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THE EFFECT OF BEHAVIORAL MANAGEMENT PROGRAM ON BLOOD CHOLESTEROL IN PATIENTS WITH CORONARY REVASCULARIZATION

Police Sub-Lieutenant Pachanut Tantikosoom

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By	Pol. Sub. Lt. Pachanat Tantikosoom
Field of Study	Nursing Science
Thesis Advisor	Associate Professor Pol. Capt. Yupin Aungsuroch, M.S.N, Ph.D.
Thesis Co-advisor	Assistant Professor Chanokporn Jitpanya, M.S, Ph.D.

Accepted by the Faculty of Nursing, Chulalongkorn University in Partial Fulfillment of the Requirements for the Doctoral Degree

.....Dean of the Faculty of Nursing
(Associate Professor Pol. Capt. Yupin Aungsuroch, M.S.N, Ph.D.)

THESIS COMMITTEE

.....Chairman
(Professor Somchit Hanucharurnkul, Ph.D., R.N.)

.....Thesis Advisor
(Associate Professor Pol. Capt. Yupin Aungsuroch, M.S.N, Ph.D.)

.....Thesis Co-advisor
(Assistant Professor Chanokporn Jitpanya, M.S, Ph.D.)

.....Examiner
(Assistant Professor Sunida Preechawong, Ph.D., R.N.)

.....External Examiner
(Associate Professor Siripaarn Suwanmonkha, Ph.D.)

.....External Examiner
(Associate Professor Vichai Benjacholamas, M.D.)

ปชาณัฏฐ์ ตันติโกสุม: ผลของโปรแกรมการจัดการพฤติกรรมต่อไขมันในเลือดของผู้ป่วยที่ได้รับการรักษาโรคหลอดเลือดหัวใจผ่านสายสวนหรือการผ่าตัดทางเบี่ยง (THE EFFECT OF BEHAVIORAL MANAGEMENT PROGRAM ON BLOOD CHOLESTEROL IN PATIENTS WITH CORONARY REVASCULARIZATION) อ. ที่ปรึกษาวิทยานิพนธ์หลัก: รศ. ร.ต.อ. หญิง ดร. ยุพิน อังสุโรจน์, อ. ที่ปรึกษาวิทยานิพนธ์ร่วม: ผศ.ดร. ชนกพร จิตปัญญา, 216 หน้า.

การศึกษาวิจัยนี้มีวัตถุประสงค์เพื่อเปรียบเทียบระดับไขมันทั้งหมด ไขมันแอลดีแอล ไขมันเอชดีแอล และไตรกลีเซอร์ไรด์ ของผู้ป่วยที่ได้รับการรักษาโรคหลอดเลือดหัวใจผ่านสายสวนหรือการผ่าตัดทางเบี่ยง ก่อนและหลังได้รับโปรแกรมการจัดการพฤติกรรม รวมทั้งเพื่อเปรียบเทียบระดับความแตกต่างของไขมันทั้งหมด ไขมันแอลดีแอลและไตรกลีเซอร์ไรด์ ในกลุ่มทดลองหลังได้รับโปรแกรมการจัดการพฤติกรรม พบว่าระดับความแตกต่างต่ำกว่ากลุ่มควบคุม โดยที่ไขมันเอชดีแอลหลังได้รับโปรแกรมในกลุ่มทดลองจะสูงกว่ากลุ่มควบคุม ผู้วิจัยได้ปรับปรุงโปรแกรมตามแนวทางของ The National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III) (2001) และใช้กรอบแนวคิดเรื่องความเชื่อในความสามารถแห่งตนของแบนดรา (1997) การศึกษาครั้งนี้เป็นการวิจัยกึ่งทดลองโดยเลือกกลุ่มตัวอย่างแบบเจาะจง มีกลุ่มตัวอย่างทั้งหมด 57 คน โดยกลุ่มทดลองจะได้รับโปรแกรมการจัดการพฤติกรรมและการพยาบาลปกติของโรงพยาบาล ส่วนกลุ่มควบคุมจะได้รับเฉพาะการพยาบาลปกติของโรงพยาบาล มีการวัดระดับไขมันที่ต้องการประเมิน 2 ครั้ง ได้แก่ครั้งแรกในวันเริ่มโปรแกรม และครั้งที่สองหลังเสร็จสิ้นโปรแกรม โปรแกรมดังกล่าวใช้เวลา 3 เดือน

ผลการทดลองพบว่า ระดับไขมันทั้งหมด ไขมันแอลดีแอล ไขมันเอชดีแอล ที่วัดได้ในกลุ่มทดลองก่อนและหลังการได้รับโปรแกรมการจัดการพฤติกรรมแตกต่างกันอย่างมีนัยสำคัญทางสถิติ ส่วนระดับไตรกลีเซอร์ไรด์เพิ่มขึ้นเล็กน้อยและไม่แตกต่างกัน จากการวัดค่าความแตกต่างสุทธิของระดับไขมันก่อนและหลังโปรแกรมการพยาบาลพบว่าไขมันทั้งหมดและไขมันแอลดีแอลของกลุ่มทดลอง ต่ำกว่ากลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติ ในขณะที่ไขมันเอชดีแอล ของกลุ่มทดลองสูงกว่ากลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติ ส่วนไตรกลีเซอร์ไรด์ของทั้งสองกลุ่มไม่แตกต่างกัน

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PACHANAT TANTIKOSOOM: THE EFFECT OF BEHAVIORAL MANAGEMENT PROGRAM ON BLOOD CHOLESTEROL IN PATIENTS WITH CORONARY REVASCULARIZATION. ADVISOR: ASSOC. PROF. POL.CAP.CAPT. YUPIN AUNGSUROCH, M.S.N, Ph.D., CO-ADVISOR: ASST. PROF. CHANOKPORN JITPANYA, M.S, Ph.D., 216 pp.

The purposes of this study were to compare total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglyceride in patients with coronary revascularization who participated in the behavioral management program before and after the intervention, to compare total cholesterol, LDL-cholesterol, and triglyceride before and after the intervention in order to show that the net change from the experimental group are lower than that of the control group, and to compare HDL-cholesterol before and after the intervention in order to show that the net change from the experimental group is higher than that of the control group. This program was created by following guidelines of the cholesterol lowering therapy by The National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III) (2001) and basing on self-efficacy theory (Bandura, 1997).

The quasi-experimental study design was presented in this study. The purposive sampling was used to select the sample size which was totally 57 subjects. The intervention group received the behavioral management program and usual care while the control group received only the usual care. Blood cholesterol was evaluated two times: first time when the program started and the second time when the program was completed (three months later).

The result of the study revealed that 1) The patients with coronary revascularization who participated in the behavioral management nursing program had a significant difference in mean scores for Total cholesterol, LDL-cholesterol, and HDL-cholesterol ($p < .o5$) but Triglyceride slightly increased in post-test and not significant ($p = .06$), 2). The patients with coronary revascularization who participated in the behavioral management program had different Total cholesterol, LDL-cholesterol and Triglyceride before and after the intervention. Net change of Total cholesterol, and LDL- cholesterol ($p < .05$) was lower than that of the control group, but Triglyceride was not significantly different ($p = .51$), and 3) The patients with coronary revascularization who participated in the behavioral management program had different HDL-cholesterol before and after the intervention. Net change of HDL-cholesterol ($p < .05$) was higher than that of the control group.

Field of study: ....Nursing Science...Student's Signature:.....

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CHAPTER I

INTRODUCTION

Background and significance of the study

Coronary revascularization including coronary artery bypass graft surgery (CABG) and percutaneous coronary intervention (PCI) (Woods et al., 2005) are both safe and established treatment modalities for invasive revascularization on patients with severe symptoms of coronary artery disease (CAD). These treatments have been increasing rapidly worldwide. In Thailand, the number of annual CABG surgeries increased from 1,731 in 2009 to 4203 in 2010 (The Society of Thoracic Surgeons of Thailand, 2010), and PCI procedures of which the annual number of procedures reached more than 12, 000 in 2008 (The Cardiac Intervention Society of Thailand, 2010).

Even though both of these revascularization therapies are highly effective in providing complete relief from angina in some patients and improvement in the severity of symptoms in most of the remainder, the likelihood of an occurrence of subsequent MI after 5 to10 years of follow-ups is similar to both medically and surgically for patients treated as well as other recurrent cardiac events, repeated revascularization procedures and cardiac. Cardiac events related to lumen re-narrowing, or restenosis at the treated site, whereas others related to the progression of atherosclerotic disease at sites remote from the site of revascularization (Moorman, Kruyer, and Jackson, 1996). Although the poor prognosis in native vessel

atherosclerosis progression is the cause which could not be prevented from these events (Frick, Valle, and Harjola, 1983; Palac et al., 1981), the management of risk factors by adjusting to positive lifestyle behavior is an advantageous action used to prevent these events (Eagle et al., 1999; Srinivas et al., 2002; Gao et al., 2003; Vavlukis et al., 2007).

The risks factors in recurrent cardiac events after revascularization include the ones that could be modified, (ACC/AHA/SCAI, 2005; NCEP, 2001). Dyslipidemia is the most predictive factor in these recurrent events and could be modified (The American College of Cardiology, and The American Heart Association, 2003; Carlson et al., 2004; Sabik et al., 2006). The relationship between dyslipidemia and the recurrence of these cardiac events have been clearly demonstrated. (Stamler, 1993; Hasdai et al., 1997; Sabik et al., 2006). The high level of total cholesterol, Triglyceride, LDL cholesterol after revascularization significantly related with the incidence of surgical graft occlusion, the re-stenosis rate in PCI; it also increased mortality and morbidity rates in these patients (Stamler, 1993; Wood et al., 2004; Sabik et al., 2006). Futterman and Lemberg (2007) demonstrated that revascularised patients having high cholesterol levels (greater than 295 mg/dl) had three times the risk of MI when compared to the other group having lower cholesterol levels. Also in CABG patients, Ng et al. (1997) demonstrated that most of these patients(90%) still had high total cholesterol levels (more than 200 mg/dl) after operation; 32% of this group received re-intervention (either PCI or CABG surgery) or cardiac transplant; and 52% required readmission within 10 years. Therefore, cholesterol lowering is the main strategy in preventing recurrent cardiac events in revascularized patients.

Dyslipidemia means the abnormality of serum lipid levels which includes elevated total cholesterol, elevated LDL cholesterol, elevated Triglyceride, and low HDL cholesterol (Caroline, 2005; National Education Program, 2001). The one of many healthcare problems in revascularized patients is the high prevalence of dyslipidemia, according to the following reports, 74.5% of CABG patients had high cholesterol (Allen, 1999; Sullivan, 2000) and lower HDL cholesterol (Efthimiadis et al., 2001; Foody et al., 2000; Vavlukis et al., 2007). As in Thailand, the prevalence of dyslipidemia with a total cholesterol $\geq$ 200 mg/dl in revascularized patients, male and female, was 66.8% and 66.0% respectively (Thai ACSR, 2002; Aekplakorn et al., 2003).

