self-management model on improvement of poorly-controlled HT comparing between experiments and controls in urban area, Nakhon Ratchasima, Thailand. The discussions were illustrated in two parts. Firstly, the discussion of first phase was results of the integrated health literacy and self-management model development. Secondly, second phase displayed sociodemographic characteristics and effects of the integrated health literacy and self-management model. The chapter outline is below:

    5.1 Discussion

        5.1.1 Phase 1: Sociodemographic characteristics and the integrated health literacy and self-management model development

        5.1.2 Phase 2: Effects of the integrated health literacy and self-management model.

    5.2 Strength and Limitation

    5.3 Conclusion and recommendations

5.1 Discussion

5.1.1 Phase 1: Sociodemographic characteristics

The baseline results presented that the median age of both groups were nearly 60 which were closely similar to age of chronic patients of Thai health literacy's survey. The proportion of female was higher than male in control group, which was similar to this Thai's survey also[86]. But there was a contrast picture to global data which prevalence HT in male was slightly higher than female[1]. There was a study showed similarly characteristics to this study, which elevated SBP, DBP, and uncontrolled hypertension associated with increasing BMI and WC[59]. Most poorly-controlled HT patients both experimental and control groups had risk factor of HT as overweight/obesity and higher WC level than standard level; moreover, they had at least one risks of CVD or CVD. Nearly half of them was unemployed,

hyperlipidemia, diabetes mellitus, and non-adherence. Those major determinants of HT were similar to a review of HT in developing countries as overweight, obesity, and diabetes[2]. Whereas dyslipidemia especially LDL causes local and systematic inflammation leading to atherosclerotic plaque; consequently, atherosclerosis resulted in poorly controlled HT [128]. Like a vicious circle, both dyslipidemia and HT cause endothelium damage, and elevation of BP in dyslipidemic patients, while BP elevation appears in HT patients. This occurrence provoked into progression of arteriosclerosis as well [129]. Additionally, the studies in urban area presented that appointment non-adherence and medication non adherence were found in poorly-controlled HT[43, 88]. However, most of poorly controlled HT patients in this study had protective factors as not smoking cigarette or drinking alcohol beverage. They also had UC scheme, getting first treatment in PCU, and taking drug preparation and reminder by self-administration. Other demographic pattern, two-third of both groups were married/co-inhabiting status, graduated primary school or lower of educational level, had enough income, moderate to high level of lifestyle and management knowledge, and adequate self-management behaviors.

Literacy and potential literacy was fair level in both groups. More than that, writing message for other to understand and reading comprehension were poorer level than the other part of literacy and potential literacy. This liked the pattern of chronic patients in Thai health literacy's survey and the characteristics of chronic patients who were VHVs in urban area[86, 91].Although the studies presented that low level of health literacy related to poorly-controlled HT[88], experience sharing and self-observation of self-care of chronic patients' scores were high. Theses scores of both group were higher than chronic patients of Thai health literacy's survey [86] but were lower than VHVs who had chronic diseases[91]. The level of GFR HDL, TG and albuminuria in experimental and control groups were normal level except TG of control group was minimal higher than standard level. GFR and HDL results were nearly similar to a Thai study. Whereas the picture of TG and albuminuria level were higher than a Thai study[60].This may because a Thai study recruited only HT patients without other co-morbidity. Obviously, mean of SBPH, DBPH, and LDL in experimental group were higher than control group significantly.

5.1.2 Phase 1: The integrated health literacy and self-management model development

The developmental steps of the integrated health literacy and self-management model were applied based on the intervention mapping (IM) protocol into the practical community-based program in Bangladeshi for chronic kidney disease and HT patients [122] . There were six steps of IM. Each step was based on previous steps, and inattention to a particular step may lead to mistakes and inadequate decisions[123]. This theories was used to develop this program, which step 1) and 2) have been already done by a researcher for conducting a needs assessment and creation matrices of change.

Step 3) was integrated HLCM and SM as main theory, this period involved all stakeholders to adjust theory into practice effectively. This step was very essential planning to gain participation from stakeholders and to assure that the program would be effective. In the first phase of the program, there was four group discussions involving all 39 stakeholders, which resulted in identifying the needs of improvements to HT care system based on the 20-item HLCM. There were 13 of 20 items that needed to be improved.

Step 4 was also imperative to integrate methods and the practical applications into an organized program. The strategies to improve poorly-controlled HT were defined from step 3 to approach 13 items problems as following; 1) established a collaborative team; 2) installed software to support HBPM; 3) provided the HT CPG to healthcare personnel so they can make better care decisions; 4) created a picture book to increase awareness, knowledge, and self-management practices among HT patients; and 5) produced a two-day workshop to increase HT self-management using a music video that encouraged self-care. Because of the identified characteristics, the tools for patients and VHVs of this program were created for reading easily, such as a picture book, HBPM instruction and lyrics to a music video. The tools can be taken back to their home thus they can read, listen, sing and dance with these tools again and again as their needs.

Step 5 was plan for adoption, implementation and sustainability of the program in real-life contexts. To sustain this program in reality, the research and research assistance must be the observers and facilitators. Emphasizing family doctor,

family nurses, health care workers, VHVs, patients, and other stakeholders to freely share their ideas and opinions. Then the direction from them guided researcher to design the appropriate activities for the community. For instance, they can learned from expertise patients or from group based-learning. The lesson learnt was from their daily life thus they can adapt themselves easily more than learning from health personnel. Another example, VHVs wanted to communicate to each other and consults staffs. They set "Love HT" line group and they invited staff to join that line group. They would feel belonging and participate well along this program until the end. Eventually, the success of the integrated program would be pointed their efficacy to extend more in their community and expand to other community as well.

Step 6 was generate an evaluation plan to conduct effect and process evaluations. Not only the evaluation was set by this research but the home visit by VHVs and family nurses were set to apply three Thai's modified questions for self-reflection. Additionally, group meeting was set for discussion any identification of self-management successfulness and problems. Then the possible solutions were established to conduct appropriate individual care.

Health care insurance and primary health care system in Thailand have been improved and strengthened for many decades. Likewise, a phrase which was appropriate to present primary health care system was "close to home, close to heart". Although the integrated health literacy and self-management model were applied based on the intervention mapping (IM) and the 20-item HLCM by involving all stakeholders in four group discussions, the results of implementation 20-item HLCM in primary health care system of Thailand were different from the original HLCM in 7 features. Seven features of the HT care system of this study were found to be appropriate as following; 6) follow-up with patients, 7) telephone considerations, 9) how to address language differences, 10) culture and other considerations, 13) welcome patients: helpful attitudes, signs, 18) link patients to nonmedical support, and 19) medication resources.

Based on HLCM design, activities in this program have been set as follows; 1) established a collaborative team; 2) installed software; 3) provided the HT CPG; 4) created a picture book; and 5) produced a two-day workshop to increase HT self-management using a music video that encouraged self-care. This design improved

patient's understanding of and engagement in health care. Poorly-controlled hypertension patients get better comprehension of their choices; benefits from community service providing for chronic care management; and good relationships with VHVs and provider teams[31].

In term of self-management, the two-days workshop prepare poorly-controlled HT patients not only knowledge about HT, the Dietary Approach to Stop Hypertension (DASH) program and exercises, stroke risk, enhanced compliance with antihypertensive medication, and self-management skills, but also increase awareness of self-care to control HT, learning to live with HT, practices for self-management by (3E: exercise, eating, and emotion; 2S: stop smoking and stop drinking alcohol), take antihypertensive medications regularly, take medications for symptom management, and recognize acute episodes, and goal setting, and resources for achieving goals. During home visit, using teach back method and asking patients three Thai-modified question as a tool by family nurses and VHVs for patients' self-reflection resulted in rising of self-awareness, self-observation, self-regulation, self-efficacy, and self-management behaviors. Increased self-management behavior enhances a person's ability and entails self-regulation skills to manage chronic conditions or risk factors, including activities like goal setting, self-monitoring and planning for and engaging in specific behaviors. A model with predicted pathway from health literacy to health status of HT patients has been proposed [21]. There were significant path from health literacy to knowledge, knowledge to self-efficacy, self-efficacy to physical activity and health status [130]. The self-observation items present self-regulation behaviors that lead to self-efficacy and SMB [32, 130]; thus, participants with a higher self-observation score are likelier to have adequate SMB.

5.1.3 Phase 2: The effects of the integrated health literacy and self-management model.

All participants got the integrated program, HBPM tool, VHV support, and home visit by family nurse through 6-months follow up. The experimental participants accomplished significantly greater improvements in health literacy for chronic diseases for experience sharing and self-observation of self-care of chronic patients and adherence at 6-months follow up than control group. In contrast, there

was no significant change of lifestyles and management knowledge in experimental group when compared to control group. The participants' self-management behavior in experimental group was also steadily increase from baseline to 6-months comparing to control group. There were continually reduced HBP and BMI in experimental group comparing to control group as following; 9.6 mmHg of SHBP, 6.2 mmHg of DHBP, and 0.8 kg/ m^2 of BMI. But there was no significant change of WC in experimental group comparing to control group. For biochemistry, LDL level significantly decreased by 23.8 mg/dL Overall, these changes may present the effectiveness of the integrated health literacy and self-management model after the imbalance baseline variables were adjusted. The results could be generally explained by the program in this study emphasized more on gaining performance of health literacy and self-management than improvement of lifestyle and management knowledge.

The occurrences of SHBP/DHBP decrease, reducing BMI, and LDL reduction was proved the effectiveness as similar as a review[17]. The integrated health literacy and self-management model of this study to control HT in community applied interventions approach which was same to a review as follows; self-monitoring, educational interventions directed to the patient, educational interventions directed to the health professional, health professional (nurse or pharmacist) led care, organizational interventions that aimed to improve the delivery of care [17]. Specifically, robust antihypertensive drug treatment decreased 8.0 mmHg of SBP and 4.3 mmHg of DBP entailing all-cause mortality reduction, while other strategies had various effects[17]. However, this study did not collected number and type of anti-hypertensive drug taking by poorly-controlled HT patients as baseline and follow up data. Increase of adherence and self-management behavior score in this study might presented drug adherence resulting in BP reduction. But this program did not include appointment reminder systems like a review[17] .The HLCM evaluation from stakeholders and baseline subgroup analysis showed most of poorly-controlled HT patients were appointment adherence whereas half of them was medication adherence.

Additionally, two items in the HLCM had a significant effected: forming a team and improving medication adherence and accuracy. These items were also managed in the two-days workshop. Likewise, three previous studies showed that the

multidisciplinary-team approach led SBP/DBP reducing in patients with poorly controlled HT [18, 19, 61]. A multidisciplinary team working increased adherence among patients who were underserved in an urban area[19]. Similar to the 2-days workshop, multidisciplinary approaching and improving medication knowledge also improves medication adherence and lifestyle change[65, 87]. Whereas low adherence to antihypertensive medication will most likely resulted in poorly controlled HT and HT recidivism[88, 131]. Although a systematic review pointed that team-based care interventions decreased BP by the effect of education on BP medication [18], which educational interventions were unlikely associated with large net reductions in blood pressure[17]. It cannot be concluded that education alone effected HBP decrease. Also, this program was integrated activities, and the result of this program had no different of lifestyles and management knowledge between experiment and control group. Oppositely, it was observe that score of lifestyles and management knowledge in each of experiment and control group tended to be increase. This might be from the usual care set group education for diabetic mellitus and HT patients in both experiment and control areas.

Similarly, two studies which presented community health workers coach and led care with multidisciplinary team approach significantly reduced SBP/DBP. Furthermore, home visiting intervention for hypertension management proved its effectiveness on all outcomes improvement and in promoting an individual's ability to self-manage hypertensive care[120]. So VHVs in this program were trained HT content refresh course, HBP measurement course, and using modified Thai asked me 3 questions during home visit or home calling in order to support poorly controlled HT in experimental group. More than that, line group was set for family care team to communicate and support community VHVs' working. This integrated program also provide care by family nurse especially taking home visit with patient-centered care, teach back method and modified Thai asked me 3 questions. The results consisted with a multicomponent proactive nursing program for elderly HT patients of primary care units in Thailand [21] and a study among underserved primary care hypertension patients [20]. The integrated program in this study provide two-days workshop, VHVs coaching, HBPM, 2 times of home visit from FN. Similarly, MPN program based on CCM had the 3 main activities as following; interactive group education, home visit,

and team meeting involving community health nurses, health volunteer, HT older patients, and family caregivers[21]. MPN focused more on promote nursing care partnership. Unlikely, this integrated study trained VHVs to coach poorly-controlled HT patients for HBPM in their home as well as a study which community health workers were trained to be a coach for patients and family members about HBPM, drug adherence and lifestyle modification[63].

Another strategy which is important one to reduce BP in this program is self-management. This integrated program emphasized more on self-management which resulting in decrease 9.6 mmHg of SHBP and 6.2 mmHg of DHBP as well as a review, but self-monitoring in a review had moderate net reductions; -2.5 mmHg of SBP and -1.8 mmHg of DBP [17]. Therefore the remained of SHBP/DHBP decrease may be effected from other strategies of the integrated program in this study. However, self-management supports interventions which focus on behavioral change was most effective in terms of improving individuals' quality of life and health outcomes[116]. This program provide self-management supports which is one in five domains of chronic care model relating 16 items of 20 items of HCLM[31].

A systematic review and individual patient data meta-analysis, revealed that self-monitoring of blood pressure alone did not relate to lower HBP[132]. Likewise, this integrated program provided and supported HBPM with two-day workshop, VHVs supports, and home visit by family nurses. These were useful procedures in treating HT. Medication adherence was improved by HBPM, especially when combined with other adherence strategies. HBPM itself has been proven to effectively lower BP as well[64]. Similarly, HBPM would be very effective for HT control because of avoidance of white-coat hypertensive treatment and the better HT control[64]. Additionally, HBPM has been used for diagnosis and HT control for many decades in developed countries. Superiority of HBPM comparing with clinic measurement in uncontrolled HT diagnosis, antihypertensive drug assessment, compliance improvement, and HT control were defined. Medication compliance was improved by HBPM especially when combining with other adherence strategies. Therefore HBPM is one useful intervention which was proved to be lowering BP effectively like program in this study involving HBPM as one of many strategies.

5.2 Limitation and Strength

Limitations

1) There were limitations in this study. The quasi-experiment design was applied in this study because

a) Researcher could not randomly assign PCU to either experiment or control group. Purposively selection for PCU to be experimental area mainly depend on sufficient providing of HBPM tool (TD3128) for experiment participants. Then a homogeneous control PCU was selected.

b) Researcher could not fully control the environment of experimental group to be as similar as control group environment. However, selection of homogenous control in this study based on population, HT prevalence, staffs, and services to experimental group.

c) The integrated program could not be blinded to participants, researcher assistance, and researcher.

2) Bias in this study might occur as following

d) Selection bias might happen due to quasi-experiment design.

e) Information bias might present because two of face-to-face questionnaire interviewer were family nurses in experimental PCU.

3) To analyze multiple linear regression, mean difference of variable at 3-months was calculated by baseline value minus 3-months value, and mean difference of variable at 6-months was calculated by baseline value minus 6-months value. After that those mean difference was analyze for multiple linear regression. There for 90.25 % was confident interval of multiple linear regression, which was not 95% CI as the beginning plan.

4) Hemoglobin A1c, depress and stress condition, and number and type of anti-hypertensive drug taking by poorly-controlled HT patients this study were not collected as baseline and follow up data. However, drug and appointment adherence was collected as an dependent variable.

Strengths

a) Selection a PCU as homogenous control could prevent contamination, co-intervention. According to the integrated program in this study provided cartoon

books, HBPM tool (TD3128), and music video for poorly-controlled HT patients to practice in their home and their community. These might lead contamination and co-intervention if experiment and control participants live in the same community. Consequently, experimental participants might invite control participants to join activities in the integrated program. They might taught family members and neighbors about HT knowledge and self-management of HT.

b) Statistics control in this study was baseline comparison between experimental and control group. Additionally, multiple linear regression and ITT were analyzed by adjusting covariates to better comparing the differences in program effects between experimental group and control group.

c) Quasi-experiment design is useful especially for behavior study in real situation. Therefore the results of this study may appropriate to implement into practice at primary care level in urban area.

5.3 Conclusion and recommendations

5.3.1 Conclusion

The study evaluated an integrated health literacy and self-management model, which was constructed over 2-months applied a multidisciplinary approach with HLCM and self-management for poorly controlled HT patients in an experiment group and compared the results to a control patients who received the usual care. The program was designed based on HLCM and SM by IM steps in the first phase. Overall of 20-items HLCM, there were 7 items which were appropriated. The other items of HT care system needed to be improved by many activities as following; 1. Collaboration team setting up. 2. Software program 3. Clinical Practice Guideline 4. A cartoon book 5. A workshop program with VDO of song for hypertensive self-care. The characteristics of poorly controlled hypertension patients in urban area were elderly, low education, non-smoking and non-drinking, exceeded fat, having at least one risks of CVD or CVD, normal biochemistry level. They had UC scheme, enough income, and moderate to high level of knowledge, adequate self-management behaviors. They had fair level of literacy but had high score of health literacy for chronic diseases. The integrated program which applied to these patients resulted in the greater SHBP and DHBP reduction, and BMI and LDL decrease over sixth

months of the program's implementation at primary care level in an urban community of Thailand. To sum up briefly, an integrated health literacy and self-management model may be effective for hypertension control among poorly-controlled HT patients in an urban community by increase of health literacy for chronic disease, self-management behaviors, and drug and appointment adherence in those patients.

5.3.2 Recommendations

The following recommendations are presented based on the finding of this study including the implementation and further study.

5.3.2.1 Recommendations for implementation

Although HBPM needs cost to support, the integrated health literacy and self-management model with HBPM, VHVs supports, and home visit by family nurses should be one strategy of national policy to defeat poorly-controlled HT problems.

Extending the program into the other area especially urban area can be useful for control HT in order to prevent its complications. Moreover, the tools in this study can be easily comprehend therefore providing tools on online for free access will be beneficial for not only HT patients, health personnel but also other people.

In order to sustain this program, municipalities need to support and organized HBPM and a workshop by using national health security local fund like an experimental area has been implemented this program.

5.2.3.2 Recommendations for further research

Further research is needed to prove which factor is most likely to cause decreases in BP and to determine the best strategy to approach poorly-controlled HT in urban community. The research should explore further the effectiveness of the integrated program to control HT in rural area.

Without budget limitation, randomize control trial designed should be applied to test the effectiveness of the integrated health literacy and self-management model.

To complete the variables which effect BP level, A1c, depress and stress condition, and number and type of anti-hypertensive drug taking by poorly-controlled HT should be taken into account.

Disclosure

The author reports no conflicts of interest in this work.