These types of lipid particles have different pathological processes as follows: a) LDL cholesterol is smaller denser particle which has a higher ability to penetrate the endothelial space and a major role in the subendothelial atherosclerotic process, (White et al., 2001). Therefore, this type of cholesterol is related to a high incidence of CAD and a more accelerated progression of atherosclerosis (Gardner et al., 1996; Wood et al., 2005). Moreover, aggressive LDL cholesterol reduction (less than 100 mg/dl) is accompanied by a 20% reduction in cardiac events, b) HDL cholesterol can slow the atherosclerotic process by promoting the efflux of LDL particles from macrophage in the subendothelial layer to move out to the liver, inhibiting the oxidative modification of LDL particles, and also having anti-inflammatory and antithrombotic effects (Wood, 2004; Barter, 2006). Therefore, the lower HDL cholesterol is related to a higher incidence of CAD (Gordon et al., 1977; Castelli et al., 1977; Schaefer et al., 1989; Wilson, 1990). In contrast, patients having higher HDL cholesterol levels (> 35 mg/dl) had 50% more chance of survival at 15 years

than patients with lower levels (≤ 35 mg/dl), c) Triglyceride could elevate atherogenic particle level, which increases risks of CAD in the metabolic syndrome (Grundy et al., 2001), and d) total cholesterol is the cholesterol particle in plasma which circulates in the form of cholesterol ester with the core of lipoprotein particles; this cholesterol is the major cause of atherosclerosis. Therefore, lowering total cholesterol (10%) could reduce the incidence of CAD after 5years of cholesterol therapy (25%).

Nowadays, the National Cholesterol Education Program (NCEP) has recommended the importance of cholesterol lowering therapy by both medication and life style modification (NCEP, 2001). It is well known that medication therapy is highly effective and considered the best choice to control blood cholesterol. However, lifestyle behavior should be in parallel with the medication therapy for better results in controlling risk factors as follows: a diet with saturated fats and cholesterol, overweight, physical inactivity, and smoking (Campbell et al., 1998; Freedman et al., 1999; Mc Hugh et al., 2001; Wood, 2001; Murchie et al., 2004; Berna et al., 2005).

Considering lifestyle behavior of Thai patients in a primary care setting, it has been found that they do not understand the relationship between risk factors and their behavior; they could not maintain positive behavior. The recommendation is to support the learning needs of CAD patients. Most learning needs are lifestyles related to risk factors, symptoms management, medication information, and anatomy and physiology of diseases (Wang and Li, 2002; Timmins and Kaliszer, 2003; Zheng and Shun, 2003). Therefore, lifestyle behavior is a good option to strengthen the medication therapy.

Lifestyle behavior is a multi-factor lifestyle therapy implemented to reduce risk factors for dyslipidemia includes the following components: 1) reduced intake of

saturated fats and cholesterol, 2) therapeutic dietary options to enhance LDL lowering (plant stanols/sterols and increased viscous, soluble fiber), 3) weight reduction, and 4) increased regular physical activity (NCEP, 2001). In addition, there are many studies which report a significant relationship between a high incidence of dyslipidemia and unhealthy individual lifestyle, including dietary intakes of saturated fatty acids and cholesterol, physical inactivity, and medical non-adherence (Ng et al., 1997; Foody et al., 2000; Efthimiadis et al., 2001; Vavlukis et al., 2007). Thus, modifying risk behavior includes:

Healthy diet with high monounsaturated fat, lower saturated fats (<7% of total calories) and cholesterol (< 200 mg/d) such as fish, fruit and vegetables, bread, pasta, potatoes, olive oil and rapeseed margarine could provide a lowering of total LDL cholesterol and without impact on HDL cholesterol (Grundy , 2001) and also has a substantial survival advantage. (Burr et al., 1989).

Increased physical activity or regular exercise is also widely believed successful in lowering cholesterol and Triglyceride as well as increasing HDL cholesterol. Moreover, this strategy could stabilize and regress atherosclerotic plaque as well as improve blood supply to heart muscles through collateralized vessels (Fletcher, Balady, and Amsterdam, 2001).

Drug adherence means the patient's ability and willingness to follow recommended health practices in medication, (Morisky, Alfonso, Marie, and Harry, 2008; Lars and Terrence, 2005) because lipid lowering medication is necessary for patients with lipid levels uncontrolled by lifestyle modification or a severe dyslipidemia condition. Non-drug adherence which is commonly found in aged patients with chronic diseases is one of the causes making dyslipedemia

uncontrollable. (Jia-Rong, Debra, Terry et al., 2008; Morisky et al., 2008 Morisky et al., 2008; Chin and Goldman, 1997). Therefore, promotion of drug adherence is a beneficial method supporting the control of dyslipidemia.

Lifestyle behavior is an individual behavior which relates to people and their environment (Bandura, 1977). Factors related with behavior are patients' health knowledge, perception of behavior, and socio-demographic backgrounds. There are many processes controlling behavior and changes in positive behavior; self-efficacy is the concept of a person' s ability to be motivated to change and maintain their behavior (Bandura, 1995). On the other hand, self-efficacy is likely to play a mediating role in lifestyle behavior as well as in control of cholesterol levels, dietary knowledge, exercise skills, and medical adherence. Therefore, the patients with a higher level of self-efficacy are more likely to sustain a healthy behavior with regard to food choices, exercise skills and medication usage which facilitate decrease in blood cholesterol when compared to those with lower self-efficacy levels (Burke et al., 2005; Berna et al., 2005).

In Thailand, there are studies having explored the effectiveness of preventive programs set in secondary and tertiary care (Ngaosomskul, 2000; Thaophan, 2001; Changperk, 2001; Pronsawan, 2001; Saengsiri, 2003; Pansamut, 2004; Hiransai, 2007). However, in reality of health care practice, most of the revascularized patients could complete the follow-ups only in primary care, not in the secondary and tertiary care (Ministry of Public Health, 2001). In addition, the advantage of health promotion in a primary care unit is the fact that it has a rural, social and cultural framework, good relationship and attitudes with health care providers, and easy site access, which

enables long term follow-up. Therefore, we propose to establish a program setting in a primary care unit.

In terms of study outcomes in Thailand, most studies evaluated the patients' lifestyles such as diet, exercise, and functional ability scale. Meanwhile, the physiological risk factors were evaluated only by total cholesterol levels (Dampan, 1996; Ngaosomskul, 2000; Saiseesub, 2000; Pansamut, 2004; Intrartul, 2005; Diteesrivorakul, 2007; Hiransai, 2007). However, the term hypercholesterolemia can reflect an increased LDL-C with an increased risk for atherosclerotic disease, or a high level of HDL-C with a reduced risk or high levels of other lipoproteins (e.g., VLDL, or chylomicrons) (Grundy, 1998; Caroline, 2005; NECP, 2001). According to this knowledge, and also within recommendations of NCEP II guidelines, we then analyzed completed lipoprotein profiles (total cholesterol, LDL-C, HDL-C, and triglycerides) as the preferred test in our study, rather than screening for total cholesterol alone. In addition, the processes and content of the previous intervention found that most studies did not apply detailed programs to the individual needs of patients and goal setting for motivating success in the purpose. Moreover, the process of following up using home visits was not studied. Thus, the assessment of patients needs by individuals, telephone calls and home visits would be considered in this program.

This program guideline was modified from The National Cholesterol Education Program (NCEP) based on self-efficacy theory (Bandura, 1997) to evaluate the level of blood cholesterol parameters through successful lifestyle changes in diet, physical activity and medical adherence.

Research questions

1. Are there significant differences of blood cholesterol of patient with coronary revascularization between before and after participating in the intervention?

2. Are there significant differences in blood cholesterol of patient with coronary revascularization after participating in the intervention between the intervention and control group?

Research Objectives

1. To compare total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglyceride in patients with coronary revascularization who participated in the behavioral management program before and after the intervention.

2. To compare total cholesterol, LDL-cholesterol, HDL-cholesterol and triglyceride before and after the intervention in order to show that the net change from the intervention group are more than those of the control group.

Theoretical framework

The behavioral management program in this study was modified from Therapeutic Lifestyle Change (TLC), the main method used in The National Cholesterol Education Program Panel III (NCEP, 2001). Also, the self-efficacy theory was adopted as a framework; blood cholesterol was the final goal of this study. The four sources of self-efficacy theory were the main processes used in running this program; they added the self- regulation to motivation and to maintain the behaviors of goal setting, self-monitoring, reinforcement, and social support. The behavior also included a health education program covering knowledge on atherosclerosis, vascular

risk in general, lifestyle behavior to a lower cholesterol diet, exercise skills, and medical adherence which are the basic needs of patients with cardiovascular disease (Wang, 1994; Bijlani et al., 2005; Taylor, 2003). The four sources can be used in many parts of the program as follows:

a) Enactive self-mastery is achieved when patients experience success in changing behavior or the practice of skills for a success in life such as practicing aerobic exercise 3-5 times per week, calculating a daily cholesterol diet, practicing reading a cholesterol diet table, and practicing in the skill of calculating heart rate or pulse.

b) Vicarious experiences mean the process of learning from other people's behavior as a role-model; a person who has success in changing lifestyle behavior and controlling blood cholesterol could be introduced as a role model.

c) Verbal persuasion refers to when people are persuaded that they have ability to do anything and can be successful. It covers providing information verbally in order to improve patients' knowledge of lifestyle behavior such as a lower cholesterol diet, exercise skills and improved medical adherence. Educating about atherosclerosis and vascular risk in general and on specific items pertinent to the individual with the aim of clarifying the connection between risk factors and changes to future vascular events can create a number of points to be discussed providing knowledge to improve the research team regarding the health care system and the health care providers.

d) Physiological feedback means the responses of the body including physiologically, emotionally, coping with stresses and overall health functions. Regarding evaluation and feedback, the research team will give feedback and evaluate

progress in diet control, exercise behavior and medical adherence by discussing visible treatment results in blood cholesterol. The research assistant will link these results with lifestyle behavior and overall well-being to promote awareness in changing lifestyle behavior.

Development of self-efficacy beliefs is the development of capacity for self-regulation that includes goal setting, self-monitoring, self-reinforment. In the other hand, self-efficacy beliefs encourage self-regulation by influencing goal-setting, activity choice, persistence, effort expenditure, and problem-solving (Barone et al., 1997; Maddux and Gosselin, 2003).

Self-monitoring refers to changing one's behavior by monitoring the behavior. Goal-setting relies on patients' motivation and praising one's efforts as well as self-reinforcement by conveying positive statements regarding accomplishment or efforts to attain inner-session goals. These provide social support during the process of change and motivation to maintain lifestyle behavior improvement. Improvement in self-efficacy is related to lifestyle behavior change including a lower cholesterol diet, physical activity, and drug adherence. Successful lifestyle change can reduce LDL cholesterol, total cholesterol, Triglyceride and increase HDL cholesterol. The behavioral management program consists of 3 phases as follows:

1. Pre-phase refers to the preparation and assessment phase including the needs of the patient throughout the day of the scheduled follow-up in the cardiovascular clinic; it takes about 20 minutes to complete.