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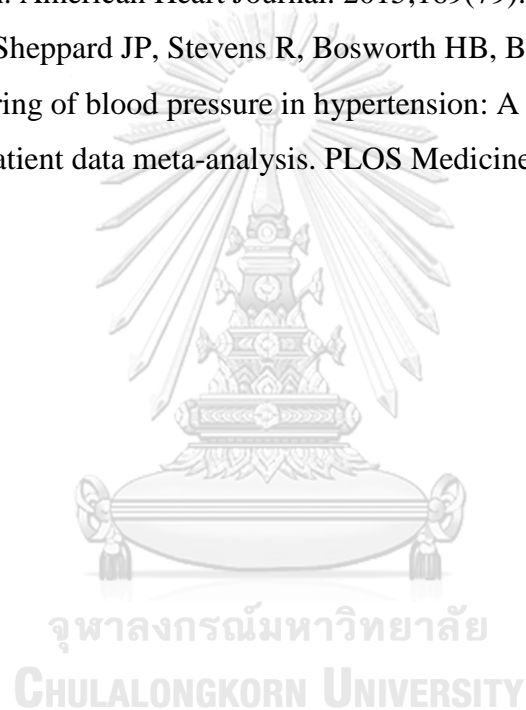
จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

APPENDIX

1. Information sheet

เอกสารชี้แจงผู้เข้าร่วมโครงการวิจัยโดยการตอบแบบสอบถาม
และการพิทักษ์สิทธิของผู้เข้าร่วมการวิจัย

ในเอกสารนี้อาจมีข้อความที่ท่านอ่านแล้วยังไม่เข้าใจ โปรดสอบถามหัวหน้าโครงการวิจัย
หรือทีมงานวิจัยให้ช่วยอธิบายจนกว่าท่านจะเข้าใจดี

ชื่อโครงการ: ประสิทธิผลของโปรแกรมผสมผสานสำหรับโรคความดันโลหิตสูงในเขตเมือง

ชื่อผู้วิจัย : นางสาวิตรี วิษณุโยธิน

ชื่อผู้ประสานงาน: นางสุรีพร แสงสุวรรณ 084-4621288

สถานที่วิจัย: เครือข่ายบริการปฐมภูมิเมืองย่า 4 หัวทะเล

ผู้ให้ทุน : เทศบาลจอหอ

ประสิทธิผลของโปรแกรมผสมผสานสำหรับโรคความดันโลหิตสูงในเขตเมือง ผล
การศึกษานี้สามารถนำโปรแกรมที่ได้ขยายให้ครอบคลุมหน่วยบริการในเครือข่ายบริการปฐมภูมิ
เมืองย่า 4 หัวทะเลและเผยแพร่ไปยังหน่วยบริการปฐมภูมิทั่วประเทศจะส่งผลให้ผู้ป่วยความดัน
โลหิตสูงควบคุมความดันโลหิตได้ดีขึ้นเกิดภาวะแทรกซ้อนไม่ว่าจะเป็นโรคหลอดเลือดสมอง
โรคหัวใจและโรคไตลดลง ลดค่าใช้จ่ายในการดูแลผู้ป่วยที่มีภาวะแทรกซ้อน

ท่านได้รับเชิญให้เข้าร่วมการวิจัยนี้เพราะท่านมีอายุ 30-70 ปี มีโรคประจำตัวคือโรค
ความดันโลหิตสูง อยู่อาศัยในพื้นที่ความรับผิดชอบเครือข่ายบริการปฐมภูมิเมืองย่า 4 หัวทะเล
ข้อมูลของท่านเกี่ยวกับข้อมูลส่วนบุคคล ความรู้เกี่ยวกับวิถีการดำเนินชีวิตและการจัดการความดัน
โลหิตสูง ความแตกฉานทางสุขภาพของโรคความดันโลหิตสูง พฤติกรรมการจัดการตนเองเกี่ยวกับ
ความดันโลหิตสูง การรับประทานยาและการติดตามนัดอย่างต่อเนื่อง ระดับความดันโลหิต ระดับ
ไขมันในเลือด ระดับการทำงานของไต ระดับโปรตีนในปัสสาวะจะถูกใช้เพื่อความสมบูรณ์ของ
การศึกษาเรื่องนี้

งานวิจัยนี้ จะมีผู้เข้าร่วมการวิจัยนี้ทั้งสิ้นประมาณ 124 คน และระยะเวลาในการเก็บ
ข้อมูล3 ครั้งครั้งที่ 1 ช่วงเดือนมิถุนายน พ.ศ. 2560 ครั้งครั้งที่ 2 ช่วงเดือนสิงหาคม พ.ศ. 2560 ครั้ง
ครั้งที่ 3 เดือน พฤศจิกายน พ.ศ.2560 โดยการตรวจเลือดและปัสสาวะจะดำเนินการเพียง 2 ครั้งคือ
ช่วงเดือนมิถุนายนและพฤศจิกายน พ.ศ. 2560

หากท่านตัดสินใจเข้าร่วมการวิจัยแล้ว ผู้วิจัยจะขอเชิญให้ท่านตอบแบบสัมภาษณ์
จำนวน 68 ข้อ โดยจะใช้เวลาประมาณ 30 นาที

      งานวิจัยนี้ใช้แบบสัมภาษณ์ในการเก็บข้อมูล จึงอาจเป็นการรบกวนท่านโดยทำให้ท่าน รู้สึกเสียเวลา หรืออึดอัด ไม่สบายใจในการตอบแบบสัมภาษณ์ ท่านมีสิทธิ์ที่จะไม่ตอบคำถาม เหล่านั้นได้ หรือหยุดตอบแบบสอบถามได้ทุกเวลาโดยไม่มีผลเสียใดๆ และไม่ต้องแจ้งให้ทราบ ล่วงหน้า

      หากมีข้อมูลเพิ่มเติมทั้งด้านประโยชน์และโทษที่เกี่ยวข้องกับการวิจัยนี้ ผู้วิจัยจะแจ้งให้ ทราบโดยรวดเร็วไม่ปิดบัง หากมีข้อข้องใจที่จะสอบถามเกี่ยวข้องกับการวิจัยเรื่องนี้ ท่านสามารถ ติดต่อสอบถามได้กับ นางสาวิตรี วิษณุโยธิน 081-0643420

      ข้อมูลส่วนตัวของท่านจะถูกเก็บรักษาไว้ ไม่เปิดเผยต่อสาธารณะเป็นรายบุคคล แต่จะ รายงานผลการวิจัยเป็นข้อมูลส่วนรวม ข้อมูลของผู้เข้าร่วมการวิจัยเป็นรายบุคคลอาจมีคณะบุคคล บางกลุ่มเข้ามาตรวจสอบได้ เช่น คณะกรรมการจริยธรรมฯ เป็นต้น

      โครงการวิจัยนี้ได้รับการพิจารณารับรองจากคณะกรรมการจริยธรรมการวิจัยในคนของ โรงพยาบาลมหาราชนครราชสีมา 49 ถ. ช้างเผือก ต. ในเมือง อ. เมือง จ. นครราชสีมา 30000 หมายเลขโทรศัพท์ 0-4423-5000 โทรสาร 0-4424-6389 หากท่านได้รับการปฏิบัติไม่ตรงตามที่ระบุ ไว้ ท่านสามารถติดต่อกับประธานคณะกรรมการฯ หรือผู้แทน ได้ตามสถานที่และหมายเลข โทรศัพท์ข้างต้น

ข้าพเจ้าได้อ่านรายละเอียดในเอกสารนี้ครบถ้วนแล้ว

                     ลงชื่อ...ผู้เข้าร่วมงานวิจัย

                     (...)

                     วันที่...

2. Inform consent form

| หนังสือแสดงเจตนายินยอมเข้าร่วมการวิจัยโดยได้รับการบอกกล่าวและเต็มใจ |

วันที่................เดือน....................พ.ศ................

ข้าพเจ้า...อายุ............................ปี

อาศัยอยู่บ้านเลขที่.................ถนน..............................ตำบล.......................อำเภอ............................

จังหวัด...................................รหัสไปรษณีย์……………............. โทรศัพท์..

        ข้าพเจ้าขอแสดงเจตนายินยอมเข้าร่วมโครงการวิจัยเรื่อง ประสิทธิผลของโปรแกรมผสมผสานสำหรับโรคความดันโลหิตสูงในเขตเมือง โดยข้าพเจ้าได้รับทราบรายละเอียดเกี่ยวกับที่มาและจุดมุ่งหมายในการทำวิจัย รายละเอียดของขั้นตอนต่างๆ ที่ข้าพเจ้าจะต้องปฏิบัติหรือได้รับการปฏิบัติ ประโยชน์ที่คาดว่าจะได้รับของการวิจัยและความเสี่ยงที่อาจจะเกิดขึ้นจากการที่ข้าพเจ้าเข้าร่วมการวิจัย โดยได้อ่านข้อความที่มีรายละเอียดอยู่ในเอกสารชี้แจงผู้เข้าร่วมการวิจัยโดยตลอดอีกทั้งยังได้รับคำอธิบายและตอบข้อสงสัยจากหัวหน้าโครงการวิจัยหรือผู้แทนเป็นที่เรียบร้อยแล้วข้าพเจ้าจึงสมัครใจเข้าร่วมโครงการวิจัยนี้ หากข้าพเจ้ามีข้อข้องใจเกี่ยวกับขั้นตอนของการวิจัยข้าพเจ้าจะสามารถติดต่อกับ นาง สาวิตรี วิษณุโยธิน หมายเลขโทรศัพท์ติดต่อ 081-0643420

        ข้าพเจ้าได้ทราบถึงสิทธิ์ที่ข้าพเจ้าจะได้รับข้อมูลเพิ่มเติมทั้งทางด้านประโยชน์และโทษจากการเข้าร่วมการวิจัย และข้าพเจ้าสามารถถอนตัวหรืองดเข้าร่วมการวิจัยได้ทุกเมื่อ โดยจะไม่มีผลกระทบใดๆ และยินยอมให้ผู้วิจัยใช้ข้อมูลส่วนตัวของข้าพเจ้าที่ได้รับจากการวิจัย แต่จะไม่เผยแพร่ต่อสาธารณะเป็นรายบุคคล โดยจะนำเสนอเป็นข้อมูลโดยรวมจากการวิจัยเท่านั้น

        หากข้าพเจ้าได้รับการปฏิบัติไม่ตรงตามที่ระบุไว้ในเอกสารชี้แจงผู้เข้าร่วมการวิจัยข้าพเจ้าสามารถติดต่อกับประธานคณะกรรมการจริยธรรมการวิจัยในคนหรือผู้แทนได้ที่สำนักงานคณะกรรมการจริยธรรมการวิจัยในคน โรงพยาบาลมหาราชนครราชสีมา 49 ถ. ช้างเผือก ต. ในเมือง อ. เมือง จ. นครราชสีมา 30000 หมายเลขโทรศัพท์ 0-4423-5000 โทรสาร 0-4424-6389

        ข้าพเจ้าเข้าใจข้อความในเอกสารชี้แจงผู้เข้าร่วมการวิจัยและหนังสือแสดงเจตนายินยอมนี้โดยตลอดแล้ว จึงลงลายมือชื่อไว้

        ลงชื่อ.................................ผู้เข้าร่วมการวิจัย/วันที่............................

          (...)

3. Instruments

a) English version questionnaire for interviewing (First: interview parts1-5, second and third interview parts 2-4)

1) Questionnaire

Part 1: Demographic questionnaire

Question No.: _____Participant No.:_____ Collector No.:_____

Date of administerd (D/M/Y): _____/_____/_____   Contact

No._____

Please answer the question by fill √ in the ❑.

1: Gender:❑Female ❑Male

2: Personal profile: Date of birth (D/M/Y):_____/_____/_____ Dq1:Age_____Years:

3: Weight_____Kg   Height_____Cm   BMI_____Kg/m^2

4: Waist circumference:_____ cm.

5: Married Status: ❑ Single   ❑ Married   ❑ Co-Inhabiting

❑ Separated   ❑Divorced   ❑ Widowed

6: Education level: ❑ No education ❑ Primary school   ❑ High school

❑ Voluntary school   ❑ Bachelor or higher   ❑Others_____

7: Household Income:_____Baht/Year

8: Patient's Income:_____Baht/Year

9: Financial Status

❑ Enough and have savings

        ❑ Enough but no savings   ❑ Not enough / have debt

10: Occupation:❑ Government Employee/Government enterprise Employee

❑ Farmer   ❑ Labour   ❑ Private Employee ❑ Student

❑ Unemployee   ❑ Other (specify)_____

11: Health Insurance:❑ CSMBS ❑ SSS ❑ UCS ❑ No health insurance

12: Do you smoke cigarette?

        ❑ Yes: Smoking for_____yeasr Amount of smoking

(roll/d):_____

❑ No: ❑ Never

❑ Smoked and quitted for_____years

13: Do you drink alcohol?

❑ Yes: Drink for＿＿＿＿＿yeasr Amount of drink (cc):＿＿＿＿＿＿＿＿

❑ No: ❑ Never

❑ Drank and quitted for＿＿＿＿＿＿years

14: In the past, did the doctor, nurse, or health personnel diagnosed that you have underlying disease as following? Please define that how many years you had the underlying diseases and where did you get treatment.

Underlying Disease	No	Yes	Living with (years)	Get Treatment at
Osteoarthritis				
Peptic Ulcer				
Chronic Obstructive Pulmonary Disease				
Diabetic Mellitus				
Asthma				
Coronary Artery Disease				
Dyslipedemia				
Renal Disease				
Chronic Bronchitis				
Arrhymia				
Cerebrovascular Disease				
Others please define＿＿＿＿＿＿＿＿＿＿＿＿				

15: Where did you get hypertension treatment at the first time?

❑ Huetalae PCU   ❑ Johoe PCU   ❑ Watpa PCU

❑ Maharat Nakhon Ratchasima Hopital   ❑Others please define ＿＿＿＿＿＿＿＿＿

　　- How long did a doctor diagnose that you had hypertension? ＿＿＿＿＿ years

　　- Do you treat hypertension by medication?

　　　❑Yes: How many drug? ＿＿＿＿＿

　　　❑ No

16: Taking your medication

- Prepare medication

☐ By yourself

☐ By the others everyday (define) _____

☐ By the others someday (define) _____

- Alarm for taking medication

☐ No one (Taking by myself)

☐ Had someone to alarm everyday (define) _____

☐ Had someone to alarm someday (define) _____

Part 2: The HELM

Please answer the question by fill √ in the ☐.

Kq1: A person is considered to have hypertension if either their systolic blood pressure is 140 or their diastolic is 90 or higher on two separate occasions.

☐ True   ☐ False ☐ Not sure   ☐ Unknown

Kq 2: Uncontrolled hypertension can lead to which of the following:

Diabetes: ☐ True ☐ False   ☐ Not sure   ☐ Unknown

Kq 3: People with hypertension do not need to take medicine if they exercise regularly

☐ True   ☐ False ☐ Not sure   ☐ Unknown

Kq 4: Eating salty food risks to hypertension.

☐ True   ☐ False ☐ Not sure   ☐ Unknown

Kq 5: Which one of the following changes to your diet is most likely to lower blood pressure?

-Eat more fruits, vegetables, whole grains, and low-fat dairy products

☐ True   ☐ False ☐ Not sure   ☐ Unknown

-Avoid add fish-sauce/seasoning/monosodium glutamate into food

☐ True   ☐ False ☐ Not sure   ☐ Unknown

Kq 6: Which one of the following statements about exercise and blood pressure is TRUE?

-Exercising for 30 minutes every day lowers blood pressure more than exercising for 30 minutes, 3 days a week

❑ True ❑ False ❑ Not sure   ❑ Unknown

Kq 7: A man reports that his blood pressure is 148⁄78 mm Hg when he checks it using the blood pressure machine in the pharmacy, 144⁄66 mm Hg in his family doctor's office, and 132⁄74 mm Hg when he checks it at home. Which of the following statements is TRUE?

-It is common for blood pressure readings to vary like this

❑ True ❑ False ❑ Not sure   ❑ Unknown

-He can be reassured that his blood pressure is normal

❑ True ❑ False ❑ Not sure   ❑ Unknown

Kq 8: When measuring your blood pressure at home, you should: Always take your reading before you take your blood pressure medicine

Take two readings, a minute or 2 apart, and write down the average value

❑ True ❑ False ❑ Not sure   ❑ Unknown

Kq 9: Blood pressure is measured with two numbers, an upper number and a lower number. It is usually written as upper⁄lower. If someone is told that their goal blood pressure is 126⁄76, when have they reached that goal?

❑When the upper is below 140 and the lower is below 90

❑When the upper is below 140, even if the lower is over 90

❑When the lower is below 90 even if the upper is over 140

Abbreviation: HELM, hypertension evaluation of lifestyle and management.

Part 3: The Health Literacy

Please answer the question by fill √ in the blank which you are alike most.

Literacy and Potential	Cannot	Can do	Well done	Very Well done
HLq1 Writing message for other to understand				
HLq2 Reading comprehension				
HLq3 Talk to other understandable				
HLq4 Hearing voice clearly				
HLq5 Seeing things clearly				
HLq6 Daily activities				
HLq7 Going out by her/himself ability				

Health Literacy for HT	Absolutely disagree ←→Absolutely agree										
	0	1	2	3	4	5	6	7	8	9	10
HLq8 You share your self-care with the other patients.											
HLq9 You observe the change of your body in order to tell the doctor in the appointment date.											
HLq10 You know that you gain benefit after taking health care activities with the other patients.											
HLq11 You join health care activities with the other patients.											
HLq12 You know the signs of your illness worsen.											
HLq13 Talking to the other patients help you to do the better self-care.											
HLq14 You live your daily life as you want even you have illness.											
HLq15 You know that if you do not take care yourself well enough, you may get the complications which are more serious than your illness being.											
HLq16 You know the balance between food intake and your activities and exercise.											
HLq17 Talking to the other patients help you to solve the problems from your illness.											
HLq18 You know what make your health get worse.											
HLq19 When you have health problem, you know how to get the better health.											
HLq20 You take care your health well and you know what to do for your self-care.											

Part 4: Self-management behaviours

Please answer the question by fill √ in the blank for how often do you do the following?.

Behaviours	never	rarely	sometime	regular
Bq1. Take part in regular physical activity (e.g., 30 minutes of walking 4–5 times per week)?				
Bq.2.1Have you ever buy delicatessen? ❑ Yes ❑ No				
Bq2.2 Read nutrition facts label to check information on sodium content?				
Bq3.Eat high salt-salt food (canned food, instant noodle, pickle fish, shrimp paste)				
Bq4. Eat low-salt products (e.g., homemade soups, fresh vegetables)?				
Bq5. Limit use of high-salt condiments (e.g., ketchup, fish sauce, monosodium glutamate, seasoning, soybean sauce)?				
Bq6. Eat < 1 teaspoon of salt/day (6 grams) or fish sauce/ soybean sauce < 3 tablespoon/day ?				
Bq 7. Eat foods that are high in saturated (e.g.,streaky pork, pork fat, chicken fat, coconut milk)?				
Bq 8. Use broil, bake or steam instead of frying when cooking?				
Bq 9. Use soybean oil, olive oil, rice brand oil to cook				
Bq 10. Eat fish, chicken breast to replace streaky pork, pork fat, chicken fat				
Bq 11. Limit total calorie intake from fat (less than 2 tablespoon) daily?				

Bq 12. Eat 5-6 ladle or more of fruits and vegetables daily?				
Bq 13. Drinking alcohol?				
Bq 14. Smoking?				
Bq 15. Check your blood pressure at home?				
Bq 16. Forget to fill your prescriptions?				
Bq 17. Forget to take your blood pressure medicine?				
Bq 18. Keep your weight down by diet control?				
Bq 19. Keep your weight down by exercise?				
Bq 20.1 Have you had stress in 3 months ago? ❑ Yes ❑ No 20.2 Stress severity ❑ Mild ❑ Moderate ❑ Severe 20.3 Stress frequency ❑ Everyday ❑ Someday ❑ Rare				
Bq 21. Engage in activities that can lower stress (e.g., deep breathing, meditation)?_____				
Bq 22. See a doctor regularly?				

Part 5: Adherence

Please answer the question by fill √ in the blank which you are alike most.

Aq1. 1 Have you ever forget to take your high blood pressure pills?

❑ Never   ❑ Yes

Aq1. 2 Did you forget to take your high blood pressure pills in 2 weeks ago?

❑ Never   ❑ Yes, how many day in the last time_____days

Aq 2 Did you take your high blood pressure pills yesterday?

❑ No   ❑ Yes

Aq 3. Have you ever cut back or stopped taking your medication without telling your doctor?

❑ Yes   ❑ No

Aq 4. When you travel or leave home, do you bring your high blood pressure medications with?

❑ Every time   ❑ Sometime   ❑ Never

Aq 5. Do you think taking medication every day is a real inconvenience.

❑ Yes   ❑ No

Aq 6. How often do you have difficulty remembering to take all your blood pressure medication?

❑Never/Rarely ❑Once in a while ❑Sometime ❑Usually ❑All of the time

Appointment adherence

Aq 7: In the last year, how often did you visit doctor/health care worker as follow up appointment?

❑ Every time

❑ Sometime

❑ Never   please define your reason _____

b) Questionnaire for First Interviewing (Thai Version)

2) Questionnaire

<div align="center">แบบสอบถามเพื่อการวิจัย</div>

เรื่อง ประสิทธิผลของโปรแกรมผสมผสานความแตกฉานทางสุขภาพและการจัดการตนเองสำหรับการควบคุมโรคความดันโลหิตสูงในชุมชนเขตเมือง จังหวัดนครราชสีมา ประเทศไทย

คำชี้แจง

        แบบสัมภาษณ์ฉบับนี้มีวัตถุประสงค์เพื่อสอบถามข้อมูลทั่วไป ความรู้วิถีการดำเนินชีวิตและการจัดการความดันโลหิตสูง ความแตกฉานทางสุขภาพ พฤติกรรมการจัดการตนเองเกี่ยวกับความดันโลหิตสูงและการรับประทานยาและการติดตามนัดอย่างต่อเนื่องของท่านโดยมีรายละเอียดของคำถามดังต่อไปนี้

ตอนที่ 1 คุณลักษณะส่วนบุคคล จำนวน 16 ข้อ

ตอนที่ 2 ความรู้ วิถีการดำเนินชีวิตและการจัดการความดันโลหิตสูง จำนวน 9 ข้อ

ตอนที่ 3 ความแตกฉานทางสุขภาพ จำนวน 20 ข้อ ประกอบด้วย 2 ส่วนดังต่อไปนี้

        3.1 การรู้หนังสือและศักยภาพ จำนวน 7 ข้อ

        3.2 ความแตกฉานทางสุขภาพสำหรับผู้ป่วยโรคเรื้อรัง จำนวน 13 ข้อ

ตอนที่ 4 การจัดการตนเองเกี่ยวกับความดันโลหิตสูง จำนวน 22 ข้อ

ตอนที่ 5 การรับประทานยาและการติดตามนัดอย่างต่อเนื่อง จำนวน 7 ข้อประกอบด้วย 2 ส่วนดังต่อไปนี้

        5.1 การรับประทานยาจำนวน 6 ข้อ

        5.2 การติดตามนัดอย่างต่อเนื่อง จำนวน 1 ข้อ

1. โปรดตอบคำถามทุกข้อตามความเป็นจริงเพราะคำตอบที่เป็นจริงและสมบูรณ์เท่านั้นจะช่วยให้การวิจัยในครั้งนี้เกิดประโยชน์อย่างเต็มที่

2. คำตอบของท่าน ผู้วิจัยจะเก็บเป็นความลับ และจะประมวลผลเป็นรายงานในภาพรวม เพื่อการพัฒนาคุณภาพการดูแลผู้ป่วยความดันโลหิตสูง

แบบสอบถามหมายเลข: _____

ผู้เข้าร่วมวิจัยหมายเลข : _____   ผู้สัมภาษณ์หมายเลข :_____

วันเก็บข้อมูล (ว/ด/ป): _____/_____/_____   เบอร์โทรผู้ประสานงาน: _____

<u>**ส่วนที่ 1: คุณลักษณะส่วนบุคคล**</u>

คำชี้แจง โปรดเติมข้อความให้สมบูรณ์หรือทำเครื่องหมาย √ ลงในช่อง ❑ หน้าข้อความที่ตรงกับคำตอบของท่าน

1: เพศ : ❑ หญิง ❑ ชาย

2: วันเกิด (ว/ด/ป) : _____/_____/_____ อายุ _____ ปี

3: น้ำหนัก_____กก. ส่วนสูง_____ซม.

4: เส้นรอบเอว:_____ ซม.

5: สถานภาพสมรส:

    ❑ โสด ❑ ใช้ชีวิตคู่ และจดทะเบียน ❑ ใช้ชีวิตคู่ร่วมกันแต่ไม่ได้จดทะเบียน

    ❑ แยกกันอยู่ ❑ หย่า ❑ หม้าย

6: ระดับการศึกษา:

    ❑ ไม่ได้เรียนหนังสือ ❑ ประถมศึกษา ❑ มัธยมศึกษา /ปวช.

    ❑ อนุปริญญา/ปวส. ❑ ปริญญาตรี ขึ้นไป ❑ อื่นๆ (ระบุ) _____

7: จำนวนสมาชิกในครอบครัว .... คน

8. รายได้เฉลี่ยต่อครอบครัว: _____ บาท/ปี รายได้ต่อบุคคล: _____ บาท/ปี

9: สถานะทางการเงิน

    ❑ พอใช้ และมีเงินเก็บ ❑ พอใช้ แต่ไม่มีเงินเก็บ ❑ ไม่พอใช้ /มีหนี้สิน

10: อาชีพ (หลัก) :

    ❑ รัฐวิสาหกิจ/ รับราชการ/ข้าราชการบำนาญ

    ❑ เกษตรกรรม (ทำไร่/ทำนา/ทำสวน ของตนเอง)

    ❑ รับจ้างรายวัน ❑ ค้าขาย/ธุรกิจส่วนตัว ❑ นักศึกษา

    ❑ ไม่ได้ประกอบอาชีพ ❑ อื่นๆ (ระบุ)_____

11: สิทธิการส่งเสริมสุขภาพและการรักษาพยาบาล:

    ❑ ข้าราชการ ❑ ประกันสังคม ❑ บัตรทอง ❑ ไม่มีสิทธิการรักษา

12: ปัจจุบันท่านสูบบุหรี่หรือไม่ :

    ❑ สูบ ➲ สูบนาน_____ ปี ปริมาณที่สูบต่อวัน_____ มวน

    ❑ ไม่สูบ ➲ เคยสูบหรือไม่ ❑ ไม่เคยสูบเลย

                            ❑ เคยสูบ ➲➲ เลิกมานาน_____ปี

13: ประวัติการดื่มสุราหรือไม่:

❑ ดื่ม ➲ ดื่มมานาน_____ ปี ปริมาณที่ดื่มต่อวัน_____

❑ ไม่ดื่ม ➲ เคยดื่มหรือไม่ ❑ ไม่เคยดื่มเลย

❑ เคยดื่ม ➲➲ เลิกมานาน_____ปี

14: ท่านเคยได้รับการวินิจฉัยจากแพทย์ พยาบาล หรือบุคลากรทางการแพทย์ และแจ้งว่าท่านมีโรค

ประจำตัว ดังต่อไปนี้ หรือไม่ และโปรดระบุว่าเป็นมานานแล้วกี่ปี ปัจจุบันรับการรักษาที่ใด

โรคประจำตัว	ได้รับการวินิจฉัย		ระยะเวลาที่เป็น (ปี)	ปัจจุบันรับการรักษาที่ใด
	ไม่เป็น	เป็น		
ไขข้ออักเสบ	❑	❑	.........ปี	
กระเพาะอาหารอักเสบ	❑	❑	.........ปี	
ถุงลมโป่งพอง	❑	❑	.........ปี	
เบาหวาน	❑	❑	.........ปี	
โรคหอบหืด	❑	❑	.........ปี	
หลอดเลือดหัวใจตีบ	❑	❑	.........ปี	
ไขมันในเลือดสูง	❑	❑	.........ปี	
ไต	❑	❑	.........ปี	
หลอดลมอักเสบเรื้อรัง	❑	❑	.........ปี	
หัวใจเต้นผิดปกติ	❑	❑	.........ปี	
หลอดเลือดเลี้ยงสมอง	❑	❑	.........ปี	
อื่นๆ โปรดระบุ_____			.........ปี	

15: ท่านรักษาโรคความดันโลหิตสูงครั้งแรกที่ใด (ตอบได้เพียง 1 ข้อ)

❑ ศูนย์แพทย์ชุมชนเมือง ๑ หัวทะเล ❑ ศูนย์สุขภาพชุมชนจอหอ

❑ ศูนย์แพทย์ชุมชนเมือง ๒ วัดป่าสาลวัน ❑ โรงพยาบาลมหาราชนครราชสีมา

❑ อื่นๆ โปรดระบุ_____

- แพทย์วินิจฉัยว่าเป็นโรคความดันโลหิตสูงมานาน _____ปี

- รักษาด้วยการกินยาหรือไม่ ❑ ใช่ ➲ กินยากี่ชนิด_____

❑ ไม่ใช่

16: การดูแลการรับประทานยาของท่าน

- การจัดยา ❏ จัดยาเอง ❏ มีคนจัดยาให้ทุกวัน (ระบุว่าเป็นใคร) _____
                          ❏ มีคนจัดยาให้บางวัน (ระบุว่าเป็นใคร) _____

- การเตือนให้ทานยา ❏ ไม่มีคนเตือน(กินยาเอง)
                          ❏ มีคนเตือนให้กินยาให้ทุกวัน (ระบุว่าเป็นใคร)_____
                          ❏ มีคนเตือนให้กินยาให้บางวัน (ระบุว่าเป็นใคร) _____

<u>ส่วนที่2: ความรู้ วิถีการดำเนินชีวิตและการจัดการความดันโลหิตสูง</u>
คำชี้แจง โปรดทำเครื่องหมาย√ ลงในช่อง ❏ หน้าข้อความที่ตรงกับคำตอบของท่าน

1: คนที่ป่วยเป็นโรคความดันโลหิตสูงคือคนที่มีความดันโลหิตตัวบน $\geq$140 หรือความดันโลหิต
ตัวล่าง $\geq$ 90 โดยการวัดแยกกันสองครั้ง

❏ ถูก ❏ ผิด ❏ ไม่แน่ใจ ❏ ไม่ทราบ

2: โรคความดันโลหิตสูงที่ควบคุมได้ไม่ดีจะทำให้เกิดภาวะเหล่านี้ตามมา

เบาหวาน ❏ ใช่ ❏ ไม่ใช่ ❏ ไม่แน่ใจ ❏ ไม่ทราบ

3: คนที่แพทย์วินิจฉัยว่าป่วยเป็นโรคความดันโลหิตสูง**<u>ไม่จำเป็น</u>**ต้องรับประทานยารักษา
ถ้าหากยัง สามารถออกกำลังกายได้อย่างสม่ำเสมอ

❏ ถูก ❏ ผิด ❏ ไม่แน่ใจ ❏ ไม่ทราบ

4: การรับประทานอาหารที่ปรุงด้วย เกลือ/ น้ำปลา/ ซอส มีความเสี่ยงต่อโรคความดันโลหิตสูง

❏ ถูก ❏ ผิด ❏ ไม่แน่ใจ ❏ ไม่ทราบ

5: การเปลี่ยนแปลงการรับประทานข้อใดต่อไปนี้สามารถลดความดันโลหิตของคุณได้

ทานผัก ผลไม้ ธัญพืช ผลิตภัณฑ์จากนมไขมันต่ำ ❏ ใช่ ❏ ไม่ใช่ ❏ ไม่แน่ใจ ❏ ไม่ทราบ
งดปรุงน้ำปลา/เครื่องปรุง/ผงชูรส เพิ่มในอาหารตามสั่ง❏ใช่❏ ไม่ใช่ ❏ไม่แน่ใจ ❏ไม่ทราบ

6: ข้อใดต่อไปนี้กล่าวได้ถูกต้องเกี่ยวกับการออกกำลังกายและความดันโลหิต

ผู้ป่วยโรคความดันโลหิตสูงควรออกกำลังกายครั้งละ 30 นาทีเป็นเวลาอย่างน้อย3 วัน / สัปดาห์

❏ ถูก ❏ ผิด ❏ ไม่แน่ใจ ❏ ไม่ทราบ

7: ผู้ป่วยชายแจ้งว่ามีระดับความดันโลหิตวัดที่ร้านขายยา 148/78 mm Hg วัดที่โรงพยาบาล 144/
66 mm Hg และวัดที่บ้าน 132/74 mm Hg ข้อใดกล่าวได้ถูกต้อง

- การวัดความดันโลหิตที่ได้ผลแตกต่างกันเช่นนี้ถือเป็นเรื่องปกติ

❏ ถูก ❏ ผิด ❏ ไม่แน่ใจ ❏ ไม่ทราบ

- ผู้ป่วยสามารถมั่นใจได้ว่าระดับความดันโลหิตของผู้ป่วยอยู่ในเกณฑ์ปกติ

☐ ถูก   ☐ ผิด   ☐ ไม่แน่ใจ   ☐ ไม่ทราบ

8: กรณีวัดความดันโลหิตที่บ้านคุณควรจะวัดและแปลผลโดย

     - วัดสามครั้ง โดยวัดห่างกันเป็นนาทีและยึดค่าเฉลี่ยครั้งที่สองและสามแทนระดับ
ความดันโลหิต

☐ ถูก   ☐ ผิด   ☐ ไม่แน่ใจ   ☐ ไม่ทราบ

9: ความดันโลหิตถูกวัดสองค่าโดยมีความดันโลหิตตัวบนและตัวล่าง หากมีคนบอกคุณว่าคุณมี
ระดับความดันโลหิต 126/76 ผลการรักษาของคุณเป็นไปตามเป้าหมายเมื่อใด

☐ เมื่อความดันโลหิตตัวบน < 140 และความดันโลหิตตัวล่าง < 90

☐ เมื่อความดันโลหิตตัวบน < 140 แม้ว่าความดันโลหิตตัวล่าง > 90

☐ ความดันโลหิตตัวล่าง < 90 แม้ว่าความดันโลหิตตัวบน >140

<u>**ส่วนที่ 3: ความฉลาดทางสุขภาพของผู้ป่วยความดันโลหิตสูง**</u>
คำชี้แจง โปรดพิจารณาความคิดเห็นของท่านต่อข้อความในแต่ละข้อแล้วทำเครื่องหมาย√ ลงใน
ช่องว่างที่ตรงกับระดับความคิดเห็นของท่านมากที่สุดเพียงหนึ่งช่อง

3.1 การรู้หนังสือและศักยภาพ	ไม่ได้เลย	พอทำได้	ทำได้ดี	ทำได้ดีมาก
1.เขียนข้อความให้ผู้อื่นเข้าใจ				
2.อ่านหนังสือได้เข้าใจ				
3.พูดคุยกับคนอื่นได้รู้เรื่อง				
4.ได้ยินเสียงชัดเจน				
5.มองเห็นสิ่งต่างๆได้ชัดเจน				
6.ทำกิจวัตรประจำวัน				
7.ไปไหนมาไหนด้วยตนเอง				

3.2 ความแตกฉานทางสุขภาพสำหรับผู้ป่วยโรคเรื้อรัง	ไม่เห็นด้วยอย่างยิ่ง ←—→เห็นด้วยอย่างยิ่ง										
	0	1	2	3	4	5	6	7	8	9	10
1.คุณพูดคุยแลกเปลี่ยนการปฏิบัติตนกับผู้ป่วยอื่นๆ											
2. คุณสังเกตการเปลี่ยนแปลงของร่างกายเพื่อนำไปบอกหมอในวันนัด											

3.คุณรู้ว่าคุณได้ประโยชน์หลังจากที่เข้าร่วมกิจกรรมดูแลสุขภาพร่วมกับผู้ป่วยอื่นๆ										
4. คุณเข้าร่วมกิจกรรมการดูแลสุขภาพร่วมกับผู้ป่วยอื่นๆ										
5. คุณรู้ว่าอาการแบบไหน ที่บ่งบอกว่าอาการป่วยของคุณแย่ลง										
6. การได้พูดคุยกับผู้ป่วยอื่นๆ ช่วยทำให้คุณอยากดูแลสุขภาพตนเองให้ดีขึ้น										
7. คุณใช้ชีวิตประจำวันได้ตามที่คุณต้องการแม้ว่าคุณจะป่วย										
8. คุณรู้ว่าถ้าคุณไม่ดูแลตนเองให้ดี คุณอาจต้องเจอโรคแทรกซ้อนที่อันตรายกว่าโรคที่เป็นอยู่										
9. คุณรู้ความสมดุลระหว่างอาหารที่กินเข้าไปกับการออกแรงต่างๆ										
10. การได้พูดคุยกับผู้ป่วยอื่นๆ ช่วยให้คุณแก้ปัญหาที่เกิดจากการเจ็บป่วยของคุณ										
11. คุณรู้ว่าอะไรทำให้สุขภาพของคุณแย่ลง										
12. เมื่อคุณมีปัญหาสุขภาพ คุณรู้ดีว่าคุณต้องทำอะไรเพื่อให้สุขภาพของคุณดีขึ้น										
13. คุณเอาใจใส่ดูแลสุขภาพตัวเองเป็นอย่างดีและรู้ว่าจะต้องทำอะไรเพื่อดูแลสุขภาพตัวเอง										