2. Active phase refers to the phase in which the patient takes action to achieve the goal. Beginning after the break time in the pre-phase for about 10-15

minutes, it continues to a home visit follow-up; it takes about 45-60 minutes. The content of the intervention is as follows:

1) Goal setting: this refers to the self-regulation process or motivational variable and a skill in trying to challenge a human to achieve certain activities successfully (Bandura, 1997).

2) Health education: this means to improve participants' knowledge on atherosclerosis, vascular risk in general, and lifestyle behavior in a lower cholesterol diet, exercise skills, and medical adherence to meet the patients' basic needs with cardiovascular disease (Wang, 1994; Bijlani et al., 2005; Taylor, 2003). In addition, the specific base information pertinent to an individual's problem in an effort to clarify the connection related to lifestyle behavior, blood cholesterol and cardiac events in the future. Developing self-efficacy must be practiced in order to have enough skills to succeed in life such as aerobic exercise about 3 to 5 times per week, at least 30 minutes per time, calculating the heart rate or pulse as well as the maximum heart rate after the exercise, recording the facts in a diary, practice reading the diet table, and practice calculating cholesterol levels in the daily diet.

3) Social support: this is associated with how networking helps people cope with stressful events. Besides, it can enhance psychological well-being (Glanz et al., 2002) as the driver or motivation process of participants to follow accordingly. (Bandura, 1997). Social support would give encouragement to patients and caregivers to express their positive and negative feelings openly. This can help motivate the participants to change and maintain their behavior.

4) Self-monitoring: this is the process that engages the individual in systematically observing his or her behavior and the circumstances surrounding or

prompting that behavior. In addition, self-monitoring is the driving tool in the motivational process used in promoting self-efficacy (Bandura, 1997). Participants will need to record in daily logs their day-to-day activities related to their specific goals including diet for each meal, the type and duration of exercise, and medication adherence.

5) Self-reinforcement: this refers to the motivation process (Bandura, 1997) contingent on self-rewards; it consists of positive statements regarding goal achievements. Diary reading will assist patients in developing positive statements in an effort to give reassurance and support behavior change. It also reconfirms that the patients and their caregivers are the keys to a change in lifestyle (Sol, 2005; Burke, 2005).

3. Post-phase: this refers to the evaluation phase after a period of 12 week post- test taken for post assessment about 20-30 minutes.

The conceptual framework regarding the behavioral management program on blood cholesterol is summarized in Figure 1.1

The Behavioral Management Program was modified from Therapeutic Lifestyle Change (TLC) (NCEP, 2001) and based on the self-efficacy theory for increased self-efficacy. The program started on the day of the scheduled follow-up in the cardiovascular clinic; the last day was for the evaluation after a period of 12 weeks as follows:

1) Goal setting: participants settled realistic goals to facilitate active participation and choose behavior that needs to be modified.
2) Health education: this provides information and education on atherosclerosis and vascular risks in general, life style behavior in lowering cholesterol via diet, exercise skills and medical adherence.
3) Social support: the participants selected and cooperating with members in their family, neighbours, or people they have befriended that be able to stimulate effective social support.
4) Self-monitoring: the participants will record their day-to-day activities related to their specific goals in daily logs; this includes diet for each meal, types and duration of exercise, and medication adherence.
5) Self-reinforcement: contingent on self-rewards consists of positive statements regarding goal achievements. Diary reading would be assist in making positive statements regarding achievements in attaining behavior change via attribution given to participants.

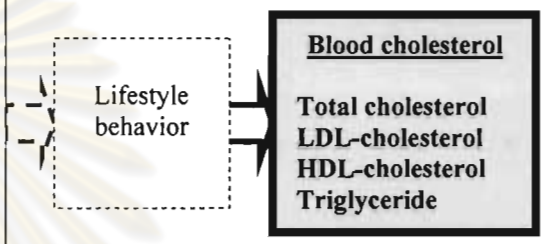


Figure 1.1: conceptual framework of this study

Research Hypotheses

1. Patients with coronary revascularization who participate in the behavioral management program will have significant differences in total cholesterol, LDL, HDL, and Triglyceride before and after the intervention.

2 Patients with coronary revascularization who participate in the behavioral management program will have differences in total cholesterol, LDL- cholesterol, HDL- cholesterol, and triglyceride before and after; net change from the experimental group is significantly more than the control group.

Scope of the study

1. The study is based on a quasi-experimental research design

The design includes pre-tests/post-tests control group. (Shadish, Cook, and Campbell, 2002; Burns and Grove, 2001). The objectives of this study are 1) to compare blood cholesterol levels in patients with coronary heart disease, between participants taking part on the behavioral management program and the control group, and 2) to compare blood cholesterol levels in patients with coronary heart disease before and after participation in the behavioral management program.

2. Population in the study are patients with coronary revascularization in the outpatient clinic, primary care setting, Thailand. Who agree to take part in this study by signing an agreement form for participating in the intervention.

The researcher selected this hospital because it is a primary care hospital that contains a cardiac clinic in OPD then the others community hospital in nearly area like to consult and transfer the patients with coronary heart disease to this clinic for

continues treatment. In addition, this hospital also has a clear transferring system to and from a tertiary care unit as follow as the policy of The National Health Security. This clinic is managed by a cardiologist and a nurse assistant who have experience in caring for patients with coronary revascularization and home health care. They are also willing to develop intervention in caring for patients with coronary revascularization. The limitation of this study is that the research will be conducted in only one community care setting. The effectiveness of this program, however, can be transferred to other community care centers in Thailand because of the similarity in culture, participants' perceived health care, the processes associated with care providers and the health care policy in Thailand.

Operational definitions

1. Behavioral management program

Behavioral management program refers to a program in the second phase prevention strategy to reduce blood cholesterol levels and that can be managed by a nurse. The researcher modified this program to suit in Thai persons basing on self-efficacy theory (Bandura, 1997) and following the guidelines of The National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III) (2001) for cholesterol lowering therapy. The program consists of 3 phases as follows:

1.1 Pre-phase refers to the preparation and assessment phase throughout the day of the scheduled follow-up at the primary care setting. The patients' lifestyle was assessed using demographics and a clinical characteristics questionnaire that was constructed by the researcher. In addition, the participants were assessed behavior with; a) the Coronary Heart Disease Preventive Self-Efficacy Scale, b) the exercise

behavior questionnaire, c) the Thai version of Heart Healthy Eating Self-Efficacy (HHESE), d) the Thai version of Morisky Medication Adherence Scale (MMAS), and e) a test of blood cholesterol (total cholesterol, LDL, HDL, and triglyceride).

1.2 Active phase refers to the phase in which the patient takes action to achieve their goals. It began after break time at the hospital then continued to home visit and follow-ups. The behavioral management program consists of:

1.2.1 Goal setting: this refers to the objective that each participant wants to achieve regarding their health. Participants needed to set a realistic goal to facilitate active participation and chose the behavior they would like to modify.

1.2.2 Health education: the research assistant attempted to improve participants' knowledge of lifestyle behavior encouraging a lower cholesterol diet, exercise skills and medical adherence by providing information and education on vascular risks in general, and specific base pertinent to an individual's problem in an effort to clarify the connection related to lifestyle behavior, blood cholesterol and cardiac events in the future. The phase involved the use of role models in exercise skills, diet management and others for support.

1.2.3 Social support: participants along with the research assistant attempted to stimulate social support by cooperating with key members in their families. Social support is strongly related to behavioral changes; it can increase exercise behavior, assist in the selection of a low cholesterol diet, and promote better medical adherence.

1.2.4 Self-monitoring: participants would need to record their day-to-day activities in daily logs; this included diet for each meal, types and duration of

exercise, and medication adherence. Participants could then use these recordings to self-evaluate. The researcher would follow up with patients on a monthly basis.

1.2.5 Self-reinforcement: contingent self-rewards consisted of positive statements regarding goal achievements. Diary reading would assist patients in developing positive statements in an effort to give reassurance and achieve behavior change; it also reconfirmed that the patients and their caregivers were the key to a change in lifestyle.

This phase prolong to the participant's home in the 6^{th} week and two follow-up telephone calls on the 3^{rd} and 9^{th} weeks as follow as the guideline question in the planning teacher that was constructed by the researcher.

1.3 Post-phase refers to the evaluation phase, following a period of 12 weeks, post- test through evaluation of blood cholesterol and also comparing lifestyle behavior with the baseline data.

2. Blood cholesterol

Blood cholesterol represents the concentration of serum lipid profiles. They include total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglyceride. Laboratories that do analysis in blood cholesterol levels must make their standardization criteria available and should strive to achieve less than 3% measurement variability.

The classification of dyslipidemia in patients with established coronary artery disease followed with the recommendations of the National Cholesterol Education Program Adult Treatment Panel III. In addition, this allows calculation of LDL using the following equation: LDL-C = TC-HDL-C x TG/5 (Friedewald et al., 1972).

Standardized procedures for processing and transporting samples in Laboratory of this setting as was followed with The National Cholesterol Education Laboratory Standardization Panel recommends as the standard of practice, (U.S. Department of Health and Human Service, 1990) as follows:

- Blood collection procedures include a 12-hour fast, except for water and any usual medication, before sampling if lipid measurements other than total cholesterol are to be taken.

- The patient would be sit quietly for 5 minutes before the vein is punctured.

- The sample would be obtained within 1 minute of tourniquet application.

Expected benefits

1. The study could be used as a guideline for cardiac rehabilitation nurses in promoting and preventing cardiac events in patients with revascularization, out-patient clinics in primary care settings.

2. The result of this study could be used as a guideline for administrators in the development of healthcare systems for patients with revascularization, in primary care settings.