ส่วนที่4: พฤติกรรมการจัดการตนเองเกี่ยวกับความดันโลหิตสูง ในช่วง 3 เดือนที่ผ่านมา

คำชี้แจง โปรดพิจารณาข้อความการจัดการตนเองของท่านเกี่ยวกับความดันโลหิตสูงของท่าน

แล้วทำเครื่องหมาย√ ลงในช่องว่างเพียงหนึ่งช่องที่ท่านเห็นด้วยกับความถี่ที่คุณได้กระทำ

พฤติกรรมนั้นมากที่สุด

พฤติกรรม (ในช่วง 3 เดือน ที่ผ่านมา)	ไม่เคย	ทำบ้าง ไม่ทำบ้าง	ประจำ
1. เคลื่อนไหว ออกแรง /ออกกำลังกาย อย่างสม่ำเสมอ แต่ละครั้งอย่างละ 30 นาที โดยทำสัปดาห์ 3-4 ครั้งขึ้นไป			
2. ท่านได้ซื้ออาหารปรุงสำเร็จรูป เช่น มาม่า หรือไม่ ❏ ใช่ ❏ ไม่ใช่			
- ก่อนรับประทาน ท่านได้อ่านฉลาก/หรือสอบถามจากผู้อื่น ถึงปริมาณเกลือในอาหารที่ปรุงสำเร็จรูปหรือไม่			
3. ท่านรับประทานอาหารที่มีเกลือสูง (เช่นอาหารกระป๋อง บะหมี่กึ่งสำเร็จรูป ปลาร้า กะปิ)			
4. ท่านรับประทานอาหารที่มีเกลือต่ำ (เช่นผักสดและการ ทำอาหารสดรับประทานเองที่บ้าน)			
5. ลดการใช้เครื่องปรุงที่มีปริมาณเกลือสูง (เช่น ซอสมะเขือเทศ, น้ำปลา, ผงชูรส, ผงปรุงรส, ซอสปรุงรส, น้ำปลา, ซีอิ๊ว)			
6. ทานเกลือน้อยกว่า 1 ช้อนชา/วัน (6 กรัม) หรือน้ำปลา/ซีอิ๊ว 3 ช้อนชา/วัน			
7. ทานอาหารที่มีไขมันสูง เช่น หมูสามชั้น มันหมู หนังไก่ กะทิ			
8. ทำอาหารใช้วิธีย่าง อบ นึ่ง แทนการทอด			
9. ใช้น้ำมันถั่วเหลือง น้ำมันมะกอก น้ำมันรำข้าว ในการ ทำอาหาร			
10. ทาน เนื้อปลา อกไก่ แทน หมูสามชั้น มันหมู หนังไก่			
11. จำกัดปริมาณการรับประทานน้ำมัน ไม่เกินวันละ 2 ช้อน โต๊ะ			

พฤติกรรม (ในช่วง 3 เดือน ที่ผ่านมา)	ไม่เคย	ทำบ้าง ไม่ทำบ้าง	ประจำ
12. ทานผักหรือผลไม้ 5-6 ทัพพี ต่อวัน			
13. ดื่มแอลกอฮอล์ (เช่น เบียร์ เหล้า สาโท)			
14. สูบบุหรี่			
15. วัดความดันโลหิตที่บ้าน			
16. ลืมไปรับยาลดความดันโลหิต			
17. ลืมทานยาลดความดันโลหิต			
18. ควบคุมน้ำหนัก โดยการควบคุมอาหาร เช่น อาหาร ประเภทแป้ง น้ำตาล น้ำหวาน			
19. ควบคุมน้ำหนัก โดยการออกกำลังกาย			
20. ทำกิจกรรมคลายเครียดอย่างไร (เช่น เล่นกีฬา เล่นดนตรี สวดมนต์ ดูทีวี อ่านหนังสือ ปลูกต้นไม้ ไปทำบุญ ปฏิบัติธรรม) ระบุ _____			
21. พบแพทย์อย่างสม่ำเสมอ			

22. ใน 3 เดือนที่ผ่านมา ท่านมีความเครียดหรือไม่ ถ้ามี ท่านมีความเครียดในระดับใด และ บ่อย แค่ไหน

　　　❏ ไม่เครียด　❏ เครียด

ระดับความเครียด

　　　❏ น้อย　❏ ปานกลาง　❏ มาก

ความถี่ในการเกิดความเครียด

　　　❏ ทุกวัน　❏ บางวัน　❏ นานๆครั้ง

<u>ส่วน 5: การรับประทานยาและการติดตามนัดอย่างต่อเนื่อง</u>

<u>5.1 การรับประทานยา</u>

**คำชี้แจง โปรดพิจารณาความคิดเห็นของท่านต่อข้อความในแต่ละข้อแล้วทำเครื่องหมาย √ ลงใน
ช่องว่างที่ตรงกับระดับความคิดเห็นของท่านมากที่สุดเพียงหนึ่งช่อง**

1: ท่านเคยลืมกินยาลดความดันโลหิตหรือไม่ ❏ ไม่เคย ❏ เคย

ใน 2 สัปดาห์ที่ผ่านมาท่านเคยลืมกินยา หรือไม่

❏ ไม่เคย ❏ เคย เคยลืมครั้งสุดท้ายกี่วันมาแล้ว _____วัน

2: เมื่อวานท่านได้กินยาลดความดันโลหิต หรือไม่ ❏ ไม่ได้กิน ❏ กิน

3: ท่านเคยหยุดกินยาเอง โดยไม่ได้แจ้ง แพทย์ พยาบาล บุคลากรสาธารณสุข หรือไม่

❏ ไม่เคย ❏ เคย ครั้งสุดท้ายเมื่อใด ระบุ_____

4: เวลาเดินทางออกนอกบ้านท่านนำยาลดความดันติดตัวไปด้วยหรือไม่

❏ นำไปด้วยทุกครั้ง ❏ นำไปด้วยบางครั้ง ❏ ไม่เคยนำไปด้วย

5: ท่านคิดว่าการรับประทานยาลดความดันโลหิตสูง ให้ครบทุกมื้อและถูกต้อง ตามที่แพทย์สั่ง เป็น
เรื่องยุ่งยาก

❏ ใช่ ❏ ไม่ใช่

6: บ่อยครั้งแค่ไหนที่ท่านรู้สึกยุ่งยากในการจำว่าท่านได้รับประทานยารักษาโรคความดันโลหิตสูง
ของท่านทั้งหมด

❏ ไม่เคย/น้อยมาก ❏ นานๆครั้ง ❏ บางครั้ง ❏ ประจำ ❏ ตลอดเวลา

<u>5.2 การติดตามนัดอย่างต่อเนื่อง</u>

คำชี้แจง โปรดเติมจำนวนครั้งที่ตรงกับคำตอบของท่านในช่องว่าง

1. ในรอบปีที่ผ่านมา ท่านไปพบแพทย์ / บุคลากรสาธารณสุข ที่ให้การดูแลรักษาโรคความดัน
โลหิตสูงตามนัด อย่างไร

❏ ไปทุกครั้ง

❏ ไปบ้างบางครั้ง

❏ ไม่ไปตามนัด เหตุผล ระบุ _____

c) **Instruction guide for home blood pressure measurement for VHVs in experimental group (Thai Version)**

ขั้นตอนการใช้เครื่องวัดความดันของผู้ป่วยและอสม.จอหอ

ปุ่มด้านบนซ้าย รูปตัว M

ปุ่มด้านล่างซ้าย รูปคน

ค่าความดันตัว

ค่าความดันตัว

ปุ่ม เปิด–ปิด

ความเร็วชีพจร / การเต้นของหัวใจ
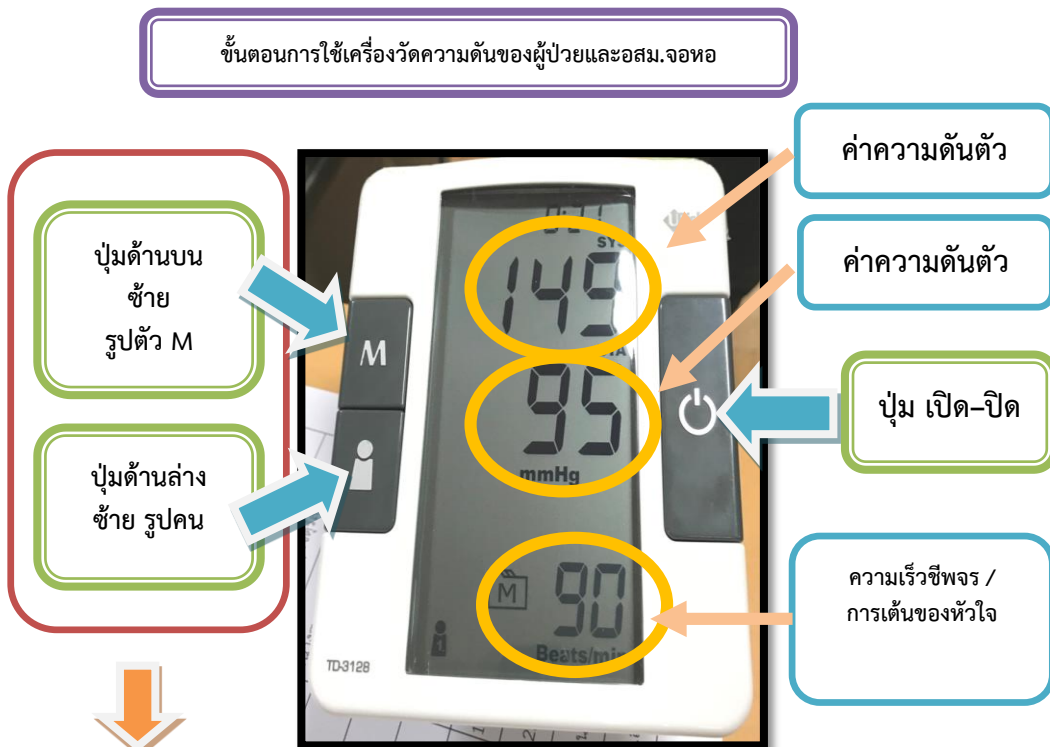
2 ปุ่มนี้ห้ามกด

<u>วิธีการใช้</u>
1. นั่งพักอย่างน้อย 10 นาที ก่อนทำการวัด
2. วางข้อศอกให้ขนานกับโต๊ะ อย่าเกร็งแขน ปล่อยตามสบาย ใส่ผ้าพันแขน ดังรูป
3. กดปุ่มเปิด – ปิด ไม่พูด หรือขยับตัว ในขณะที่เครื่องกำลังทำการวัด
4. ถอดผ้าพันแขน แล้วรอประมาณ 1 นาที
5. ใส่ผ้าพันแขน อีกรอบเพื่อวัดซ้ำ แล้วกดปุ่มเปิด – ปิด

<u>การแปลผล</u>

ระดับความดันโลหิต	ค่าบน	ค่าล่าง	คำแนะนำ
ระดับอันตราย	160 ↑	100 ↑	พบแพทย์โดยด่วน
สูงมาก	140-159	90-99	พบแพทย์
ค่อนข้างสูง	121-139	80-89	ปรึกษาแพทย์
ปกติ	↓ 120	↓ 80	ตรวจเช็คความดันโลหิตสม่ำเสมอ

ถ้า ค่าความดันตัวบน มากกว่า 140 ตัวล่าง หรือตัวล่าง มากกว่า 90
ลองทบทวน.......
    1. เกิดจากอะไร
    2. จะแก้ไขอย่างไร
    3. รู้ได้ยังไงว่าแก้ไขแล้ว

d) Ask me question (Thai Version)

3 คำถามที่สำคัญ

1. ปัญหาสำคัญในการควบคุม
ความดันโลหิตของท่านคืออะไร
2. ท่านจะจัดการปัญหานี้อย่างไร
3. การแก้ปัญหาแบบนี้สำคัญ
อย่างไรต่อการควบคุมความดัน
โลหิตของท่าน

e) Time-schedule of HBPM by VHVs of experimental group (Thai Version)

กำหนดวันวัดความดันโลหิตผู้ป่วยจอหอ

ครั้งที่	ว.ด.ป. อสม.วัดผู้ป่วยติดต่อกัน7 วัน เช้า **3** ครั้ง ห่างกัน **1** นาที	อสม. ส่งเครื่อง.จนท.	อสม. รับเครื่องคืนไปให้ผู้ป่วย	ว.ด.ป. ผู้ป่วยวัดเอง เช้า **2** ครั้งห่างกัน **1** นาที เย็น **2** ครั้งห่างกัน **1** นาที
1	22 ส.ค. 60- 28 ส.ค. 60	29-30 ส.ค. 60	1 ก.ย. 60	3 ก.ย. -28 ก.ย. 60
2	-	29 ก.ย. 60	1 ต.ค. 60	2 ต.ค.- 26 ต.ค. 60
3	-	27 ต.ค. 60	29 ต.ค. 60	30 ต.ค.- 16 พ.ย. 60
4		17 พ.ย. 60	19 พ.ย. 60	-
5	20 พ.ย.-26 พ.ย.60	27 พ.ย. -1ธ.ค. 60	3 ธ.ค. 60	4 ธ.ค. – 28 ธ.ค. 60 พยาบาล ลงเยี่ยมบ้าน
6	-	29 ธ.ค. 60	2 ม.ค. 61	3 ม.ค. -25 ม.ค. 61
7		26 ม.ค. 61	28 ม.ค. 61	29 ม.ค. – 15 ก.พ. 61
8		16 ก.พ. 61	18 ก.พ. 61	
9	19 ก.พ. 61 - 25 ก.พ.61	26 ก.พ. 61	สิ้นสุดโครงการ	พยาบาล ลงเยี่ยมบ้าน

f) **Instruction guide for home blood pressure measurement for VHVs in control group (Thai Version)**

ขั้นตอนการใช้เครื่องวัดความดันหัวทะเล

ห้ามกดปุ่มนี้
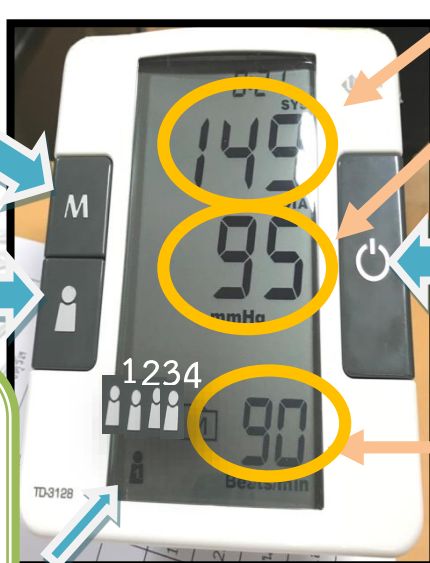
ปุ่ม M
ปุ่มเรียกดูค่าที่บันทึกไว้

ปุ่มเลือกผู้ใช้งาน

ปุ่มกดเลือกลำดับของผู้ป่วย
1. กดครั้งแรกห้ามเกิน 2 วินาที แล้ว
ปล่อย (นับ 1 – 2)
2. ลำดับเลขที่แสดง คือ ข้อมูลของ
ผู้ป่วยที่จะบันทึก
3. หากต้องการเปลี่ยน ให้กดซ้ำ (ห้าม
เกิน 2 วินาที) วนไปจนได้ลำดับผู้ป่วย
ที่ต้องการ
*ห้ามกดนานเกิน 2 วินาที หากกดแล้ว
ให้ปรึกษาพยาบาล

ค่าความดันตัวบน

ค่าความดันตัวล่าง

ปุ่ม เปิด–ปิด

ความเร็วชีพจร /
การเต้นของหัวใจ

1234

TD-3128

การแปลผล

ระดับความดันโลหิต	ค่าบน	ค่าล่าง	คำแนะนำ
ระดับอันตราย	160 ↑	100 ↑	พบแพทย์โดยด่วน
สูงมาก	140-159	90-99	พบแพทย์
ค่อนข้างสูง	121-139	80-89	ปรึกษาแพทย์
ปกติ	↓ 120	↓ 80	ตรวจเช็คความดัน
โลหิตสม่ำเสมอ

วิธีการใช้
1. นั่งพักอย่างน้อย 10 นาที ก่อนทำการวัด
2. วางข้อศอกให้ขนานกับโต๊ะ อย่าเกร็งแขน ปล่อย
ตามสบาย ใส่ผ้าพันแขน ดังรูป
3. กดปุ่มเปิด – ปิด ไม่พูด หรือขยับตัว ในขณะที่
เครื่องกำลังทำการวัด
4. ถอดผ้าพันแขน แล้วรอประมาณ 1 นาที
5. ใส่ผ้าพันแขน อีกรอบเพื่อวัดซ้ำ แล้วกดปุ่มเปิด –
ปิด

g) Time-schedule of HBPM by VHVs of control group (Thai Version)

กำหนดการวัน
วัดความดันโลหิตผู้ป่วยหัวทะเล

ครั้ง ที่	วัน/เดือน/ปี อสม.วัดผู้ป่วยติดต่อกัน 7 วัน เช้า 3 ครั้ง ห่างกัน 1 นาที	อสม. ส่งเครื่องเจ้าหน้าที่	อสม. รับเครื่องวัดความดัน
1	**9 - 15 กันยายน 2560**	15 กันยายน 2560 (บ่าย)	วันศุกร์ ที่ 17 พฤศจิกายน 2560
2	**18 - 24 พฤศจิกายน 2560**	24 พฤศจิกายน2560 (บ่าย)	วันศุกร์ ที่ 16 กุมภาพันธ์ 2560
3	**17 - 23 กุมภาพันธ์ 61**	23 กุมภาพันธ์ 2561 (บ่าย)	**สิ้นสุดโครงการ**

จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

h) HT picture book (Thai Version)

หนังสือการ์ตูน "รู้ทันเพื่อพิชิตโรคความดันสูง"

เพลง "ฮู้ทัน..ควมดั๋นสูง"

โอย.....นอ..นอ...คนบ้านเฮา
คนป่วยความดัน ถ้าสูงมากนั้นยิ่งอันตราย
ต้องควบคุมให้ไหว ขจัดโรคร้ายด้วยทาง 3 อ.
อ. ที่ 1 อาหาร อ. ที่ 2 อารมณ
อ. ที่ 3 ขยับเหมาะสมออกกำลังกาย นะคนบ้านเฮา
     ให้ลดเค็ม แป้งน้ำตาล ของหวานมันไม่ถี่ น้ำหนักเกิน
ต้องลดให้ได้ กินตามใจบ่ดี ออกกำลังกาย ทำได้ทุกที่
สุขภาพจิตดี ไม่คิดวุ่นวาย ครอบครัวสำคัญให้กำลังใจ
จั่งได้รักษาเบิ่งกันเดอเฮา
     คนป่วยความดัน ถ้าสูงมากนั้นยิ่งอันตราย ต้องควบคุม
ให้ไหว ขจัดโรคร้ายด้วยทาง 3 อ. ใส่ใจกินยาตามหมอ และ
ต้องหลีก 2 ส. งดสูบบุหรี่ทำได้ยุเนาะ งดสุราได้บ่ 2 ส ต้องหยุด
โอย....นอ...นอ... คนบ้านเฮา
     ให้โรคภัยหาย ห่างไกลภัยร้าย ให้อยู่ดีมีแฮงด้วยหลัก 3 อ.
เด้อครับพี่น้อง หากรุนแรง จะเสี่ยงแทรกซ้อน หัวใจ ไต ก็วาย
หลอดเลือดตีบตัน อาจสมองพิการ อัมพาตได้ง่าย ตายเฉียบพลัน
หากความดันสูง ป้าๆลุงๆต้องเช็คร่างกาย หมอมาบอกกล่าว
ด้วยความห่วงใย จั่งได้อดสากินยาเด้อเฮา
     คนป่วยความดัน ถ้าสูงมากนั้นยิ่งอันตราย ต้องควบคุมให้ไหว
ขจัดโรคร้ายด้วยทาง 3 อ. และต้องหลีก 2 ส. ใส่ใจกินยาตามหมอ
ทำประจำบ่ต้องรีรอ ทำได้ยุเนาะ น้อคนบ้านเฮา
     โอย...นอ...นอ... คนบ้านเฮา ให้โรคภัยหาย ห่างไกลภัยร้าย
 ให้อยู่ดีมีแฮงด้วยหลัก 3 อ. เด้อครับพี่น้อง โรคทุเลา ด้วยตัวเราเอง
โรคทุเลา ด้วยตัวเราเอง

147
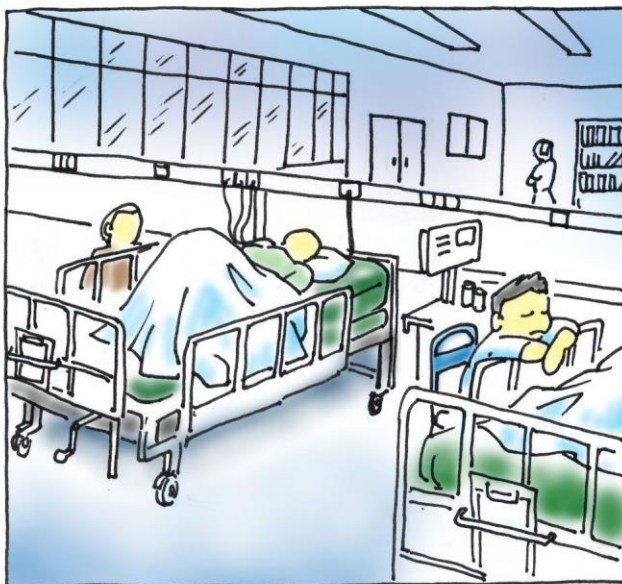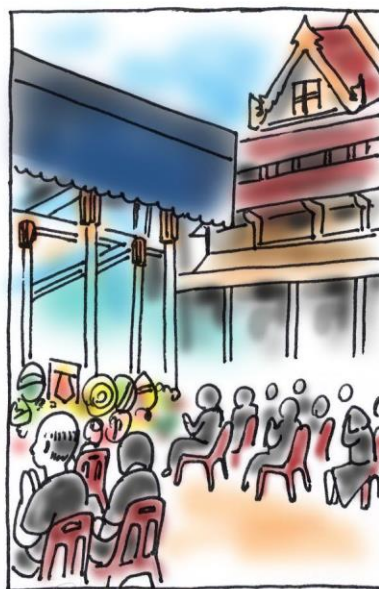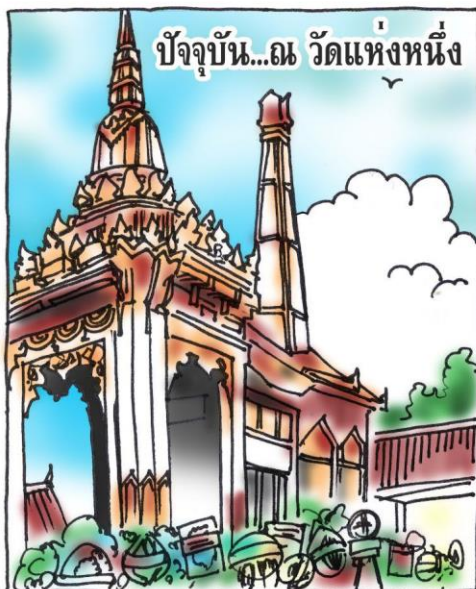
ผมความดันตอนนี้ ตัวบน 135 ตัวล่าง 89 หมอบอกว่า ถ้าวัดห่างกัน 2-4 อาทิตย์ ตัวบนมากกว่า หรือเท่ากับ 140 หรือตัวล่าง มากกว่า หรือเท่ากับ 90 ถึงจะถือว่าเป็นความดันโลหิตสูง

แล้วหมอบอกว่าเป็นอะไร?

หมอบอกว่าเป็นแค่โรคอ้วนลงพุง และให้ปรับพฤติกรรม เหมือนที่เราคุยกันคราวก่อน

รอบหลังวัดได้ 130/80 หมอชมใหญ่เลย ดี ที่ไม่เป็นโรคความดัน

แล้วนายหล่ะ..โกวิท ดูแลตัวเองยังไงมั่ง เล่าให้ฟังหน่อยสิ

งด
เหล้า
บุหรี่

ตรวจ
สุขภาพ
ตาม
นัด

ไปวัด
ทำบุญ
ตักบาตร

ทำสมาธิ
ทำจิตใจ
ให้สบาย

ไม่ว่าจะเป็นผู้ป่วย
โรคความดันโลหิตสูง
เสี่ยงต่อความดันโลหิตสูง
หรือคนปกติ
เราจะต้องไม่ประมาท
ต้องดูแลตัวเองและครอบครัว
ด้านอาหาร อารมณ์ ออกกำลังกาย
ห่างไกลเหล้า บุหรี่
จะได้ไม่ต้องทุกข์ทรมาน
จากโรคแทรกของความดันสูง
เหมือนคุณศักดิ์ที่
เพิ่งตายไปยังไงละจ๊ะ

คุณทำได้!!!

ความรู้เพิ่มเติม

โรคอ้วนลงพุง

(โรคเม็ตตะโบลิกซินโดรม)

เกณฑ์หลัก

รอบเอวผู้ชายมากกว่าหรือเท่ากับ 90 เซนติเมตร

รอบเอวผู้หญิงมากกว่าหรือเท่ากับ 80 เซนติเมตร

เกณฑ์เสี่ยงอีกอย่างน้อย 2 ใน 4

1.ความดันโลหิตสูงตั้งแต่ 130/85 มิลลิเมตรปรอท

2.น้ำตาลในเลือดขณะอดอาหารสูงตั้งแต่ 100 มิลลิ-
    กรัมต่อเดซิลิตรขึ้นไป

3.ไขมันไตรกลีเซอไรด์ (ไขมันเลว)ในเลือดสูง ตั้งแต่
    150 มิลลิกรัมต่อเดซิลิตรขึ้นไป

4.ไขมันเอชดีแอล (ไขมันดี) สำหรับผู้ชายน้อยกว่า
    40 ต่อเดซิลิตร ผู้หญิงน้อยกว่า 50 ต่อเดซิลิตร

ถาม-ตอบ ง่ายๆ
เกี่ยวกับโรคความดันโลหิตสูง

ความดันโลหิตคืออะไร

คือแรงดันเลือดที่เกิดจากหัวใจ
สูบฉีดเลือดไปเลี้ยงทั่วร่างกาย

ความดันโลหิตสูงคืออะไร

ค่าความดันตัวบน มากกว่าหรือเท่ากับ 140
ค่าความดันตัวล่าง มากกว่าหรือเท่ากับ 90
หากวัดได้ค่าความดันโลหิตสูง ต้องได้รับการรักษา

ความดันโลหิตสูงจะพบได้บ่อยแค่ไหน

ผู้ใหญ่ที่มีอายุมากกว่า 25 ปี 4 ใน 10 คน จะมี
ความดันโลหิตสูง **** 9 ใน 10 ของวัยผู้ใหญ่
ที่มีอายุถึง 80 ปี จะพัฒนาเป็นความดันโลหิตสูง

ทำไมความดันโลหิตจึงมีความสำคัญ

ความดันโลหิตสูง ยังเป็นปัจจัยเสี่ยงของโรค
หลอดเลือดหัวใจ และภาวะแทรกซ้อนต่างๆ
เช่น โรคหลอดเลือดสมอง และ ไตวาย

ถาม-ตอบ ง่ายๆ
เกี่ยวกับโรคความดันโลหิตสูง

สาเหตุของความดันโลหิตสูงคืออะไร

โรคอ้วน ชอบทานเค็ม 30%
ทานผักผลไม้น้อย ไม่ออกกำลังกาย 20%
ทานอาหารที่มีไขมัน และน้ำตาลสูง 50%

ใครบ้างที่จะเป็นความดันโลหิตสูง

พบมากในกลุ่มผู้สูงอายุ และผู้ที่มีประวัติ
คนในครอบครัวเป็นโรคนี้อยู่

ความดันโลหิตสูงจำเป็นต้องได้รับการดูแลรักษาหรือไม่

ต้องได้รับการดูแลรักษา และปรับเปลี่ยน
พฤติกรรม เพื่อลดการเกิดภาวะแทรกซ้อนต่างๆ

จะทราบได้อย่างไรว่าตนเองมีความดันโลหิตสูง

ควรได้รับการตรวจวัดความดันโลหิตอย่างน้อย
ปีละ 1 ครั้ง และควรรู้ค่าความดันโลหิตของตนเอง

DDC
กรมควบคุมโรค
Department of Disease Control

สำนักสื่อสารความเสี่ยง
และพัฒนาพฤติกรรมสุขภาพ
Bureau of Risk Communication
and Health Behavior Development

Google play   App Store

สายด่วน
กรมควบคุมโรค
1422

เคล็ดลับ
ลดโรคร้าย
แทรกซ้อน
จาก
ความดันโลหิตสูง

1

ทานยาตามแพทย์สั่ง

วัดความดันโลหิต
สม่ำเสมอ

พักผ่อนให้เพียงพอ

2

ออกกำลังกาย
สม่ำเสมอ

ไม่ดื่มเหล้า ไม่สูบบุหรี่

ควบคุมน้ำหนัก

ลดเค็มลดมัน

กินผักผลไม้
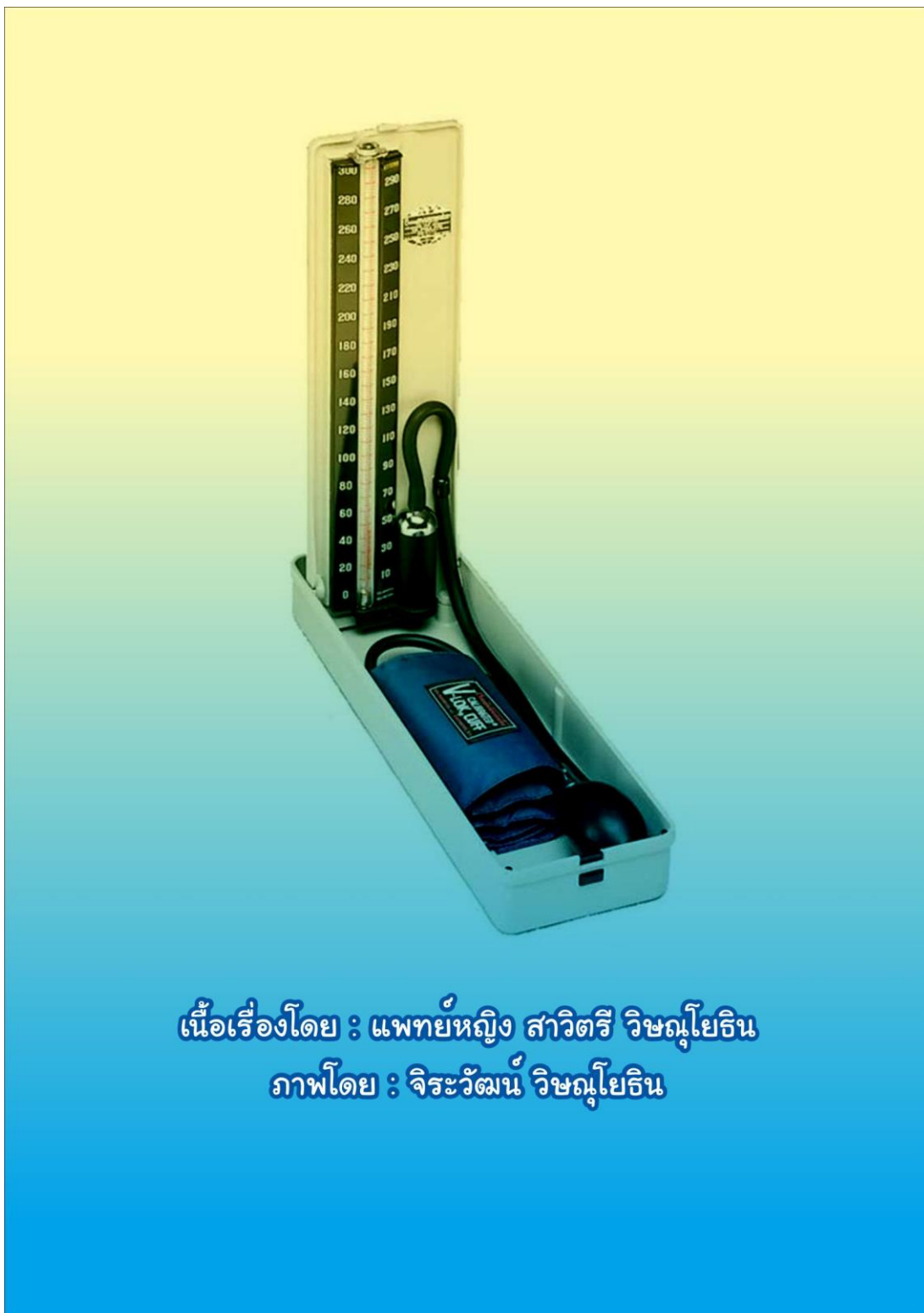
เนื้อเรื่องโดย : แพทย์หญิง สาวิตรี วิษณุโยธิน
ภาพโดย : จิระวัฒน์ วิษณุโยธิน

i) HT clinical practice guideline book (Thai Version)

หนังสือแนวทางการป้องกัน การวินิจฉัย การดูแลรักษาโรคความดันโลหิตสูง

ผังการป้องกัน การวินิจฉัยและการดูแลรักษาความดันโลหิตสูงของคลินิกหมอครอบครัว

ดำเนินงาน 3อ.2ส.ในชุมชน/PCU คัดกรองโดยการวัดความดันโลหิตกลุ่มเป้าหมายในชุมชน/PCU

ระดับความดันโลหิต

SBP≥140 และ/หรือ DBP≥80 มี 3 ระดับ

SBP<120 และ/หรือ DBP<80

SBP 120-139 และ/หรือDBP 80-89

วัดBPปีละครั้ง

ปรับพฤติกรรม 3อ.2ส. วัดBPปีละครั้ง

ระดับ 1 SBP 140-159 และ/หรือ DBP 90-99

ปรับพฤติกรรม 3อ.2ส. 2-4 wks

ให้การวินิจฉัย HTถ้ามี DM/TOD/CKD stage≥ 3, Symptomatic CVDเริ่มการรักษาด้วยยาและปรับพฤติกรรม 3อ.2ส. +LAB: หากผิดปกติปฏิบัติตาม Guideline

ถ้าBP<120/80:วัดBPปีละครั้ง

ถ้าBP120-139/80-89: วัดBP3mos, ปรับพฤติกรรม 3อ.2ส.

ถ้าBP≥140/90ให้การวินิจฉัย HT เริ่มการรักษาด้วยยาร่วมกับปรับพฤติกรรม 3อ.2ส.+LAB:หากผิดปกติปฏิบัติตาม Guideline

ระดับ 2 SBP 160-179 และ/หรือ DBP 100-109

ปรับพฤติกรรม 3อ.2ส. 2-4 wks

ให้การวินิจฉัย HTถ้ามี DM/TOD/CKD stage≥ 3, Symptomatic CVDเริ่มการรักษาด้วยยาและปรับพฤติกรรม 3อ.2ส. +LAB:หากผิดปกติปฏิบัติตาม Guideline

ถ้าBP<120/80:วัดBPทุก3-6mos

ถ้าBP120-139/80-89: วัดBPทุก 3mos , ปรับพฤติกรรม 3อ.2ส.

ถ้าBP≥140/90ให้การวินิจฉัย HT เริ่มการรักษาด้วยยาร่วมกับปรับพฤติกรรม 3อ.2ส.+LAB:หากผิดปกติปฏิบัติตาม Guideline

ระดับ 3 SBP ≥ 180 และ/หรือ DBP ≥ 110

-วินิจฉัย HT เริ่มการรักษาด้วยยาร่วมกับปรับพฤติกรรม 3อ.2ส.
--consult แพทย์
-LAB:หากผิดปกติปฏิบัติตาม Guideline

โรคความดันโลหิตสูงคือ

โรคความดันโลหิตสูง (hypertension) หมายถึง ระดับความดันโลหิตซิสโตลิก (systolic blood pressure, SBP) ≥ 140 มม.ปรอท และ/หรือ ความดันโลหิตไดแอสโตลิก (diastolic blood pressure, DBP) ≥ 90 มม.ปรอท

Isolated systolic hypertension (ISH) หมายถึง ระดับ SBP ≥ 140 มม.ปรอท แต่ระดับ DBP < 90 มม.ปรอท

Isolated office hypertension หรือ white-coat hypertension (WCH) หมายถึง ภาวะที่ความดันโลหิตที่วัดในคลินิก โรงพยาบาล หรือสถานบริการสาธารณสุข พบว่าสูง (SBP ≥ 140 มม.ปรอทและ/หรือ DBP ≥ 90 มม.ปรอท) แต่เมื่อวัดความดันโลหิตที่บ้านจากการวัดด้วยเครื่องวัดความดันโลหิตอัตโนมัติพบว่าไม่สูง (SBP < 135 มม.ปรอท และ DBP < 85 มม.ปรอท)

Masked hypertension (MH) หมายถึง ภาวะที่ความดันโลหิตที่วัดในคลินิก โรงพยาบาล หรือสถานบริการสาธารณสุข พบว่าปกติ (SBP < 140 มม.ปรอทและ DBP < 90 มม.ปรอท) แต่เมื่อวัดความดันโลหิตที่บ้านจากการวัดด้วยเครื่องวัดความดันโลหิตอัตโนมัติพบว่าสูง (SBP ≥ 135 มม.ปรอท และ/หรือ DBP ≥ 85 มม.ปรอท)

การวัดความดันโลหิต

การเตรียมผู้ป่วย

ไม่ดื่มชาหรือกาแฟ และไม่สูบบุหรี่ ก่อนการวัด 30 นาที พร้อมกับถ่ายปัสสาวะให้เรียบร้อย ให้ผู้ป่วยนั่งพักบนเก้าอี้ในห้องที่เงียบสงบเป็นเวลา 5 นาที หลังพิงพนักเพื่อไม่ต้องเกร็งหลังเท้า 2 ข้าง วางราบกับพื้น ห้ามนั่งไขว่ห้าง ไม่พูดคุยขณะวัด แขนซ้ายหรือขวาที่ต้องการวัดวางอยู่บนโต๊ะ ไม่ต้องกำมือ

การเตรียมเครื่องมือ

ทั้งเครื่องวัดความดันโลหิตชนิดปรอท (mercury sphygmomanometer) และเครื่องวัดความดันโลหิตชนิดอัตโนมัติ (automatic blood pressure measurement device) จะต้องได้รับการตรวจสอบมาตรฐานอย่างสม่ำเสมอเป็นระยะ ๆ และใช้ arm cuff ขนาดที่เหมาะสมกับแขนของผู้ป่วย กล่าวคือ ส่วนที่เป็นถุงลม (bladder) จะต้องครอบคลุมรอบวงแขนผู้ป่วยได้ร้อยละ 80 สำหรับผู้ใหญ่ทั่วไป ซึ่งมีเส้นรอบวงแขนยาวประมาณ 27-34 ซม. จะใช้ arm cuff ที่มีถุงลมขนาด 16 ซม. x 30 ซม.