CHAPTER II

LITERATURE REVIEW

This chapter presented an integrative review of the summarization studies and researches that related to the many aspects of knowledge in coronary artery disease, dyslipedemia as a major risk factor and lifestyle change that having motivated process which base on the self-efficacy theory. This literature review included the following:

1. Coronary artery disease
    - 1.1 Pathophysiology
    - 1.2 Clinical presentation
    - 1.3 Treatment and Coronary revascularization
2. Dyslipidemia and cardiac events after coronary revascularization
    - 2.1 Type of Lipid Profile
        - 2.1.1 Total cholesterol
        - 2.1.2 LDL Cholesterol
        - 2.1.3 HDL Cholesterol
        - 2.1.4 Triglycerides
    - 2.2 Measurement of Lipid profile
        - 2.2.1 Procedures of lipid measurement
        - 2.2.2 Recommendations for detection of blood cholesterol level
3. Factors associated with dyslipidemia in Coronary Artery Disease (CAD)
4. Dyslipidemia management in revascularization

4.1 The benefits of dyslipidemia management

4.2 Lifestyle intervention and revascularization

4.3 Therapeutic program to lower cholesterol in revascularized patients

5. The self-efficacy theory

6. The relationship between self-efficacy and risk behavior

7. The secondary prevention programs in patients with coronary artery disease

8. The Behavioral Management Program

1. Coronary artery disease

1.1 Pathophysiology

Coronary artery disease (CAD) is a chronic atherosclerotic process that begins during adolescence and slowly progresses throughout life. This process is a chronic immunoinflammatory, fibroproliferative disease of the arterial wall (Glass and Witztum, 2001; Libby, 2002; Hansson, 2005). This process begin with the occurrence of intact but leaky dysfunctional endothelium (Davies, 1988). Circulated atherogenic lipoproteins, low-density lipoprotein (LDL), extravasate through this dysfunctional endothelium into the subendothelial space, where potentially atherogenic lipoproteins are retained and modified (e.g., oxidized) and become cytotoxic, proinflammatory, chemotaxic, and proatherogenic (Glass and Witztum, 2001). The endothelium becomes activated by proinflammatory stimuli, and the expression of adhesion molecules. The blood-borne cells both monocytes and T cells adhere to the endothelium and transendothelial migration. Within intima layer,

the monocytes differentiate into macrophages and develop to lipid-loaded macrophages containing massive amounts of cholesteryl esters (foam cells) which is a hallmark of both early and late atherosclerotic lesions. With continuing supply of atherogenic lipoproteins,the macrophages eat these lipoproteins until they die because, contributes to the formation of a soft and destabilizing lipid-rich core within the plaque. These plaques are classified to vulnerable plaque which usually has thinner fibrous cap, lipid-rich atheromatous core, these prone to be ruptured and developed acute intraluminal occlusive thrombosis (so-called inflamed thin-cap fibroatheroma) which responsible for acute coronary syndromes (Schaar, Muller, and Falk, 2004). For the other plaque type, stable plaque has smaller luminal size but thicker fibrous cap which responsible for stable angina, this angina represented from diminished coronary blood supply to myocardium during exertion (Falk, 2006).

1.2 Clinical presentation

Angina pectoris is the most common symptom known as chest pain described as a transient chest discomfort, heaviness (Corti, Fuster, and Badimon, 2003; Wood, 2005). Base on clinical onset of angina, there are two patterns of angina, first is chronic stable angina and the other is acute coronary syndrome refers to any group of clinical symptoms compatible with MI and covers the spectrum of clinical conditions ranging from unstable angina (UA) to non–ST-segment elevation myocardial infarction (NSTEMI) to ST-segment elevation myocardial infarction (STEMI) (Belcher, Gaw, Cooper et al., 2002).

Unstable angina and NSTEMI are closely related conditions: their pathophysiologic origins and clinical presentations are similar, but they differ in severity.

A diagnosis of NSTEMI can be made when the ischemia is sufficiently severe to cause myocardial damage that results in the release of a biomarker of myocardial necrosis into the circulation (cardiac-specific troponins T or I, or muscle and brain fraction of creatine kinase [CK-MB]). In contrast, the patients considered to have experienced UA if no such biomarker can be detected in the bloodstream hours after the initial onset of ischemic chest pain. Unstable angina exhibits 1or more of 3 principal presentations: (1) rest angina (usually lasting more than 20 minutes), (2) new-onset (less than 2 months previously) severe angina, and (3) a crescendo pattern of occurrence(increasing in intensity, duration, frequency, or any combination of these factors) (Kumar and Cannon, 2009).

1.3 Treatment and Coronary revascularization

1.3.1 Chronic stable angina

The treatment of stable angina has 2 major purposes. The first is to prevent MI and death (and thereby increase the "quantity" of life), these medications are aspirin and Lipid lowering. The second is to reduce the symptoms of angina and the occurrence of ischemia, which should improve the quality of life by medication: ß-Blockers, Calcium antagonists. Long-acting nitrates and/or revascularization with percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG),

Revascularization provided more relief of symptoms, better quality of life than medical therapy. If the patient is known to have left main coronary artery stenosis, 3-vessel CAD, or 2-vessel CAD with proximal left anterior coronary

artery stenosis, revascularization by a catheter-based technique or surgery should be offered (ACC/AHA/ACP–ASIM Guidelines, 1999).

1.3.2 **Acute coronary syndrome :** Unstable angina /NSTEMI

The 2007 ACC/AHA guidelines state that the goal of immediate treatment of patients with UA/NSTEMI is to provide relief of ischemia and to prevent the recurrence of adverse ischemic events (Anderson et al., 2007).Treatment with anti-ischemic, antiplatelet, and anticoagulant agents is fundamental to achieving this goal. In addition to this aggressive medical therapy, for high risk patients, revascularization is considered early—an early invasive strategy that involves routine cardiac catheterization, generally within 4 to 24 hours after admission. In contrast, for stable patients, this revascularization is considered only if ischemia recurs despite vigorous medical therapy, either when the patient is at rest or during a noninvasive stress test.

1.3.3 **Coronary revascularization.**

Coronary revascularization is the process of restoring the blood flow bringing oxygen and nutrients to the heart muscle. This process could be accomplished by surgery that bypass the blockages or obstructions site in the coronary arteries by surgical graft, CABG or non surgical, percutaneous catheter base procedure, PCI. When comparing to medical strategy, these revascularization provide more angina relief, better quality of life and improved survival in high risk patients.

A) Percutaneous coronary intervention

At current, PCI has dramatically increased, becoming one of the most common medical interventions performed. This procedure be performed

percutaneously by using inflated balloon and/or stent catheters —special metal mesh tube under fluoroscopy and has aim to correct stenotic (narrowed) site that having proper morphology for this therapy. The entry site of these catheters could be at groins through the femoral artery or at arms through the brachial or radial artery and these catheters be maneuvered into the coronary artery. The improvement of luminal diameter following balloon angioplasty results from stretching of the vessel wall, atheromatous plaque compression, partial disruption of not only the intimal plaque but also the media and adventitia (Baim and Grossman, 2006). The residual stenosis of less than 20% which considered as an optimal result (ACC/AHA/SCAI, 2005). PCI is preferred in patients with single- or double-vessel disease which approachable stenotic site by catheter.

B) Coronary artery bypass graft surgery

This surgery has aimed to create new pathways in coronary arteries by produced new vessel which moved from patient leg vein (saphenous vein graft), or intrathoracic artery (internal mammary artery). These new vessels are grafted to the coronary arteries to go around the stenotic sites. This surgery is usually performed with the heart stopped, necessitating the usage of heart lung machine called on-pump technique or the other techniques which perform CABG surgery on a beating heart, so-called "off-pump" surgery. This surgery improved survival rates in patients with three-vessel and left-main coronary artery disease, especially those with left ventricular dysfunction or inducible ischemia during stress testing (Zollikofer et al., 1993; Bonow, Smaha, Smith et al., 2002; Belcher, Gaw, Cooper et al., 2002).

2. Dyslipidemia and cardiac events after coronary revascularization

Patients who undergo revascularization are at an increased risk for further cardiac events in the months to years after revascularization. Cardiac events occur at a rate of 2.4–4.1% per year up to 5 years after PCI (Moorman, Kruyer, and Jackson, 1996). Some of these events relate to lumen renarrowing, or restenosis at the treated site, whereas others relate to progression of atherosclerotic disease at sites remote from the site of revascularization. In patients undergoing CABG, the majority of late events relate to the degeneration of saphenous vein grafts, and progression of ungrafted native vessel coronary artery disease may also occur.

Saphenous vein grafts develop significant atherosclerosis within 5 years after CABG, and 35–40% of saphenous vein grafts are occluded within 10 years of the initial surgery and another 25–30% have significant atherosclerotic disease. (Lytle et al., 1985; Bourassa et al., 1978; Campeau et al., 1983; FitzGibbon et al., 1991). Atherosclerosis progression was found in 33% of native coronary arteries and in 65% of venous bypass grafts 15 years after successful CABG; only 22% of patients showed no evidence of atherosclerosis progression (Brussel et al., 1997). Given that 40% of native vessel progression was found distal to the anastomotic site, it is not surprising that the progression of atherosclerosis can significantly affect clinical recurrence after CABG, despite the patency of the venous graft conduit. Arterial conduits have better late-term patency rates, but do little to prevent native vessel atherosclerosis progression (Frick, Valle, and Harjola, 1983; Palac et al., 1981). According to these strong evidences, they indicated that revascularization does not prevent myocardial infarction (Muhlbaier et al., 1992; Davis et al., 1992; Wiseman

et al., 1988; Mark et al., 1994). And there are no data to support the belief that revascularization reduces the rate of myocardial infarction (Forrester and Shah, 1997). The prevention of clinical events related to plaque instability may be the major benefit of lipid-lowering therapy in patients undergoing coronary revascularization.

2.1 Type of Lipid profile

A lipid profile is the collective term given to the estimation of, typically, total cholesterol, high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholestero l (LDL-C), and triglycerides that is very helpful to identify a patient's risk of CAD that is caused by a condition called dyslipidemia.

2.1.1 Total cholesterol

Cholesterol is a fat-like substance (lipid) that is present in cell membranes and is a precursor of bile acids and steroid hormones. Total cholesterol is total quantity of cholesterol in blood. This lipid be transported within the water-based bloodstream by combination with a protein molecule in the form of lipoprotein which has five major types in the human body as following: Low-density lipoproteins (LDL), High-density lipoproteins (HDL), Very low-density lipoproteins (VLDL), Intermediate-density lipoproteins (IDL), Chylomycrons, they differ in the amount of cholesterol that they carry in comparison to triglyceride and fatty acids.

The target total cholesterol in revascularized patients should be lower than 200mg/dL. The term hypercholesterolemia can reflect to an increased LDL-C with an increased risk for atherosclerotic disease, or a high level of HDL-C with a reduced risk or high level of other Lipoproteins (e.g., VLDL, or chylomicrons). According to this knowledge, and also recommendation in NCEP II guidelines, then,

we analyzed completed lipoprotein profiles (total cholesterol, LDL-C, HDL-C, and triglycerides) as the preferred test in our study, rather than screening for total cholesterol alone.

2.1.2 Low-Density Lipoprotein Cholesterol; LDL-C

LDL-C typically makes up 60–70 % of the total cholesterol. It contains a single apolipoprotein, namely apo B-100 (apo B). LDL-C is the major atherogenic lipoprotein. Direct LDL-C measurements are also available and better reveal individual issues but are less often promoted or done due to higher costs and being available from only a couple of laboratories in Thailand, it's estimated using the HDL and triglyceride levels, which are easier to determine in a blood sample. A fasting blood sample is necessary, because eating before the tests causes triglycerides to rise and can change the LDL estimation.

The Friedewald formula is: LDL = Total Cholesterol - HDL - 1/5 triglycerides (Friedewald et al., 1972). The formula is accurate only if triglyceride levels are lower than 400 mg/dL.