วิธีการวัด

การวัดความดันโลหิตนิยมวัดแขนด้านที่ใช้งานน้อยกว่า (non-dominant arm) พัน arm cuff ที่ต้นแขนเหนือข้อพับแขน 2-3 ซม. และให้กึ่งกลางของถุงลม ซึ่งจะมีเครื่องหมายวงกลมเล็ก ๆ ที่ขอบ

ให้วางอยู่บนหลอดเลือดแดง brachial ให้ประมาณระดับ SBP ก่อนโดยการบีบลูกยาง (rubber bulb) ให้ลมเข้าไปในถุงลมอย่าง รวดเร็วจนคลำชีพจรที่หลอดเลือดแดง brachial ไม่ได้ ค่อย ๆ ปล่อยลมออกให้ ปรอทในหลอดแก้วลด ระดับลงในอัตรา 2-3 มม.ปรอท/วินาที จนเริ่มคลำชีพจรได้ถือเป็นระดับ SBP คร่าว ๆ จากนั้นวัดระดับความดันโลหิตโดยการฟัง ให้วาง bell หรือ diaphragm ของ stethoscope เหนือหลอด เลือดแดง brachial แล้วบีบลูกยางจนระดับปรอทเหนือกว่า SBP ที่คลำได้ 20-30 มม.ปรอท แล้วค่อย ๆปล่อย ลมออก เสียงแรกที่ได้ยิน (Korotkoff sound phase I) จะตรงกับ SBP ปล่อยระดับปรอททลงจน เสียงหายไป (Korotkoff sound phase V) จะตรงกับ DBP ให้ทำการวัดอย่างน้อย 2 ครั้ง ห่างกันครั้งละ 1 นาที จากแขน เดียวกัน และท่าเดียวกัน นำผลที่ได้ทั้งหมดมาหาค่าเฉลี่ย โดยทั่วไปการวัดครั้งแรกมักมีค่าสูงที่สุด หากพบ ผลจากการวัดสองครั้งต่างกันมากกว่า 5 มม.ปรอท ควรวัดเพิ่มอีก 1-2 ครั้ง ในการวัดความดันโลหิตครั้งแรก แนะนำให้วัดที่แขนทั้งสองข้าง หากต่างกันเกิน 20/10 มม.ปรอท จากการวัดซ้ำหลาย ๆ ครั้ง แสดงถึงความ ผิดปกติของหลอดเลือด ให้ส่งผู้ป่วยต่อไปให้ผู้เชี่ยวชาญ หากความดันโลหิตของแขนทั้งสองข้างไม่เท่ากัน โดยเฉพาะในผู้สูงอายุมากกว่าร้อยละ 10 จะมี SBP ของแขนสองข้างต่างกัน > 10 มม.ปรอทได้ การติดตาม ความดันโลหิตจะใช้ข้างที่มีค่าสูงกว่า สำหรับในผู้ป่วยบางราย เช่น ผู้สูงอายุและผู้ป่วยโรคเบาหวาน หรือใน รายที่มีอาการหน้ามืดเวลาลุกขึ้นยืน ให้วัดความดันโลหิตในท่ายืนด้วย โดยวัดความดันโลหิตในท่านอนหรือ นั่งหลังจากนั้นให้ผู้ป่วยยืนแล้ววัดความดันโลหิตซ้ำ อีก 2 ครั้งหลังยืนภายใน 1 และ 3 นาที หาก SBP ในท่า ยืนต่ำกว่า SBP ในท่านั่งหรือนอนมากกว่า 20 มม.ปรอท ถือว่าผู้ป่วยมีภาวะ orthostatic hypotension การ ตรวจหาภาวะนี้จะมีความไวขึ้นหากเปรียบเทียบ SBP ในท่านอนกับ SBPในท่ายืน

ตารางที่ 1 การจำแนกโรคความดันโลหิตสูงตามความรุนแรงในผู้ใหญ่อายุ 18 ปีขึ้นไป

Category	SBP (มม.ปรอท)		DBP (มม.ปรอท)
Optimal	< 120	และ	< 80
Normal	120-129	และ/หรือ	80/84
High normal	130-139	และ/หรือ	85-89
Grade 1 hypertension (mild)	140-159	และ/หรือ	90-99
Grade 2 hypertension (moderate)	160-179	และ/หรือ	100-109
Grate 3 hypertension (severe)	≥ 180	และ/หรือ	≥ 110
Isolated systolic hypertension (ISH)	≥ 140	และ	< 90

หมายเหตุ : *SBP = systolic blood pressure; DBP = diastolic blood pressure.*
เมื่อความรุนแรงของ SBP และ DBP อยู่ต่างระดับกัน ให้ถือระดับที่รุนแรงกว่าเป็นเกณฑ์ สำหรับ ISH ที่แบ่งระดับ ความรุนแรงเหมือนกันโดยใช้แต่ SBP

การวัดความดันโลหิตโดยผู้ป่วยเองที่บ้านโดยใช้เครื่องมือวัดความดันโลหิตอัตโนมัติ (Self หรือ Home Blood Pressure Monitoring: HBPM)

1) ใช้ในการตรวจหาผู้ป่วยที่เป็น isolated office hypertension หรือ WCH และ MH
2) แนะนำให้ใช้ติดตามผลการรักษาในผู้ป่วยที่ได้รับยาลดความดันโลหิตทุกราย ถ้าเป็นไปได้
3) การเตรียมผู้ป่วยและเครื่องมือดังกล่าวข้างต้นและต้องมีการแนะนำผู้ป่วยถึงการใช้เครื่องมือดังกล่าวอย่างเหมาะสม พร้อมกับทำการบันทึกค่าที่วัดได้
4) แนะนำให้ใช้เครื่องวัดความดันโลหิตอัตโนมัติ ชนิดวัดที่ต้นแขนและได้รับการรับรองมาตรฐาน แต่ไม่แนะนำให้ใช้เครื่องวัดความดันโลหิตอัตโนมัติ ชนิดวัดที่ปลายนิ้วหรือที่ข้อมือยกเว้นในกรณีที่การวัดความดันโลหิตที่ต้นแขนทำได้ยากลำบาก เช่น ในผู้ป่วยที่อ้วนมาก
5) แนะนำให้วัดความดันโลหิตวันละ 2 ครั้ง โดยวัดในช่วงเช้าก่อนรับประทานยาลดความดันโลหิต 2 ครั้ง และช่วงเย็นอีก 2 ครั้ง (รวมวันละ 4 ครั้ง) เป็นเวลา 3-7 วันก่อนพบแพทย์ ให้ตัดค่าที่วัดได้ในวันแรกออก และคำนวณค่าเฉลี่ยจากค่าที่เหลือทั้งหมด แล้วนำผลดังกล่าวไปใช้ในการตัดสินใจเริ่มหรือปรับเปลี่ยนการรักษา ซึ่งค่าความดันโลหิตที่วัดได้ที่บ้านจากเครื่องวัดความดันโลหิตอัตโนมัติจะต่ำกว่าค่าที่วัดได้ที่สถานพยาบาล ประมาณ 5 มม.ปรอท จึงควรถือว่าความดันโลหิตผิดปกติเมื่อ SBP $\geq$ 135 มม.ปรอท และ/หรือ DBP $\geq$ 85 มม.ปรอท
6) ไม่แนะนำให้ผู้ป่วยปรับขนาดยาลดความดันโลหิตด้วยตนเอง
7) แนะนำให้หยุดวัดความดันโลหิตที่บ้านถ้าการวัดนี้ก่อให้เกิดความกังวลต่อผู้ป่วย

ตารางที่ 2 ปัจจัยเสี่ยงต่อการเกิดโรคหัวใจและหลอดเลือด

1.1	ระดับของ SBP และ DBP
1.2	ระดับของ pulse pressure > 60 มม.ปรอท
1.3	อายุ $\geq$ 55 ปี ในเพศชาย หรือ $\geq$ 65 ในเพศหญิง
1.4	สูบบุหรี่
1.5	ระดับไขมันในเลือดผิดปกติ Total cholesterol > 200 มก./ดล., LDL-C > 130 มก./ดล., HDL-C < 40 มก./ดล. ในเพศชายหรือ < 50 มก./ดล. ในเพศหญิง หรือระดับ triglyceride > 150 มก./ดล.
1.6	FPG 100-125 มก./ดล.
1.7	OGTT ผิดปกติ
1.8	ประวัติการเกิด CVD ในบิดา มารดา หรือพี่น้องก่อนวัยอันควร
1.9	อ้วนลงพุง WC $\geq$ 90 ซม. ในเพศชาย และ $\geq$ 80 ซม. ในเพศหญิง

ตารางที่ 3 การตรวจหาร่องรอยการทำลายอวัยวะจากโรคความดันโลหิตสูงโดยผู้ป่วยยังไม่มีอาการ

2.1	Electrocardiography เพื่อตรวจหา LVH (Sokolow-Lyon voltage criteria คือ SV1 + RV5 หรือ RV6 > 3.5 mV, Cornell voltage criteria คือ SV3 + RaVL ในเพศชาย > 2.8 mV ในเพศหญิง > 2.0 mV และ Cornell product คือ Cornell voltage $\times$ QRS width > 244 mV-msec)
2.2	Echocardiography เพื่อตรวจหา LVH (left ventricular mass index $\geq$ 115 กรัม/ม.^{2} ในเพศชาย และ $\geq$ 95 กรัม/ม.^{2} ในเพศหญิง)
2.3	Carotid wall thickness (intima-media thickness > 0.9 มม.) หรือพบ arterial plaque
2.4	Carotid-femoral PWV > 10 ม./วินาที
2.5	ABI < 0.9
2.6	ระดับ SCr (1.3-1.5 มก./ดล. ในเพศชาย และ 1.2-1.4 มก./ดล. ในเพศหญิง)
2.7	eGFR < 60 มล./นาที/1.73 ม.^{2} (สูตร CKD-EPI)
2.8	ตรวจปัสสาวะพบ albuminuria (urine albumin/creatinine ratio 30-300 มก./กรัมครีอะตินิน)

ตารางที่ 4 การตรวจหาโรคเบาหวาน

4.1	มีอาการของโรคเบาหวานชัดเจน คือ หิวน้ำมาก ปัสสาวะบ่อยและมาก น้ำหนักตัวลดลงโดยที่ไม่มีสาเหตุ ร่วมกับมีระดับพลาสมากลูโคสในเวลาใดก็ได้ $\geq$ 200 มก./ดล.
4.2	FPG $\geq$ 126 มก./ดล.
4.3	ระดับพลาสมากลูโคสที่ 2 ชั่วโมงหลังทำ OGTT มีค่า $\geq$ 200 มก./ดล.
4.4	ระดับ hemoglobin A$_{1c}$ > 6.5% โดยจะต้องตรวจวัดในห้องปฏิบัติการที่มีมาตรฐานรับรองเท่านั้น (NGSP certified and standardized to DCCT assay)

สำหรับผู้ที่ไม่มีอาการของโรคเบาหวานชัดเจน ควรตรวจเลือดซ้ำอีกครั้งหนึ่งต่างวันกันเพื่อยืนยันการวินิจฉัยโรค

ตารางที่ 5 การตรวจหาโรคหัวใจและหลอดเลือดและโรคไต

5.1	โรคหลอดเลือดสมอง: Ischemic stroke, Cerebral hemorrhage, Transient ischemic attack
5.2	โรคหัวใจ Myocardial infarction, Angina, ประวัติการทำ coronary revascularization, ภาวะหัวใจล้มเหลว
5.3	โรคไต: Diabetic nephropathy, CKD, Albuminuria > 300 มก./วัน หรือ proteinuria > 500 มก./วัน
5.4	โรคของหลอดเลือดแดงส่วนปลาย
5.5	จอตาผิดปกติ: Hemorrhage, Exudates, Papilledema

ตารางที่ 6 การประเมินความเสี่ยงโดยรวมต่อการเสียชีวิตจากโรคหัวใจและหลอดเลือดใน 10 ปี ข้างหน้า

	ความเสี่ยงโดยรวมต่อการเสียชีวิตจาก CVD ใน 10 ปีข้างหน้า			
ระดับความดันโลหิต RF, TOD, CVD, CKD	High normal SBP 130-139 หรือ DBP 85-89	Grade 1 HT SBP 140-149 หรือ DBP 90-99	Grade 2 HT SBP 160-179 หรือ DBP 100-109	Grade 3 HT SBP ≥ 180 หรือ DBP ≥ 110
ไม่มีปัจจัยเสี่ยงอื่น		ต่ำ	ปานกลาง	สูง
มีปัจจัยเสี่ยงอื่น 1-2 ข้อ	ต่ำ	ปานกลาง	ปานกลาง-สูง	สูง
มีปัจจัยเสี่ยงอื่นตั้งแต่ 3 ข้อขึ้นไป	ต่ำ-ปานกลาง	ปานกลาง-สูง	สูง	สูง
TOD, CKD stage 3 หรือเป็นเบาหวาน	ปานกลาง-สูง	สูง	สูง	สูง-สูงมาก
Symptomatic CVD, CKD stage ≥ 4 หรือ เบาหวานที่มี TOD/RFs	สูงมาก	สูงมาก	สูงมาก	สูงมาก

BP = blood pressure; RF = risk factor; TOD = target organ damage; CVD = cardiovascular disease; CKD = chronic kidney disease; HT = hypertension; SBP = systolic blood pressure; DBP = diastolic blood pressure; CKD stage ≥ 4 = eGFR < 30 มล./นาที/1.73 ม.^{2}; CKD stage 3 = eGFR 30-59 มล./นาที/1.73 ม.^{2}

ให้นำปัจจัยเสี่ยงต่อ CVD ที่ได้จากการซักประวัติและการตรวจร่างกาย รวมทั้งการตรวจทาง ห้องปฏิบัติการต่าง ๆ มาประเมินความเสี่ยงในการเสียชีวิตจาก CVD ใน 10 ปี ข้างหน้า

การจัดระดับความเสี่ยงโดยรวมต่อการเสียชีวิตจาก CVD อาศัยระดับความดันโลหิต จำนวนของปัจจัยเสี่ยง, TOD ที่ไม่มีอาการ, โรคเบาหวาน, ระยะของ CKD หรือการปรากฏ CVD อยู่แล้ว

การจัดระดับของความเสี่ยงใช้นิยามดังต่อไปนี้ ความเสี่ยงต่ำหมายถึง ความเสี่ยงโดยรวมที่จะเกิดการ เสียชีวิตจาก CVD ในเวลา 10 ปี ต่ำกว่าร้อยละ 1, ความเสี่ยงปานกลาง หมายถึง ความเสี่ยงที่โดยรวมจะเกิดการ เสียชีวิตจาก CVD อยู่ระหว่างร้อยละ 1 ไปจนถึงน้อยกว่าร้อยละ 5 ความเสี่ยงสูง หมายถึง ความเสี่ยงโดยรวมที่จะ เกิดการเสียชีวิตจาก CVD อยู่ระหว่างร้อยละ 5 ไปจนถึงน้อยกว่าร้อยละ 10, ความเสี่ยงสูงมาก หมายถึง ความเสี่ยง โดยรวมที่จะเกิดการเสียชีวิตจาก CVD มีตั้งแต่ร้อยละ 10 ขึ้นไป

การรักษาความดันโลหิตสูง

การรักษาโดยการปรับเปลี่ยนพฤติกรรมชีวิต

การปรับเปลี่ยนพฤติกรรมชีวิตให้ได้ในระยะยาวนอกจากถือเป็นหัวใจสำคัญในการป้องกันโรค ความดันโลหิตสูงแล้วยังเป็นการรักษาพื้นฐานสำหรับผู้ป่วยโรคความดันโลหิตสูงทุกคน ไม่ว่าผู้ป่วยจะมีข้อ บ่งชี้ในการใช้ยาหรือไม่ก็ตาม ในกรณีที่ผู้ป่วยใช้ยาลดความดันโลหิตร่วมกับการปรับเปลี่ยนพฤติกรรมจะ ทำให้ประสิทธิภาพของการรักษาด้วยยาสูงขึ้น ประสิทธิภาพของการปรับเปลี่ยนพฤติกรรมต่อการรักษาโรค ความดันโลหิตสูงสรุปดังตารางที่ 7 ดังนั้นแพทย์และบุคลากรทางการแพทย์ควรให้คำแนะนำเรื่องการ ปรับเปลี่ยนพฤติกรรมชีวิตแก่ผู้ป่วยทุกราย

ตารางที่ 7 ประสิทธิภาพของการปรับเปลี่ยนพฤติกรรมในการรักษาโรคความดันโลหิตสูง

วิธีการ	ประสิทธิภาพของการลดระดับความดันโลหิต
ลดน้ำหนักในผู้ป่วยที่มี BMI $\geq$ 25 กก./ม.^{2}	ทุก ๆ BW ที่ลดลง 1 กก. สามารถลด SBP ได้เฉลี่ย 1 มม.ปรอท โดยรวมการลด BW 10 กก. สามารถลด SBP ได้เฉลี่ย 5-20 มม.ปรอท
การรับประทานอาหารแบบ DASH	SBP ลดลง 8-14 มม.ปรอท
การจำกัดโซเดียมในอาหารน้อยกว่า 2,300 มก. ต่อวัน	SBP ลดลง 2-8 มม.ปรอท
การออกกำลังกายแบบแอโรบิกอย่างสม่ำเสมอ	SBP ลดลงเฉลี่ย 4 มม.ปรอท DBP ลดลงเฉลี่ย 2.5 มม.ปรอท
การลดการดื่มแอลกอฮอล์	SBP ลดลง 2-4 มม.ปรอท

BMI = body mass index; BW = body weight; SBP = systolic blood pressure; DASH = Dietary Approaches to Stop Hypertension; DBP = diastolic blood pressure.