2.1.3 High-Density Lipoprotein Cholesterol; HDL-C

HDL-C normally makes up 20–30 % of the total cholesterol. The major apolipoproteins of HDL are apo A-I and apo A-II. HDL-C is the smallest of the lipoprotein particles. They are the densest because they contain the highest proportion of protein. HDL-C transports cholesterol mostly to the liver or steroidogenic organs such as adrenals, ovary, and testes. Several steps in the metabolism of HDL-C can contribute to the transport of cholesterol from lipid-laden macrophages of atherosclerotic arteries, termed foam cells, to the liver for secretion into the bile. This pathway has been termed reverse cholesterol transport and is

considered as the classical protective function of HDL-C toward atherosclerosis. Epidemiological studies have shown that high concentrations of HDL-C (over 60 mg/dL) have protective value against cardiovascular diseases such as ischemic stroke and myocardial infarction. Low concentrations of HDL-C (below 40 mg/dL for men, below 50 mg/dL for women) (Wilson PWF et al., 1998) increase the risk for atherosclerotic diseases —every 1mg/dL decrease in HDL-C causes a 3-4 % increase in CAD (Gordon, 1989).

2.1.4 Triglycerides

Triglycerides in plasma are derived from fats eaten in foods or made in the body from other energy sources like carbohydrates. Calories ingested in a meal and not used immediately by tissues are converted to triglycerides and transported to fat cells to be stored. Hormones regulate the release of triglycerides from fat tissue so they meet the body's needs for energy between meals. Elevated triglyceride levels (more than 200mg/dL) may be an independent risk factor for CAD (Grundy, 1998) and are commonly associated with low HDL-C and other non-lipid risks (the metabolic syndrome, diabetes, abdominal obesity, smoking, and physical inactivity).

First-line therapy for elevated serum triglycerides should be therapeutic lifestyle changes. For revascularized patients with elevated triglycerides or low HDL-C levels, addition of a fibrate or nicotinic acid to LDL-C lowering therapy can be considered.

However, the lipid abnormality has associated mechanisms as shown in Table 2.1

Table 2.1 Lipid Abnormalities and associated mechanisms

Lipid Abnormalities	Mechanisms
Elevated total cholesterol	-High dietary intake of saturated fat and cholesterol -LDL receptor deficiency and other enzyme/receptor abnormalities
Elevated LDL- cholesterol	-LDL receptor deficiency -Apoprotein B-100 genetic defect, other enzyme/receptor abnormalities -High diet intake of saturated fat and cholesterol
Elevated Triglycerides	-Deficiency in LPL -Obesity, physical inactivity, insulin resistance, glucose intolerance, excessive alcohol intake
Low HDL	-Apoprotein A-I deficiency, other enzyme/receptor abnormalities -Reduced VLDL clearance -Cigarette smoking, physical inactivity, insulin resistance, elevated triglycerides, overweight and obese, high carbohydrate (CHO) intake (>60% total calories), certain drugs (B-blockers, anabolic steroids, progestational agents)

Source; National Cholesterol Education Program; NCEP (2001)

2.2 Measurement of Lipid profile

2.2.1 Procedures of lipid measurement

A lipoprotein profile involving measurement of total cholesterol, triglyceride and HDL-C levels and the indirect calculation of LDL-C requires a 9- to 12-hour fast. Individuals should be seated for at least five minutes prior to phlebotomy to avoid hemoconcentration. Blood should be collected in tubes without anticoagulant for serum or with EDTA for plasma. Plasma produces values approximately 3 percent lower than serum. The measurement of any lipid is preferably performed with the person in a baseline stable condition, that is, in the absence of acute illnesses including stroke, trauma, surgery, acute infection, weight loss, pregnancy, or recent change in usual diet. These conditions often result in values that are not representative of the person's usual level.

2.2.2 Recommendations for detection of blood cholesterol level

The target of these blood cholesterol components in patients with established coronary artery disease has followed the recommendations of the National Cholesterol Education Program Adult Treatment Panel III as shown in Table 2.2

Table 2.2 Cholesterol blood level and category by recommendations of the National Cholesterol Education Program Adult Treatment Panel III

	Cholesterol blood Level (mg/dl)	**Category**
Total cholesterol	Less than 200	Desirable
	200-239	**Borderline High**
	240 and above	**High**
HDL	Less than 40	**Low HDL**
	40-59	**Medium HDL**
	More than 60	**High HDL**
LDL	Less than 100	Optimal
	100-129	Near optimal/above optimal
	130-159	Borderline high
	160-189	High
	190 and above	Very high
Triglycerides	Less than 150	Normal
	150-199	Borderline high
	200-499	High
	More than 500	Very high

According to the latest update in 2010 of NCEP ATP III, revascularized patients are categorized as high to very high risk —more than 20 % chance of having recurrent MI, death within 10 years. These patients should be considered the option of lowering the LDL-C (usually using a statin plus lifestyle changes) to lower than 70 mg/dL instead of the currently recommended 100 -130 mg/dL (Fogoros, 2010).

3. Factors associated with dyslipidemia in Coronary Artery Disease (CAD)

Dyslipidemia or hypercholesterolemia is an important risk factor for the initiation and progression of atherosclerosis and is strongly associated with cardiovascular events (Bittner, 2005; Grundy, 1998; Gordon, 1989). Knowing the risk factors of dyslipidemia is important since it is the first stage in the prevention and reduction of coronary heart disease. It is known that the one of the main causes of Dyslipidemia is genetic predisposition. The most commonly known genetic disorder tis Hypercholesterolemia (FH), which can be both heterozygous and homozygous. It is a condition characterized by very high levels of blood cholesterol. The secondary causes of dyslipidemia are associated with various diseases processes. Sometimes measurement of the lipid profile can lead to a previously undiscovered clinical disorder, as follows:

3.1 Metabolic related illnesses were the most common disease underlying dyslipidemia. These includeddiabetes, hypertension and glycogen storage disorder. The result from previous studies recommended that insulin resistance is probably a central mechanism and having three of these five characteristics effectively doubles

the risk for CVD. Hyperglycemia may also be associated with increase in triglyceride levels.

3.2 Elevation of triglyceride and LDL levels may cause renal failure in patients with nephrotic syndrome, however low HDL cholesterol levels are often found in patients with chronic renal failure.

3.3 Hepatic related diseases such as cirrhosis and obstructive liver disease have been associated with hypercholesterolemia , especially an abnormal lipoprotein-x level, which is related to bile duct obstructions and is made up of non-esterifies cholesterol and phospholipids, in serum. Although patients with primary billiary cirrohosis do not show a high cardiovascular rate, previous studies have shown that the last stage of the disease is associated with decreased intestinal absorption of lipid and is prone to chronic renal failure.

3.4 Hormonal related diseases, hypothyroidism may be associated with increased triglycerlide and LDL cholesterol levels because of medications used by these patients.

3.5 Estrogen. It is well known that total cholesterol levels increase at postmenopause. LDL tend to rise, while HDL levels decrease and triglyceride levels increase (Mozaffarian, Katan, Ascherio, Stampfer, Willett, 2006)

3.6 Drug, There are many drugs which effect lipid levels. For example; Thiazide diuretic can increase triglyceride levels, Beta-blockers can increase triglyceride and lower HDL levels, Isotretinoin which is used in acne treatment may cause dyslipideamia, and Anabolic steroids are associated with low HDL level (Tanaka et al., 2001).

3.7 Lifestyle related causes. Unhealthy lifestyles may directly affect lipid levels and may be correlated with metabolic syndrome such as overweight and obesity, imbalances between excess calories consumed in diet and too few calories expended, high consumption of saturated fats and sugar, physical inactivity, or excessive alcohol intake.

A high effective intervention must assess the factors that can increase lipid levels. It is recommended all factors in the intervention be included in the management of dyslipideamia.

4. Dyslipidemia management in patient with revascularization

4.1 The benefits of dyslipidemia management

Aggressive lipid-lowering therapy have a profound effect on the occurrence of death and MI in revascularized patients, due to stabilization of atherosclerotic plaques at remote sites rather than a reduction in restenosis as in The Fluvastatin Angioplasty Restenosis (FLARE) trial randomly assigned 1,054 patients undergoing PCI to treatment with fluvastatin, or placebo, Fluvastatin treated group had reduction 37% in LDL-C level but no significant difference in angiographic restenosis, where as having 65% significantly lower incidence of death and MI (Serruys et al., 1999).

Two other studies evaluated the effects of lipid lowering therapy on late clinical and angiographic outcomes in patients undergoing CABG. The Cholesterol-Lowering Atherosclerosis Study (CLAS) was a randomized, placebo-controlled, angiographic trial that assigned 162 nonsmoking men after CABG to lipid-lowering

therapy with combined colestipol hydrochloride and niacin therapy, or placebo. In the treated group had 26% reduction in total cholesterol, a 43% reduction in LDL-C, and a 37% increase in HDL-C was achieved in the treatment arm during the 2 years of treatment. Lipid-lowering therapy resulted in a significant reduction in the average number of lesions per subject that progressed, the percentage of patients with new atheroma formation in native coronary arteries, the percentage of patients with new lesions, and any adverse change in bypass grafts. Clinical deterioration in overall coronary status was significantly less in colestipol–niacin-treated patients than in placebo treated patients (Blankenhorn et al., 1987).

The Post Coronary Artery Bypass Graft (Post- CABG) trial randomly assigned 1,351 patients to treatment with low-dose coumadin, aggressive LDL-C control (goal: 60–85 mg/dL), both, or neither. Low-dose coumadin had no effect on retarding the progression of saphenous vein graft disease. In contrast, aggressive LDL-C control resulted in less progression of saphenous vein graft lesions (27% vs 39% for moderate LDL-C–treated patients; p ,0.001), and the rate of revascularization was 27% lower in aggressive LDL-C –treated patients compared with moderately-treated LDL –C patients (6.5% vs 9.2%; p 5 0.03) (The Post CABG Investigators, 1997).

As a result of these evidences, it is critical that patients undergoing CABG should receive lipid-reduction therapy to preserve the patency of their saphenous vein grafts.

4.2 Lifestyle intervention and revascularization

In 2000, the American Heart Association and the American Association of Cardiovascular and Pulmonary Rehabilitation recommended that cardiac

rehabilitation programs provide several important core components consisting of baseline patient assessment, nutritional counseling, risk factor management (*ie*, lipid levels, hypertension, weight, diabetes, and smoking), psychosocial management, physical activity counseling, and exercise training (Balady et al., 2000).

The effectiveness of lifestyle interventions within secondary prevention of CAD remains unclear. Despite the expanded use of percutaneous revascularization, there are few controlled studies of cardiac rehabilitation after these procedures. In one study (Lisspers et al., 1999), 93 patients who had been treated with PCI were randomly assigned to receive a behaviorally oriented intervention or a control group. After 12 months, the intervention patients, compared with the control subjects, improved significantly on self-rated measures of smoking, exercise, and diet habits. Patients also lost weight, improved their exercise capacity, and experienced less chest pain during exertion. Although the mechanisms for decreased mortality with exercise have not been fully explained, exercise training improves the lipid profile (Brubaker, 1996; LaMonte, 2000), reduces BP, lowers the fasting glucose level (Wei, 1999), and reduces body fat and increases lean body mass. Many of these risk factors exist in patients who have had PCI.

The systematic review (Cole and Smith, 2011) aimed to determine the effectiveness of lifestyle interventions in revascularized patients, they included 21 randomized controlled trials of lifestyle interventions with 10,799 patients, in primary care settings, with a minimum follow-up of three months, published since 1990. In trials that examined mortality and morbidity, significant benefits were reported for total mortality (in 4 of 6 trials; overall risk ratio (RR) 0.75 (95% CI 0.65,

0.87)), cardiovascular mortality (3 of 8 trials; overall RR 0.63 (95% CI 0.47, 0.84)), and nonfatal cardiac events (5 of 9 trials; overall RR 0.68 (95% CI 0.55, 0.84)).

This study also reported effects in cholesterol outcomes compared to controls. In intervention group, twelve from 19 studies demonstrated significant improvement. Seven of these 12 studies reported significant improvements in total cholesterol level (Giallauria et al., 2009; Redfern et al., 2009; Giannuzzi et al., 2008; Allen et al., 2002; Ornish et al., 1998; Carlsson, 1998; Hamalainen, 1995). Another study found a significant lower total cholesterol between female intervention and control groups but not male (Munoz et al., 2007). Five studies reported significant improvements in LDL-C level among intervention patients (Giallauria et al., 2009; Allen et al., 2002; Wallner et al., 1999; Ornish et al., 1998; Carlsson, 1998).

Giallauria et al., found a significant improvement in levels of HDL-C among intervention patients compared to controls (Giallauria et al., 2009).

Numerous studies and single-center registries have documented that despite good intentions and an awareness by the clinicians of the NCEP II guidelines, there is often poor compliance in adhering to the recommendations for lipid reduction therapy. This may be particularly true for patients undergoing coronary revascularization who may feel that their problem has been "fixed" by the use of stents or surgical revascularization. In a review of 129 patients undergoing PCI with documented hypercholesterolemia, 47% of patients were not receiving lipid-lowering agents at the time of PCI; only 1 of 24 patients treated with lipid-lowering therapy achieved the NCEP treatment goal of LDL -C less than 100 mg/dL (Marques et al., 1996). No significant improvement in cardiac risk factors was found in another study of 93 patients evaluated 1 year after PCI, including smoking (40%), obesity (38%),

and hypertension (43%) (Kimmerle et al., 1994). LDL-C levels were lower (228±47 at baseline to 189±42 mg/dL 1 year after intervention; p ,0.001), but only 68% of patients received lipid-lowering drugs, and only 10% of patients had LDL-C levels less than 135 mg/dL (Kimmerle et al., 1994). It is only with an awareness of the importance of risk-factor modification and emphasis to the patients and family that atherosclerosis is a lifelong disease that patients will remain motivated to continue with an aggressive risk factor modification program.

4.3 Therapeutic program to lower cholesterol in revascularized patients

The National Heart, Lung, and Blood Institute (NHLBI) of the National Institutes of Health (NIH) launched the National Cholesterol Education Program (NCEP) in November 1985. The goal of the NCEP is to contribute to reducing illness and death from CAD by reducing the percentage of patients with high blood cholesterol. Through educational efforts directed at health professionals and the public, the NCEP aims to raise awareness and understanding about high blood cholesterol as a risk factor for CAD and the benefits of lowering cholesterol levels as a means of preventing CAD. The Adult Treatment Panel III (ATP III) of the NCEP issued an evidence-based set of guidelines on cholesterol management in 2001

In our study, the health care providers in primary care unit managed dyslipidemia in these revascularized patients on the base of this program. In this program, LDL-C lowering is the primary goal of therapy which have different LDL-C level goals. This desired levels are depend on the categories of risk of recurrent MI or death which have three levels. Revascularized patients are categorized as high risk, their target LDL-C are less than 100 mg/dL. In addition, for these patients having

additional more risk factors eg. diabetes, metabolic syndrome, smoking, kidney disease are categorized to very high risk (patients who having chance to develop recurrent MI or death >20 % in 10 years), so this group need more intensive LDL-lowering therapy to having an LDL-C goal of less than70 mg/dL

Both of LDL-lowering drug therapy and lifestyle therapies are the main strategies of management.

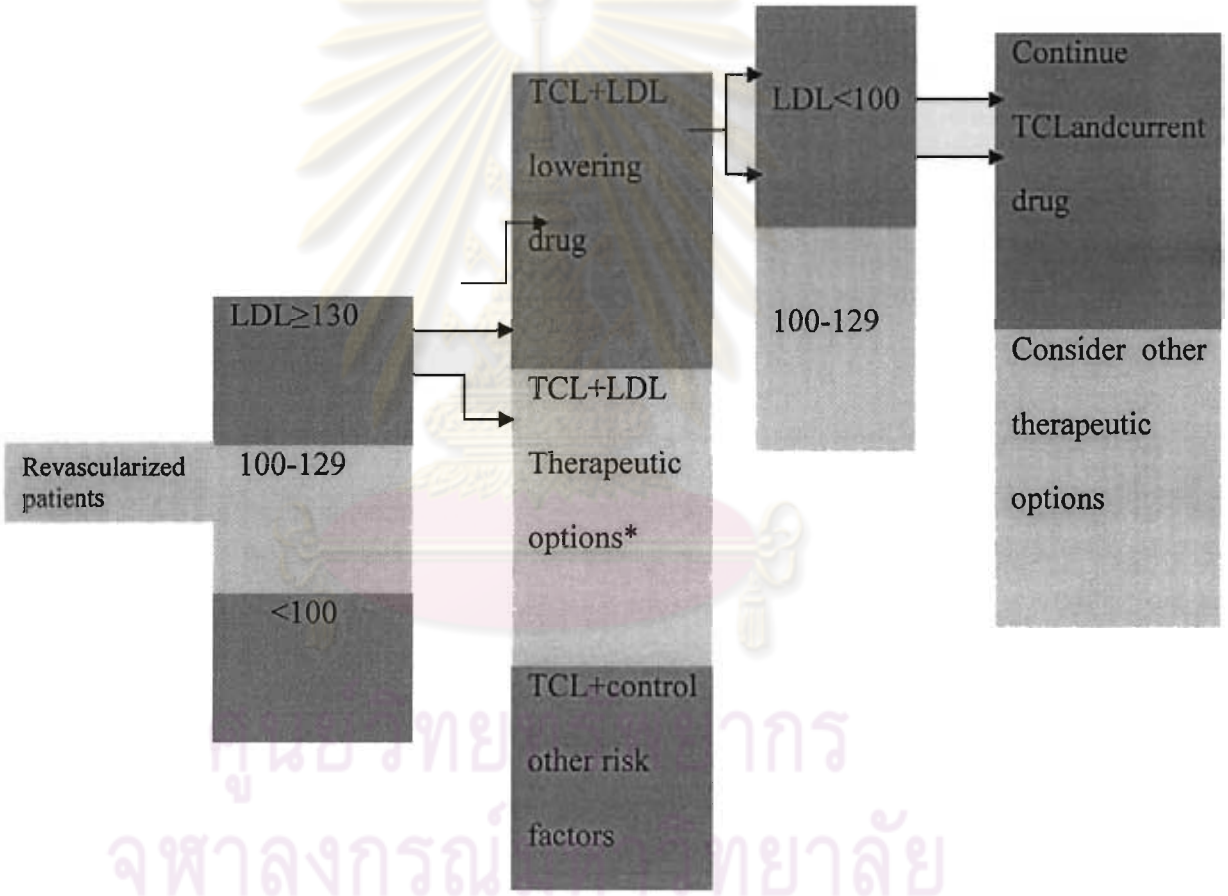


Figure 2 Therapeutic approaches to LDL lowering in revascularized patients

*Therapeutic options include intensifying LDL-lowering dietary or drug therapies, emphasizing weight reduction and increased physical activity, adding drugs to lower triglycerides or raise HDL cholesterol (nicotinic acid or fibrates), and intensifying control of other risk factors.

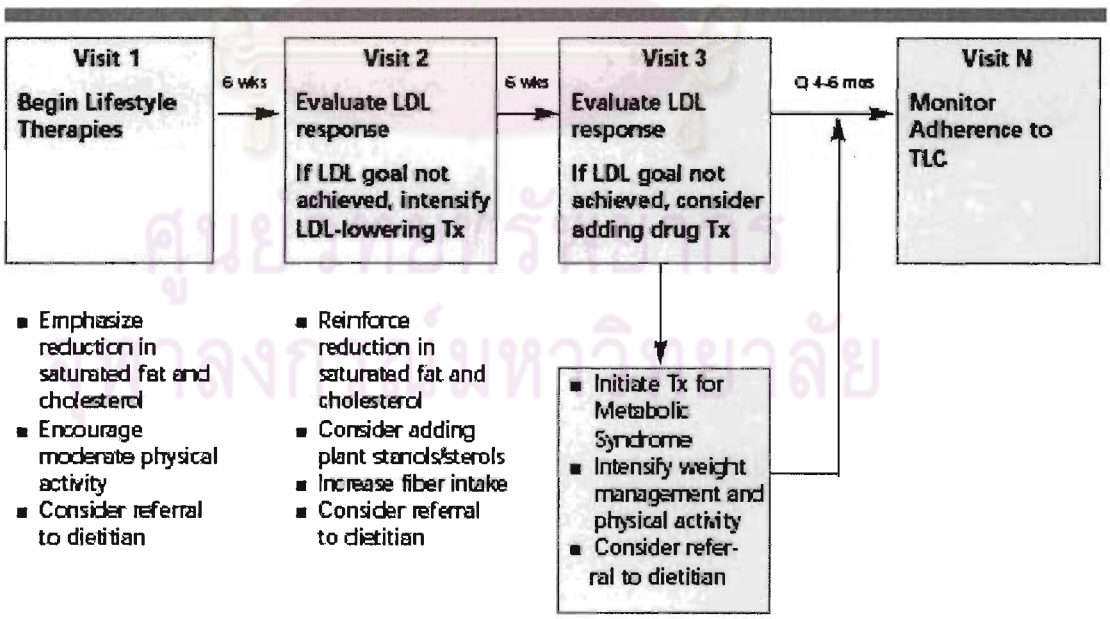
ATP III recommends a multifactorial lifestyle therapies to reducing risk for CAD. This approach is designated *therapeutic lifestyle changes* (TLC) and includes the following components: 1) Reduced intakes of saturated fats and cholesterol, 2) Therapeutic dietary options for enhancing LDL lowering (plant stanols/sterols and increased viscous [soluble] fiber). 3) Weight reduction 4) Increased regular physical activity. All of these have been shown to reduce overall CAD risks and contribute directly to decline in CAD (Campbell et al., 1998; Freedman et al., 1999; Mc Hugh et al., 2001; Wood, 2001; Smith et al., 2001; Murchie et al., 2004; Berna et al., 2005)

For revascularized patients, the type and intensity of LDL-lowering therapy are adjusted according to baseline LDL-C level.