1) **การควบคุมน้ำหนักตัวให้อยู่ในเกณฑ์ปกติหรือใกล้เคียงปกติ** โดยให้มีค่า BMI ตั้งแต่ 18.5-22.9 กก./ม.^{2} และ WC อยู่ในเกณฑ์มาตรฐาน สำหรับคนไทย คือ ผู้ชายน้อยกว่า 90 ซม. และ ผู้หญิงน้อยกว่า 80 ซม. แนะนำให้ตรวจสอบน้ำหนักด้วยตนเองอย่างสม่ำเสมอ กรณีที่มีภาวะน้ำหนักเกิน หรืออ้วนแนะนำให้ลดน้ำหนัก การที่น้ำหนักลดลงตั้งแต่ร้อยละ 5 ของน้ำหนักตั้งต้นขึ้นไปจะส่งผลให้ระดับ ความดันโลหิตลดลงเทียบเท่ากับยาลดความดันโลหิต 1 ชนิด

2) **การออกกำลังกาย** แนะนำให้ประชาชนทุกคน ไม่ว่าจะเป็นหรือไม่เป็นโรคความดันโลหิต สูงออกกำลังกายความหนักระดับปานกลางอย่างน้อยวันละ 30 นาที อย่างน้อยสัปดาห์ละ 5 วัน เพื่อสุขภาพที่ ดี โดยในแต่ละวันอาจแบ่งออกกำลังกายเป็นช่วงเวลาสั้น ๆ ครั้งละ 10 นาที วันละ 3 ครั้งและควรกระตุ้นให้ มีการเคลื่อนไหวร่างกายที่กระฉับกระเฉง ลดพฤติกรรมนั่ง ๆ นอน ๆ เพื่อช่วยควบคุมน้ำหนักตัว สำหรับ การออกกำลังกายเพื่อลดน้ำหนักและลดปัจจัยเสี่ยงในการเกิด CVD ควรออกกำลังกายแบบแอโรบิก (การ ออกกำลังกายที่กล้ามเนื้อมัดใหญ่ ๆ หลาย ๆ มัดทำงานพร้อมกันหรือสลับกันอย่างต่อเนื่อง) อย่างน้อย สัปดาห์ละ 5 วัน โดยไม่ควรออกกำลังกายติดต่อกันเกิน 2 วัน สามารถเลือกออกกำลังกายที่ระดับความ หนักแตกต่างกันได้หลายแบบ ดังนี้

2.1) ระดับปานกลาง หมายถึง ออกกำลังกายจนชีพจรเต้นร้อยละ 50-70 ของชีพจรสูงสุดตามอายุ (อัตราชีพจรสูงสุดคำนวณจาก 220 – อายุในหน่วยปี) หรือ ยังสามารถพูดเป็นประโยค ต่อเนื่องได้ (self-talk test) รวมเป็นระยะเวลาสัปดาห์ละ 150 นาที ตัวอย่างรูปแบบการออกกำลังกายที่มีความหนักปานกลาง เช่น เดินเร็ว ว่ายน้ำเร็ว ปั่นจักรยานอยู่กับที่แบบไม่ฝืด ตัดหญ้า เต้นแอโรบิกเบา ๆ

2.2) ระดับหนักมาก หมายถึง ออกกำลังกายจนชีพจรเต้นร้อยละ 70-85 ของชีพจรสูงสุดตามอายุ ควรทำอย่างน้อยสัปดาห์ละ 75 นาที หรือครั้งละ 10 นาทีเป็นระยะเวลารวมกันอย่างน้อยวันละ 30 นาที

สัปดาห์ละ 3 วัน ตัวอย่างรูปแบบการออกกำลังกายที่มีความหนักมาก เช่น การออกกำลังกายต่อเนื่องใน
โรงยิมปั่นจักรยานอยู่กับที่แบบฝืด ปั่นจักรยานแข่งขัน

3) การจำกัดโซเดียมในอาหาร

การบริโภคโซเดียม ไม่เกิน 2,300 มก./วัน สามารถช่วยลดความดันโลหิตได้ทั้งในผู้ป่วยที่มีและไม่มีโรค
ความดันโลหิตสูงโดยเกลือแกง (โซเดียมคลอไรด์) 1 ช้อนชา (5 กรัม) มีโซเดียม 2,000 มก. น้ำปลา 1 ช้อน
ชา มีโซเดียมประมาณ 350-500 มก. ซีอิ๊ว 1ช้อนชา มีโซเดียมประมาณ 320-455 มก. และผงชูรส 1 ช้อนชามี
โซเดียม 492 มก.

4) การรับประทานอาหารตามแนวทาง DASH(Dietary Approaches to Stop Hypertension)

โดยเน้นอาหารประเภทผัก 5 ส่วนต่อวัน (ผัก 1 ส่วน มีปริมาณเท่ากับ ผักดิบประมาณ 2 ทัพพี
[1 ถ้วยตวง] หรือผักสุก 1 ทัพพี [1/2 ถ้วยตวง]) ผลไม้ 4 ส่วนต่อวัน (ผลไม้ 1 ส่วน มีปริมาณเท่ากับ
ผลไม้หั่นพอดีคำประมาณ 6-8 ชิ้น หรือผลไม้เป็นผลขนาดกลาง 1 ผล หรือผลไม้เป็นผลขนาดเล็ก 2-4 ผล
หรือ ปริมาณผลไม้ที่วางเรียงชั้นเดียวบนจานรองกาแฟได้พอดี 1 จาน) นมไขมันต่ำและผลิตภัณฑ์นมไขมัน
ต่ำ 2-3 ส่วนต่อวัน ธัญพืช ถั่วเปลือกแข็ง 7 ส่วนต่อวัน ซึ่งรูปแบบอาหารดังกล่าวจะทำให้ร่างกายได้รับ
โพแทสเซียม, แมกนีเซียม, แคลเซียมและใยอาหาร ในปริมาณสูงซึ่งช่วยส่งเสริมประสิทธิภาพของการลด
ความดันโลหิตจากการลดโซเดียมในอาหาร อย่างไรก็ดี ไม่แนะนำให้รับประทานโพแทสเซียม และ/หรือ
แมกนีเซียมเสริมในรูปของผลิตภัณฑ์เสริมอาหาร เพื่อหวังผลในการช่วยลดระดับความดันโลหิต โดยเฉพาะ
ผู้ป่วยที่เป็นโรคไต หรือได้รับยาที่เพิ่มระดับโพแทสเซียม

5) การจำกัดหรืองดเครื่องดื่มแอลกอฮอล์

ในกรณีที่ไม่ดื่มแอลกอฮอล์อยู่แล้ว ไม่แนะนำให้ดื่ม ถ้าดื่มเครื่องดื่มแอลกอฮอล์ควรจำกัดปริมาณดังนี้
ผู้หญิงไม่เกิน 1 ดื่มมาตรฐาน (standard drink) ต่อวัน และผู้ชายไม่เกิน 2 ดื่มมาตรฐานต่อวัน ปริมาณ 1 ดื่ม
มาตรฐานของเครื่องดื่มแอลกอฮอล์ หมายถึง เครื่องดื่มที่มีแอลกอฮอล์ประมาณ
10 กรัม ได้แก่

5.1) เหล้าแดง 35 ดีกรี ปริมาณ 2 ฝาใหญ่ หรือ 30 มล.

5.2) เหล้าขาว 40 ดีกรี ปริมาณ 30 มล.

5.3) น้ำขาว อุ กระแช่ 10% ปริมาณ 3 เป๊ก/ตอง/ก๊ง หรือ 150 มล.

5.4) สาโท สุราแช่ สุราพื้นเมือง 6% ปริมาณ 4 เป๊ก/ตอง/ก๊ง หรือ 200 มล.

5.5) เบียร์ 5% : 240มล.

5.6) เบียร์ 6.4% : 1/2 กระป๋อง หรือ 1/3 ขวดใหญ่

5.7) ไวน์ 12% : 100 มล.

6) การหยุดบุหรี่

การเลิกบุหรี่อาจไม่ได้มีผลต่อการลดความดันโลหิตโดยตรง แต่สามารถลดความเสี่ยงต่อการเกิด
โรคหัวใจและหลอดเลือดได้ การที่แพทย์หรือบุคลากรทางการแพทย์ใช้เวลาเพียง 3-5 นาทีเพื่อ

แนะนำให้ผู้ป่วยเลิกบุหรี่หรือกระตุ้นให้ผู้ป่วยเกิดความรู้สึกอยากเลิกบุหรี่สามารถช่วยเพิ่มโอกาสให้ผู้ป่วย เลิกสูบบุหรี่ได้ ผู้ป่วยที่สูบบุหรี่มากกว่า 10 มวนต่อวัน ควรพิจารณาใช้ยาเพื่อช่วยในการเลิกบุหรี่ แพทย์ สามารถแนะนำให้ผู้ป่วยรับบริการคำปรึกษาฟรีจากศูนย์เลิกบุหรี่ทางโทรศัพท์แห่งชาติ (Thailand National Quitline) ที่เรียกว่า "1600" สายเลิกบุหรี่ โทรฟรี ได้ทุกเครือข่ายและไม่เรียกเก็บค่าบริการ เปิดบริการระหว่าง 07.30-20.00 น. ตั้งแต่วันจันทร์ถึงวันศุกร์ สำหรับนอกเวลา หรือวันหยุด สามารถฝากข้อความและเบอร์โทร กลับ หรือ สามารถติดต่อขอรับบริการผ่านเว็บไซต์ www.thailandquitline.or.th

การรักษาโดยการใช้ยาลดความดันโลหิต

ก่อนการรักษาโดยการใช้ยาลดความดันโลหิตควรประเมินความเสี่ยงโดยรวมของผู้ป่วยต่อ การเสียชีวิตจาก CVD ใน 10 ปี ข้างหน้าก่อน (ตารางที่ 6) และวางแผนการรักษา (ตารางที่ 8) ผู้ป่วยทุก รายควรได้รับคำแนะนำเกี่ยวกับการปรับเปลี่ยนพฤติกรรม และให้การรักษาอย่างเหมาะสมเพื่อลดปัจจัย เสี่ยง จะเริ่มให้ยาลดความดันโลหิตทันทีในผู้ป่วยกลุ่มที่มีความเสี่ยงโดยรวมต่อการเสียชีวิตจาก CVD สูง และสูงมาก ส่วนในผู้ป่วยกลุ่มที่ความเสี่ยงต่ำควรเริ่มให้ยาถ้าหากความดันโลหิตของผู้ป่วยยังคงอยู่ที่ระดับ ≥ 140/90 มม.ปรอทหลังจากให้คำแนะนำไปแล้วอย่างน้อย 1 เดือนและในผู้ป่วยกลุ่มที่มีความเสี่ยงปานกลาง หรือปานกลางถึงสูง ควรเริ่มให้ยา ถ้าหากความดันโลหิตของผู้ป่วยยังคงอยู่ที่ระดับ ≥ 140/90 มม.ปรอท หลังจากให้คำแนะนำไปแล้วอย่างน้อย 1 สัปดาห์

ตารางที่ 8 แนวทางการรักษาความดันโลหิตสูงด้วยวิธีการปรับพฤติกรรมและการให้ยาลดความดันโลหิต

ระดับความดันโลหิต RF, TOD, CVD, CKD	High normal* SBP 130-139 หรือ DBP 85-89	Grade 1 HT SBP 140-159 หรือ DBP 90-99	Grade 2 HT SBP 160-179 หรือ DBP 100-109	Grade 3 HT SBP ≥ 180 หรือ DBP ≥ 110
ไม่มีปัจจัยเสี่ยงอื่น	ไม่ต้องรักษา	ปรับพฤติกรรม 2-4 เดือน หาก BP >140/90 ให้ยา	ปรับพฤติกรรม 2-4 สัปดาห์ หาก BP >140/90 ให้ยา	ปรับพฤติกรรม เริ่มให้ยาทันที
มีปัจจัยเสี่ยงอื่น 1-2 ข้อ	ปรับพฤติกรรม ไม่ต้องให้ยา	ปรับพฤติกรรม 2-4 สัปดาห์ หาก BP >140/90 ให้ยา	ปรับพฤติกรรม 2-4 สัปดาห์ หาก BP >140/90 ให้ยา	ปรับพฤติกรรม เริ่มให้ยาทันที
มีปัจจัยเสี่ยงอื่นตั้งแต่ 3 ข้อขึ้นไป	ปรับพฤติกรรม ไม่ต้องให้ยา	ปรับพฤติกรรม 2-4 สัปดาห์ หาก BP >140/90 ให้ยา	ปรับพฤติกรรม เริ่มให้ยาทันที	ปรับพฤติกรรม เริ่มให้ยาทันที
TOD, CKD stage 3 หรือเป็นเบาหวาน	ปรับพฤติกรรม ไม่ต้องให้ยา	ปรับพฤติกรรม เริ่มให้ยาทันที	ปรับพฤติกรรม เริ่มให้ยาทันที	ปรับพฤติกรรม เริ่มให้ยาทันที
Symptomatic CVD, CKD stage ≥ 4 หรือ เบาหวานที่มี TOD/RFs	ปรับพฤติกรรม ไม่ต้องให้ยา	ปรับพฤติกรรม เริ่มให้ยาทันที	ปรับพฤติกรรม เริ่มให้ยาทันที	ปรับพฤติกรรม เริ่มให้ยาทันที

BP = blood pressure; RF = risk factor; TOD = target organ damage; CVD = cardiovascular disease; CKD = chronic kidney disease; HT = hypertension; SBP = systolic blood pressure; DBP = diastolic blood pressure; CKD stage ≥ 4 = eGFR < 30 มล./นาที/1.73 ม.^{2}; CKD stage 3 = eGFR 30-59 มล./นาที/1.73 ม.^{2}

* ในผู้ที่มีความดันโลหิตในเกณฑ์ high normal อาจพิจารณาให้ยาในผู้ที่มี masked hypertension

หลักการใช้ยาลดความดันโลหิต

ควรเลือกใช้ยาลดความดันโลหิตเริ่มต้นจากยา 4 กลุ่มต่อไปนี้ 1) Thiazide–type diuretics, 2) Calcium channel blockers (CCBs), 3) Angiotensin converting enzyme inhibitors (ACEIs), 4) Angiotensin receptor blockers (ARBs) สำหรับยา alpha–blockers (ABs) ไม่แนะนำให้ใช้เป็นยาขนาน แรกยกเว้นในผู้ป่วยที่มีต่อมลูกหมากโต แต่สามารถใช้ ABs ร่วมกับยาลดความดันโลหิตกลุ่มหลักได้ ส่วน beta–blockers (BBs) จะไม่ใช้เป็นยาขนานแรกจะใช้ BBs เป็นยาขนานแรก ก็ต่อเมื่อมีข้อบ่งชี้ดังต่อไปนี้ ผู้ป่วยโรคหลอดเลือดหัวใจ (coronary artery disease, CAD) ผู้ป่วยที่เป็น acute coronary syndrome (ACS) ผู้ป่วยที่มีหัวใจเต้นเร็ว หรือเต้นเร็วผิดปกติ ผู้ป่วยที่อาจมีการกระตุ้นระบบประสาท sympathetic มาก ผู้ป่วย หัวใจ และควรเลือกใช้เป็นยาชนิดแรกในการใช้รักษาความดันโลหิตสูงในสตรีวัยเจริญพันธุ์

ระดับความดันโลหิตเป้าหมาย

1) ความดันโลหิต < 140/90 มม.ปรอท ในผู้ป่วยทั่วไป
2) ความดันโลหิต < 140-150/90 มม.ปรอท ในผู้ป่วยที่อายุมากกว่า 60 ปี แต่น้อยกว่า 80 ปี
3) ความดันโลหิต < 150/90 มม.ปรอท ในผู้ป่วยที่อายุ > 80 ปี
4) ความดันโลหิต < 130/80 มม.ปรอท ในผู้ป่วยอายุ < 50 ปี
5) ความดันโลหิต < 140/90 มม.ปรอท ในผู้ป่วยโรคเบาหวาน
6) ความดันโลหิต < 140/90 มม.ปรอท ในผู้ป่วย CKD ที่ไม่มี albuminuria และโรคไตเรื้อรังที่มี albuminuria น้อยกว่า 30 มก.ต่อวัน (น้ำ หนัก ++/คุณภาพหลักฐาน II)
7) ความดันโลหิต < 130/80 มม.ปรอท ในผู้ป่วย CKD ที่มี albuminuria ตั้งแต่ 30 มก.ต่อวันขึ้นไป
8) ความดันโลหิต < 140/90 มม.ปรอท ในผู้ป่วยที่เคยเป็น CVD แล้ว

การติดตามผู้ป่วย

ความถี่ในการติดตามผู้ป่วยขึ้นกับความรุนแรงของโรคก่อนเริ่มให้การรักษา

ตารางที่ 9 ระยะเวลานัดติดตามผู้ป่วย (หลังวัดความดันโลหิตครั้งแรก)

ระดับความดันโลหิต (มม.ปรอท)		ระยะเวลานัด
SBP	DBP	
< 140	< 90	ตรวจวัดระดับความดันโลหิตซ้ำใน 1 ปี
140-159	90-99	ตรวจยืนยันว่าเป็นโรคความดันโลหิตสูงจริงหรือไม่ใน 2 เดือน
160-179	100-109	ประเมินหรือส่งผู้ป่วยไปปรึกษาต่อภายใน 1 เดือน
≥ 180	≥ 110	ประเมินหรือส่งผู้ป่วยไปปรึกษาต่อทันทีภายใน 1 สัปดาห์ ทั้งนี้ขึ้นกับสภาพผู้ป่วย

แนะนำให้พิจารณาใช้ยากลุ่มเหล่านี้ก่อน(ตารางที่ 10) เนื่องจากเห็นชัดเจนว่าเป็นประโยชน์ในระยะยาวกับผู้ป่วยบางกลุ่มในเรื่องของการลดอัตราเสียชีวิตและทุพพลภาพ ในการเลือกใช้ยาชนิดที่ 2 หรือใช้ยาลดความดันโลหิต 2 ชนิดร่วมกันควรเลือกจากกลุ่มยาที่ สามารถเสริมฤทธิ์กันได้ดี (ภาพที่ 1) และไม่ควรใช้ยาในกลุ่ม ACEIs ร่วมกับยาในกลุ่ม ARBs

ตารางที่ 10 กลุ่มยาลดความดันโลหิตที่เลือกใช้ในสภาวะที่จำเพาะ

Condition	Drug
Asymptomatic organ damage	
LVH	ACEIs, CCBs, ARBs
Asymptomatic atherosclerosis	CCBs, ACEIs
Albuminuria (30-300 mg/g)	ACEIs, ARBs
Renal dysfunction	ACEIs, ARBs
Cardiovascular disease	
Previous stroke	ACEIs, thiazide-type diuretics
Previous myocardial infarction	BBs, ACEIs, ARBs
Angina pectoris	BBs, CCBs
Heart failure	Diuretics, BBs, ACEIs, ARBs, MRAs
Aortic aneurysm	BBs
Atrial fibrillation, prevention	ARBs, ACEIs, BBs or MRAs
Atrial fibrillation, ventricular rate control	BBs, non-DHP CCBs
CKD/proteinuria (> 300 mg/g)	ACEIs, ARBs
Peripheral artery disease	ACEIs, CCBs
Others	
ISH (elderly)	Diuretic, CCBs
Metabolic syndrome	ACEIs, ARBs, CCBs
Diabetes mellitus	ACEIs, ARBs
Pregnancy	Methyldopa, BBs, CCBs

LVH – left ventricular hypertrophy, BBs – beta-blockers, non-DHP CCBs – non-dihydropyridine calcium channel blockers, MRAs – mineralocorticoid receptor antagonists.

ภาพที่ 1 การเลือกใช้ยาลดความดันโลหิตที่เสริมฤทธิ์กัน
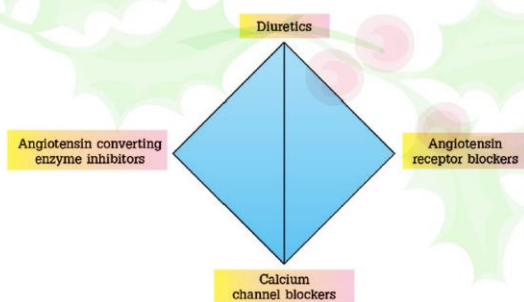
ในกรณีที่ผู้ป่วยไม่มีข้อบ่งชี้ในการใช้ยากลุ่มใดให้ใช้ยาลดความดันโลหิตอย่างเป็นขั้นตอน (แผนภูมิที่ 1)

แผนภูมิที่ 1 แนวทางการเริ่มต้นรักษาและการปรับขนาดยาลดความดันโลหิต
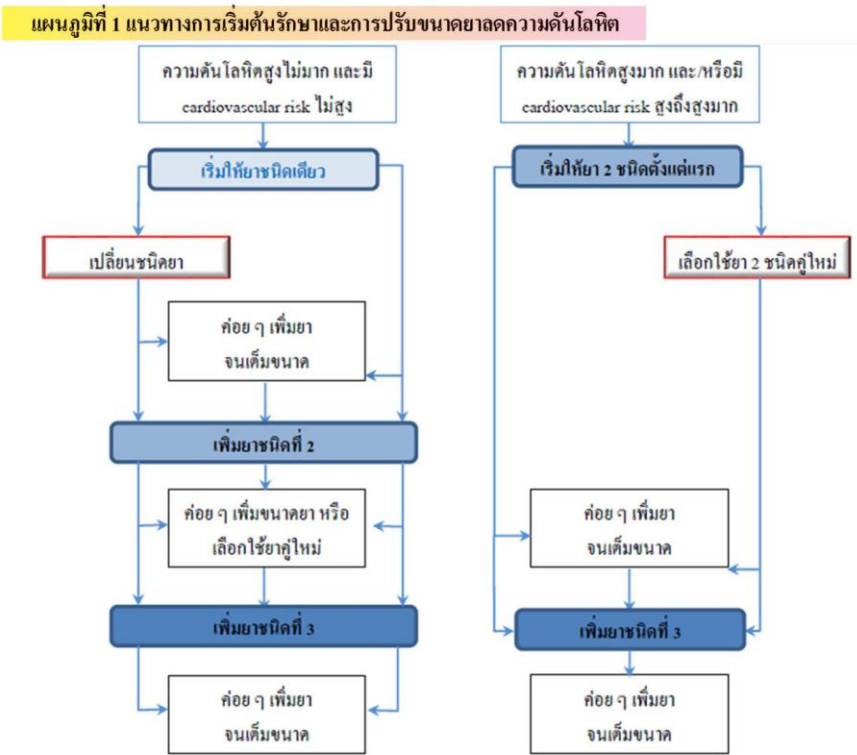
ก. ความดันโลหิตสูงไม่มาก คือ *Grade 1 hypertension (mild)* ความดันโลหิตสูงมาก คือ ตั้งแต่ *Grade 2 hypertension* ขึ้นไป

Cardiovascular risk ไม่สูง หมายถึง กลุ่มผู้ป่วยที่มีความเสี่ยงต่ำจนถึงความเสี่ยงปานกลางถึงสูงตามตารางที่ 6

Cardiovascular risk สูง หมายถึง กลุ่มผู้ป่วยที่มีความเสี่ยงสูงจนถึงสูงมากตามตารางที่ 6

ข. ให้เลือกยาจากยาที่อยู่ใน 4 กลุ่มหลักและเลือกใช้ยาร่วมกันตามคำแนะนำตามภาพที่ 1 โดยห้ามไม่ให้ใช้ยากลุ่ม *angiotensin converting enzyme inhibitors* ร่วมกับยากลุ่ม *angiotensin receptor blockers*

เอกสารอ้างอิง

1. สมาคมความดันโลหิตสูงแห่งประเทศไทย. แนวทางการรักษาความดันโลหิตสูงในเวชปฏิบัติทั่วไป ฉบับปรับปรุง 2558. Trickthink Printing, Chiangmai; 2015; [cite 2017 April 16]. Available from: http://www.thaihypertension.org/files/GL%20HT%202015.pdf

คลินิกหมอครอบครัว
โรงพยาบาลมหาราชนครราชสีมา
พ.ศ. 2560

4. Descriptive results of questionnaire part 2-4

    a) Number and percentage of lifestyle and management knowledge at baseline, 3-month, and 6- month of poorly controlled HT patients in urban area between experiment and control group

Question about	Number and percentage of correct answer					
	Baseline		At 3-month		At 6-month	
	Experimen t n (%)	Control n (%)	Experimen t n (%)	Contro l n (%)	Experimen t n (%)	Contro l n (%)
1.Diagnosis	38 (60.3)	29 (48.3)	48 (76.2)	36 (63.2)	47 (75.8)	39 (67.2)
2.Complicatio n	19 (30.2)	5 (8.5)	4 (6.3)	5 (8.8)	0 (0.0)	9 (15.5)
3.Treatment	14 (22.2)	10 (16.9)	22 (34.9)	17 (29.8)	19 (30.6)	16 (27.6)
4.Risks	54 (85.0)	45 (75.0)	57 (90.5)	46 (80.7)	59 (95.2)	50 (86.2)
5.DASH	52 (82.5)	50 (83.3)	60 (95.2)	44 (77.2)	57 (91.9)	49 (84.5)
6.Salt	52 (82.5)	47 (78.3)	59 (93.7)	45 (78.9)	60 (96.8)	46 (79.3)
7.Exercise	54 (85.7)	23 (88.3)	61 (96.8)	47 (82.5)	62 (100.0)	53 (91.4)
8. BP	41 (65.1)	35 (58.3)	52 (82.5)	41 (71.9)	51 (91.9)	43 (74.1)
9.HBP	35 (55.6)	31 (51.7)	52 (82.5)	41 (73.2)	55 (88.7)	41 (70.7)
10.BP Interpretation	41 (65.1)	43 (72.9)	59 (93.7)	33 (58.9)	52 (83.9)	37 (63.8)

b) Number and percentage of literacy and potential literacy level at baseline, 3-month, and 6- month of poorly controlled HT patients in urban area between experiment and control group

Level	Number and percentage of literacy and potential literacy level					
	Baseline		At 3-month		At 6-month	
	Experiment	Control	Experiment	Control	Experiment	Control
Writing						
no.poor	34	43	40	41	37	41
% poor	56.7	71.7	63.5	71.9	59.7	70.7
no.fair	16	10	17	14	17	14
% fair	26.7	16.7	27.0	24.6	27.4	24.1
no.good	10	7	6	2	8	3
% good	16.7	11.7	9.5	3.5	12.9	5.2
Reading						
no.poor	28	34	32	37	30	37
% poor	44.4	56.7	50.8	64.9	48.4	63.8
no.fair	29	16	22	17	22	17
% fair	46.0	26.7	34.9	29.8	35.5	29.3
no.good	6	10	9	3	10	4
% good	9.5	16.7	14.3	5.3	16.1	6.9
Talking						
no.poor	20	15	12	26	16	18
% poor	31.7	25.0	19.0	45.6	25.8	31.0
no.fair	33	26	32	28	32	35
% fair	52.4	43.3	50.8	49.1	51.6	60.3
no.good	10	19	19	3	14	5
% good	15.9	31.7	30.2	5.3	22.6	8.6
Heard						
no.poor	14	15	12	14	14	15
% poor	22.2	25.0	19.0	24.6	22.6	25.9
no.fair	38	29	31	40	36	40
% fair	60.3	48.3	49.2	70.2	58.1	69.0
no.good	11	16	20	3	12	3
% good	17.5	26.7	31.7	5.3	19.4	5.2

| Level | Number and percentage of literacy and potential literacy level | | | | | |
| | Baseline | | At 3-month | | At 6-month | |
	Experiment	Control	Experiment	Control	Experiment	Control
Clear						
no.poor	27	23	17	29	24	26
% poor	42.9	38.3	27.0	50.9	38.7	44.8
no.fair	30	27	32	26	26	29
% fair	47.6	45.0	50.8	45.6	41.9	50.0
no.good	6	10	14	2	12	3
% good	9.5	16.7	22.2	3.5	19.4	5.2
Daily activities						
no.poor	19	15	6	15	13	9
% poor	30.2	25.0	9.5	26.3	21.0	15.5
no.fair	31	28	30	39	31	41
% fair	49.2	46.7	47.6	68.4	50.0	70.7
no.good	13	17	27	3	18	8
% good	20.6	28.3	42.9	5.3	29.0	13.8
Going out						
no.poor	15	14	9	18	12	16
% poor	23.8	23.3	14.3	31.6	19.4	27.6
no.fair	30	27	21	32	30	33
% fair	47.6	45.0	33.3	56.1	48.4	56.9
no.good	18	19	33	7	20	9
% good	28.6	31.7	52.4	12.3	32.3	15.5

c) Mean and standard deviation of self-care of chronic patients on health literacy at baseline, 3-month, and 6- month of poorly controlled HT patients in urban area between experiment and control group
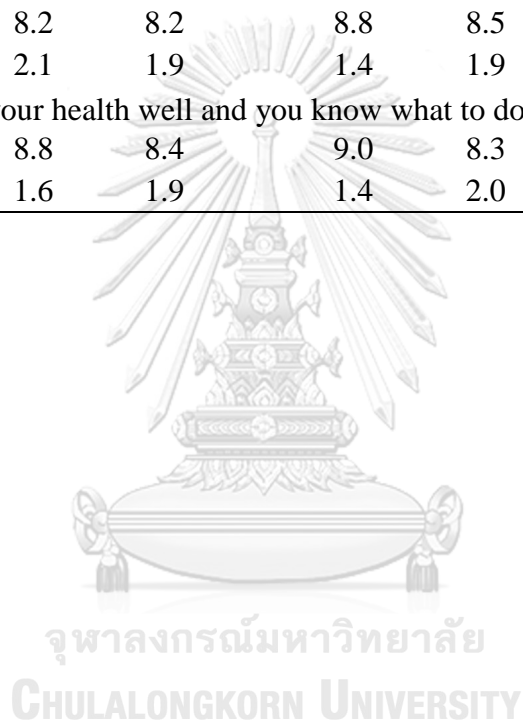
Question	Mean and standard deviation of self-care of chronic patients (Total score= 10)					
	Baseline		At 3-month		At 6-month	
	Experiment	Control	Experiment	Control	Experiment	Control
8.You share your self-care with the other patients.						
Mean	7.0	6.5	7.6	7.4	8.6	7.2
SD	2.8	2.6	2.4	2.0	1.4	1.8
9.You observe the change of your body in order to tell the doctor in the appointment date.						
Mean	7.8	7.7	8.1	7.7	9.0	7.4
SD	2.5	2.2	2.0	1.8	1.4	1.9
10.You know that you gain benefit after taking health care activities with the other patients.						
Mean	8.5	9.2	8.7	8.5	9.3	8.0
SD	2.1	12.0	2.0	1.7	1.2	1.8
11.You join health care activities with the other patients.						
Mean	7.9	7.4	8.4	7.6	9.2	7.2
SD	2.6	2.7	1.9	2.5	1.4	2.2
12.You know the signs of your illness worsen.						
Mean	7.7	7.4	8.0	7.5	8.9	7.1
SD	2.2	2.2	2.1	1.8	1.4	1.9
13.Talking to the other patients help you to do the better self-care.						
Mean	8.7	8.3	8.9	8.4	9.2	8.1
SD	1.8	2.2	1.5	1.9	1.3	1.9
14.You live your daily life as you want even you have illness.						
Mean	8.4	8.1	8.9	8.0	9.5	8.2
SD	2.0	2.1	1.5	1.8	0.9	1.6
15.You know that if you do not take care yourself well enough, you may get the complications which are more serious than your illness being.						
Mean	8.3	8.2	10.0	8.1	9.2	8.1
SD	2.3	2.4	11.5	2.1	1.1	2.1
16.You know the balance between food intake and your activities and exercise.						
Mean	7.8	7.1	8.2	7.3	8.9	7.5
SD	2.1	2.4	1.8	2.3	1.8	1.8

Question	Mean and standard deviation of self-care of chronic patients (Total score= 10)					
	Baseline		At 3-month		At 6-month	
	Experiment	Control	Experiment	Control	Experiment	Control
17.Talking to the other patients help you to solve the problems from your illness.						
Mean	8.3	7.8	8.7	7.9	9.2	8.2
SD	1.9	1.9	1.5	2.2	1.2	2.0
18.You know what make your health get worse.						
Mean	7.9	7.1	9.5	7.5	9.2	7.6
SD	2.2	2.6	1.7	2.5	1.3	2.0
19.When you have health problem, you know how to get the better health.						
Mean	8.2	8.2	8.8	8.5	9.4	8.3
SD	2.1	1.9	1.4	1.9	1.0	1.4
20.You take care your health well and you know what to do for your self-care.						
Mean	8.8	8.4	9.0	8.3	9.4	8.5
SD	1.6	1.9	1.4	2.0	1.0	1.6

d) Mean and standard deviation of self-management behavior at baseline, 3-month, and 6- month of poorly controlled HT patients in urban area between experiment and control group

Question number	Mean and standard deviation of self-management behavior (Total score=3)											
	Baseline				At 3-month				At 6-month			
	Experiment		Control		Experiment		Control		Experiment		Control	
	$\overline{x}$	SD	$\overline{x}$	SD	$\overline{x}$	SD	$\overline{x}$	SD	$\overline{x}$	SD	$\overline{x}$	SD
1	2.3	0.7	2.4	1.1	2.5	0.7	2.3	0.7	2.6	0.5	2.3	0.7
3	2.1	0.5	2.3	1.0	2.4	1.0	2.1	0.4	2.4	0.6	2.0	0.3
4	2.6	0.6	2.6	0.6	2.7	0.6	2.8	0.4	2.9	0.3	2.8	0.5
5	2.2	0.7	2.3	0.7	2.5	0.7	2.3	0.7	2.7	0.5	2.3	0.6
6	2.2	0.7	2.3	0.7	2.6	0.6	2.4	0.6	2.6	0.5	2.3	0.5
7	2.2	0.5	2.1	0.6	2.3	0.5	2.0	0.5	2.4	0.6	2.1	0.4
8	2.2	0.7	2.1	0.6	2.5	0.6	2.3	0.5	2.6	0.5	2.1	0.4
9	2.4	0.8	2.7	1.3	2.4	0.8	2.5	0.7	2.7	0.6	2.3	0.7
10	2.3	0.6	2.3	0.6	2.7	0.5	2.5	0.5	2.6	0.5	2.4	0.5
11	2.0	0.7	2.2	1.1	2.4	0.6	2.3	0.6	2.6	0.6	2.1	0.5
12	2.3	0.7	2.3	0.6	2.5	0.6	2.5	0.6	2.8	0.4	2.6	0.5
13	2.7	0.6	2.8	0.5	2.8	0.5	2.8	0.6	2.7	0.6	2.9	0.4
14	2.9	0.4	3.0	0.3	2.9	0.4	2.9	0.3	2.9	0.4	2.9	0.3
15	1.7	0.8	1.4	0.6	3.0	0.2	2.2	0.5	3.0	0.2	1.8	0.5
16	2.9	0.4	2.9	0.4	3.0	0.3	2.8	0.5	2.9	0.3	2.8	0.4
17	2.7	0.5	2.7	0.6	2.8	0.5	2.6	0.5	2.9	0.4	2.6	0.6
18	2.3	0.7	2.3	0.6	2.4	0.6	2.2	0.7	2.4	0.8	2.1	0.5
19	2.3	1.4	2.4	0.7	2.4	0.7	2.5	1.1	2.6	0.6	2.2	0.7
22	2.9	0.3	3.0	0.9	3.0	0.2	2.9	0.3	3.0	0.2	2.9	0.3

e) Mean and standard deviation of drug and appointment adherence at baseline, 3-month, and 6- month of poorly controlled HT patients in urban area between experiment and control group

Question number	Mean and standard deviation of drug and appointment adherence (Total score=1)											
	Baseline				At 3-month				At 6-month			
	Experiment		Control		Experiment		Control		Experiment		Control	
	$\overline{x}$	SD	$\overline{x}$	SD	$\overline{x}$	SD	$\overline{x}$	SD	$\overline{x}$	SD	$\overline{x}$	SD
1.1	0.6	0.5	0.6	0.5	0.7	0.4	0.6	0.5	0.8	0.4	0.6	0.5
1.2	0.9	0.3	0.9	0.3	1.0	0.2	0.8	0.4	0.9	0.3	0.8	0.4
2	0.9	0.2	0.9	0.2	1.0	0.2	0.9	0.3	1.0	0.2	0.9	0.3
3	0.9	0.2	0.9	0.3	1.0	0.1	0.9	0.3	1.0	0.2	0.9	0.3
4	0.9	0.3	0.8	0.3	0.9	0.2	0.9	0.2	1.0	0.2	0.9	0.3
5	1.0	0.0	1.0	0.2	1.0	0.2	1.0	0.2	0.9	0.2	0.9	0.3
6	1.0	0.0	0.9	0.2	1.0	0.1	1.0	0.1	1.0	0.1	1.0	0.1
7	0.9	0.2	0.9	0.2	1.0	0.2	0.9	0.2	1.0	0.2	0.9	0.3

จุฬาลงกรณ์มหาวิทยาลัย

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VITA

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