Patients with baseline LDL-C ≥130 mg/dL generally will require an LDL-lowering drug to achieve LDL-C <100 mg/dL. Therefore, a cholesterol-lowering drug should be initiated simultaneously with TLC and maximal control of other risk factors. If the LDL-C falls to the range of 100–129 mg/dL. LDL lowering can be intensified with dietary or drug therapy to achieve an LDL cholesterol level< 100 mg/dL. Patients with baseline LDL-C 100–129 mg/dL, All approaches include TLC as initial therapy, Inclusion of therapeutic dietary options (e.g., plant stanol/sterols and increased viscous fiber) can help to achieve the LDL goal. If LDL cholesterol levels remain appreciably above 100 mg/dL after 3 months of maximal dietary therapy, consideration can be given to adding an LDL-lowering drug. Patients with baseline LDL-C < 100 mg/dL, further LDL-lowering therapy is not currently recommended. Emphasis should be placed on controlling other risk factors and the metabolic syndrome. The TLC diet should be recommended to the person to help maintain a low LDL.

The steps in TLC are shown in figure 1. The initial step is to reduce saturated fats and cholesterol in food, to limit energy from total fat (25-35% of total calories) and provided low saturated fats and *trans* fatty acids for 6 weeks, encourage moderate physical activity. If the LDL cholesterol goal has not been achieved, other therapeutic options such as plant stanol/sterols and viscous fiber can be added. After maximum reduction of LDL-C is achieved with dietary therapy, emphasis shifts to management of the metabolic syndrome and its associated lipid risk factors (elevated triglycerides and low HDL-C). A high proportion of patients with the metabolic syndrome are overweight/obese and sedentary; for them, weight reduction therapy and physical activity guidance is required to obtain further CAD risk reduction beyond that achieved by LDL lowering.

Figure 3 A Model of Steps in Therapeutic Lifestyle Changes (TLC)



Source: NCEP ATP III, 2001

4.3.1 Diet management

The current guidelines of the NCEP ATP III recommended diet with reduction in total fat to 25% to 35% of total calories, lowering the components in diet that could elevate LDL-C level (Jenkins et al., 2000) as following: saturated fatty acids should be no more than 7% of total calories, *trans-unsaturated* fatty acids, and cholesterol intake should not exceed 200 mg/ day, while any increase in fat intake should be in the form of either polyunsaturated (up to 10% of total calories) or monounsaturated (up to 20% of total calories) that being proved to lower LDL-C level.

A) Saturated fatty acids are the biggest dietary cause of high LDL-C levels. Meta-analyses have found a significant relationship between saturated fat and serum cholesterol levels (Clarke et al., 1996). Saturated fats are found in animal products such as butter, cheese, whole milk, ice cream, cream, and fatty meats. They are also found in some vegetable oils -- coconut, palm, and palm kernel oils. However, most other vegetable oils contain unsaturated fat and are healthy. A perspective published in 2011 reported the replacement of 1% of energy from saturated fatty acid with polyunsaturated fatty acid lowers LDL cholesterol and is likely to produce a reduction in CAD incidence of more than 2–3% (Dyerberg et al., 2011). Diet rich in either monounsaturated fat or polyunsaturated fat is effective in lowering LDL-C, while lowered the level of HDL-C slightly in men but not in women (Mensink and Katan, 1989). Thus, substitution of carbohydrate and/or unsaturated fatty acids for saturated and trans fatty acids results in reduction of LDL cholesterol (Mensink, Zock, Kester et al., 2003). Monounsaturated fats are found in olive and

canola oils, and polyunsaturated fats are found in fish, safflower, sunflower, corn, and soybean oils.

B) Trans fatty acids are form when vegetable oil hardens (a process called hydrogenation) and found in fried foods, commercial baked goods (donuts, cookies, crackers), processed foods, and margarines. They can raise LDL-C levels and also lower HDL-C levels (Mozaffarian et al., 2006).

4.3.2 Weight control management

Jenkins et al. (2000) found that weight reduction could lower LDL-C level, and in the most widely used classification of body mass, body weight is expressed in terms of body mass index (BMI) (Poirier et al., 2006). BMI is a simple index of weight-for-height that is commonly used to classify underweight, overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in metres (kg/m2). Current public health guidelines classify adult BMI between 18.5 and 24.9 kg/m^2 as normal weight, between 25.0 and 29.9 kg/m^2 as overweight, and 30 kg/m^2 and above as obesity. In addition, waist circumference provides a convenient measure of abdominal obesity, with men's circumferences ≥40in, women's circumferences ≥35in classified as abdominally obesity (National Institute of Health (NIH), 1998). Overweight and obese individuals are at greater risk for developing CAD, primarily as a consequence of obesity-related conditions such as diabetes, hypertension, and dyslipidemia (Calle et al., 1999).

In revascularized patients who undergo bare-metal stent implantation, obesity is an important risk factor for clinical and angiographic restenosis at the target lesion and for composite major adverse cardiac events in

patients who receive, but not in drug eluting stent (DES) implanted patients (Nikolsky et al., 2005).

Among patients undergoing PCI with DES, obesity was not associated with restenosis at the target lesion, but was associated with a higher risk of atherosclerotic progression and stenosis at remote target lesion (Zhijian, Yujie, and Yingxin, 2010). Cardiac surgeons often perceive obesity as one of many factors that make the technical difficulties inherent to the surgical and postsurgical care which related to perioperative adverse outcomes. However, obesity has not been reported to be associated with increased mortality following CABG in numerous studies (Ascione and Angelini, 2003; Rockx et al., 2004). In contrast to BMI-defined obesity, the components of the insulin resistance syndrome have been associated following CABG, with angiographic progression of atherosclerosis in nongrafted coronary arteries (Korpilahti et al., 1998; Wee, Girotra, and Weinstein, 2008). The Metabolic syndrome was also reported to be a strong and independent risk factor for morbidity and mortality following CABG (Echahidi et al., 2007).

NCEP ATP III identified the metabolic syndrome as a multiplex risk factor for cardiovascular disease and recommended the criteria as following of ATP III are shown in Table 1. When 3 of 5 of the listed characteristics are present, a diagnosis of metabolic syndrome can be made.

Table 2.3 ATP III Clinical Identification of the Metabolic Syndrome

Risk Factor	Defining Level
Abdominal obesity, given as waist circumference*†	
Men	>102 cm (>40 in)
Women	>88 cm (>35 in)
Triglycerides	≥150 mg/dL
HDL cholesterol	
Men	<40 mg/dL
Women	<50 mg/dL
Blood pressure	≥130/≥85 mm Hg
Fasting glucose	≥110 mg/dL

A program of weight loss and exercise provide the foundation of treatment for metabolic syndrome. Weight loss increases HDL-C, decreases LDL -C and triglycerides. Together, diet and exercise improve risk factors more than diet alone.

A meta-analysis of 70 studies demonstrated the weight reduction contribute to decreased total cholesterol, LDL-C and triglyceride (Dattilo and Kris-Etherton, 1992) and also increased HDL -C (Wood et al., 1991). In revascularized patient, the target BMI is 18.5 to 24.9 kg/m^2, with a waist circumference of <40 inches for men and <35 inches for women.

4.3.3 Physical activity management

Along with dietary management, physical activity or exercise is an essential element of the lifestyle therapies and the centerpiece of rehabilitation programs. It is difficult to know the precise proportion of benefit due to exercise alone, because most data derive from comprehensive exercise rehabilitation programs that also incorporate such efforts as smoking cessation, dietary management, however this exercise training effect achieved markedly to quality of life (Brochu et al., 2000). The benefits of exercise training come from increasing cardiac stroke volume and skeletal muscle oxygen extraction. The trained patient is able to deliver a given quantity of oxygenated blood to the peripheral tissues at a lower heart rate and at lower systolic pressure (Piperidon and Bliss, 2005; Pollock, Franklin, Balady et al., 2000). The decline in rate–pressure product (heart rate × systolic arterial pressure) corresponds to a reduction in myocardial oxygen demand for a particular level of exercise, allowing the trained patient to achieve a higher level of activity before demand outpaces blood supply. Myocardial perfusion has been observed to increase by 25% to 50%, presumably through the vasodilation of coronary arteries and improvement of collateral blood flow to ischemic zones (Hambrecht et al., 2000; Schachinger et al., 2000). The trained patients must achieve a physiologic training effect to obtain health benefits; such a training effect requires aerobic exercise (running, jogging, fast walking, cycling, swimming) performed at least four times a week for at least 30 minutes a session, resulting in a heart rate of 70% to 85% of a predicted maximum (Balady et al., 2007). However, significant reductions in coronary risk do not require the attainment of maximum cardiopulmonary fitness. Moderate degrees of exercise may provide nearly equivalent results. Persons with low baseline

levels of activity demonstrate the greatest improvement in outcomes with exercise training, even if they exercise with only moderate intensity (e.g., walking 3 to 4 miles/hr). Epidemiologic data suggest that simple informal exercise carried out as part of everyday life (e.g., walking, stair climbing, working in the yard) confers survival benefit. The current consensus regarding the approach to exercise is shifting from an emphasis on maximizing intensity to maximizing compliance. For previously inactive patients, this translates into a program of a moderate degree of exercise, usually prescribed as starting with walking at a rate of 3 to 4 miles/hr by accumulate a total of 30 minutes over the course of the day rather than to put in 30 minutes of exercise at a single session.

The regular physical activity was affected to weight loss by increasing caloric output and muscular strength (Lavie and Milani, 2004), decreased anxiety, depression level, increased quality of life (Lavie and Milani, 2004; Piperidon and Bliss, 2005). For the positive effects of moderated –high intensity exercise(30-60 minutes/day, 3 times per week) on lipids were demonstrated after duration 12 weeks (Kodama, Tanaka, Saito et al., 2007; Durstine, Grandjean, Cox, and Thompson, 2002; Leon, Franklin, Costa et al., 2005). These effects were an increase of 8 to 23% in HDL-C and an increase of 5 to 26% in the ratio of total cholesterol to HDL-C (Warner et al., 1995; Mendoza et al., 1991). For patients with base-line triglyceride values that exceed 200 mg/dL, exercise alone, without dietary change, decreases triglyceride levels by 22%. The minimal effect of exercise training alone on LDL-C makes a strong case for concurrent nutritional counseling and drug therapy (Brochu et al., 2000)

4.3.4 Medical adherence

Adherence refers to the patient's ability and willingness to follow recommended health practices. The use of secondary prevention medications, such as antiplatelet agents (Mangano, 2002; Johnson et al., 1992), angiotensin-converting enzyme (ACE) inhibitors (Oosterga et al., 2001; Kjoller-Hansen et al., 2000), ß-blockers (Chen et al., 2000), and lipid-lowering therapy (The Post Coronary Artery Bypass Graft Trial Investigators, 1997; Knatterud et al., 2000) have each been associated with a lower rate of adverse cardiac events in patients after CABG. Patients undergo CABG with greater use of these indicated secondary prevention medications after hospital discharge and at 1 year are associated with a lower 2-year rate of death or myocardial infarction. These data underscore the importance of appropriate secondary prevention measures to improve long-term clinical outcomes after CABG surgery (Goyal et al., 2007; Silber et al., 2000). For secondary prevention, of course, an optimal change of life style and optimal medical treatment of risk factors is mandatory. Independent of the optimal risk factor modification, all of these patients (according to the rules of evidence-based medicine) should take these cardioprotective medications, if no contraindications or intolerance are present. Nonadherence to each class of this medication was associated with higher all-cause and cardiovascular mortality (Ho, Magid, and Shetterly, 2008). Nonadherence to these medications is common in clinical practice and associated with a broad range of adverse outcomes. Silber et al. (2000) surveyed the using of these drugs in post revascularized patients, they found only 89% were on ASA (or clopidogrel), 51% on lipid lowering drugs (46% on statins), 65% on beta blockers, and only 43% had an ACE-inhibitor. These findings suggest that medication nonadherence should be a

target for quality improvement interventions to maximize the outcomes of revascularized patients. There were many studies demonstrated the effective of program to improve medical adherence in this revascularized patient group, Campbell et al (1998) reported proportions taking aspirin which was ascertained by postal questionnaire. A significantly greater number of intervention patients at one-year follow-up was taking aspirin compared to controls. Carlsson (1998) found significant differences between intervention and control patients in use of statins and cholestyramine. In the study by Cupples and McKnight (1994, 1999) trained health visitors assessed the use of prophylactic drugs for angina by interviewing patients. At the two- and five-year follow-ups, a significantly higher number of intervention patients were using prophylactic medication than controls.

5. The self- efficacy theory

To change risk behaviors in patients with revascularization is the major key to success in lifestyle intervention, this require individual assistance to identify and address their own knowledge, attitudes, beliefs, expectations, thoughts, skills, competencies and life situations that act as barriers to behavior change and hence disease prevention and self-management. These barriers manifest in decreased perceived importance of making changes and how they behave in response to different situations these are related to decreased self-efficacy.

Definitions of theoretical concepts

Self-efficacy is the belief in one's effectiveness in performing specific tasks. "People who regard themselves as highly efficacious act, think, and feel differently from those who perceive themselves as inefficacious. They produce their own future, rather than simply foretell it." Self-efficacy theory is an important component of psychologist Albert Bandura's social cognitive theory, which suggests high inter-relation between individual's behavior, environment, and cognitive factors. Each of these variables had interactively as determinants of each other in a triadic reciprocal causation (Bandura, 1977).

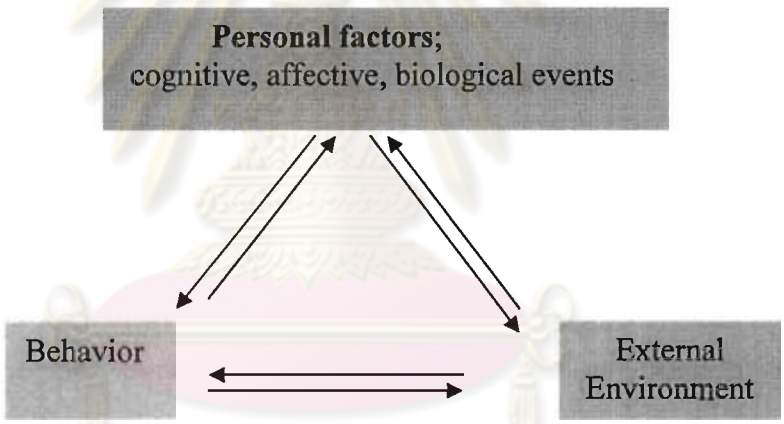


Figure 4 Reciprocal determinism (Bandura, 1977)

Self-efficacy theory maintains that self-efficacy expectancy, a belief about one's ability to successfully perform a behavior, is independent of outcome expectancy, a belief about the likelihood of the behavior leading to a specific outcome.

Bandura (1997, 1986) describe that there are two components in self-efficacy theory include perceived self-efficacy and outcome expectation. He defined self-

efficacy as the conviction that one can successfully execute the behavior required to produce the outcomes. The outcome expectancy refers to a person's estimation that a given behavior will lead to certain outcomes. He states that self-efficacy is the most important precondition for behavioral change, since it determines the initiation of coping behavior.

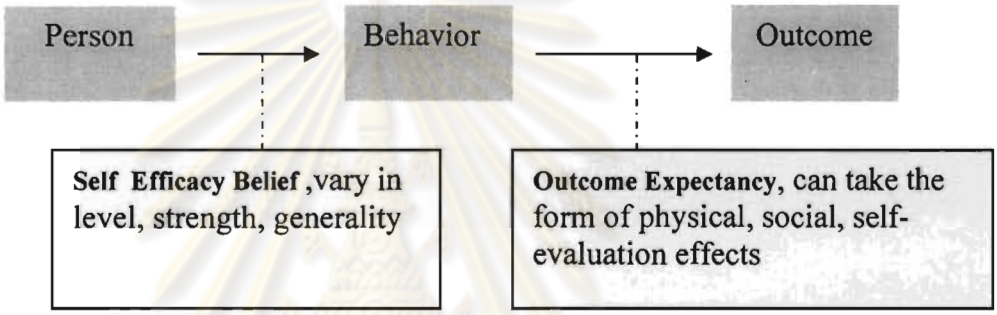


Figure 5 The difference between perceived self-efficacy and outcome expectation (Bandura, 1997)

Meta-analysis of researches on the relationship between perceived self-efficacy and outcome expectancy presented that self-efficacy are more strongly related to performance or behavior change (Jenkins, 1985; Neff and King, 1995; Rouniak et al., 2002)

Self-efficacy or perceive self-efficacy; concepts of self-efficacy are the same as social learning theory (Bandura, 1986; Brawley, 1991) Perceived self-efficacy is defined as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives. Self-efficacy beliefs determine how people feel, think, motivate themselves and behave. Such

beliefs produce these diverse effects through four major processes. They include cognitive, motivational, affective and selection processes. Bandura (1997, 1986), there are four major sources of self-efficacy belief, as follow.

1. Enactive Mastery Experience

This is the most influential source of efficacy information because they provide the most authentic evidence of whether one can muster what it takes to succeed. Successes could built a robust sense of efficacy whereas failures undermine it, especially if failures occur before a sense of efficacy is firmly established (timing is important). A resilient sense of efficacy requires experience in overcoming obstacles through perseverant effort Bandura explained (1994, 1977).

2. Vicarious Experience

The observing others perform threatening activities without adverse consequences, can also enhance personal self-efficacy by demonstrating that the activity is "do-able" with a little effort and persistence. Vicarious experience can be enhanced through live modeling (observing others perform an activity), or symbolic modeling.

3. Verbal Persuasion

People are led to believe they can successfully accomplish a task or behavior through the use of suggestion, exhortation, or self-instruction. However, because verbal persuasion is not grounded in personal experience, it is a weaker inducer of efficacy and may be extinguished by histories of past failures.

4. Psychological and Affective states

Enhance perceived self-efficacy by diminishing emotional arousals such as fear, stress, and physical agitation since they are associated with decreased

performance, reduced success, and other avoidance behaviors. Emotional arousal can be mitigated with repeated symbolic exposure that allows people to practice dealing with stress, relaxation techniques, and symbolic desensitization.

Outcome expectation a judgment of the likely consequence such behavior will produce" or as a person's estimate that a given behavior will lead to certain outcomes (Bandura, 1977, 1982; Jojet, 2003). Because the outcome expectation is the result of the judgments of what we can accomplish, so it can't to contribute to prediction of behavior. A high sense of efficacy may not result in behavior consistent with that belief, however if the individual also believes that the outcome of engaging in that behavior will have undesired effect.

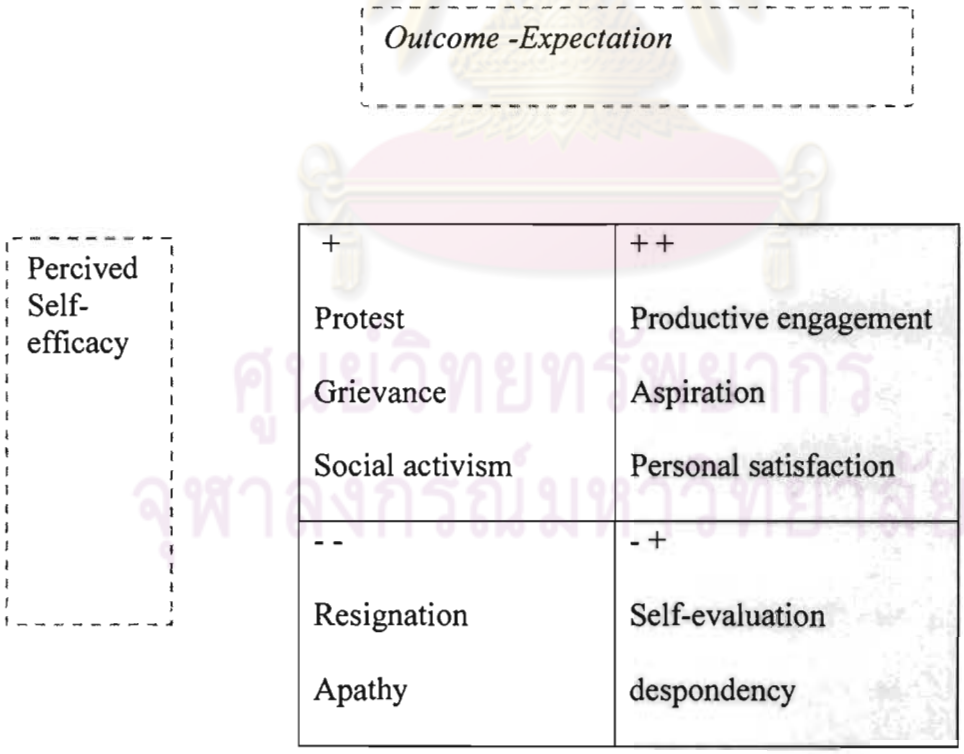


Figure 6 The relationship between perceived self-efficacy and outcome expectation (Bandura, 1977)

From the figure 6 could be describe that if increase in the perceived self-efficacy, the outcome expectation is also high and there is high tendency of doing it. Whereas, if the perceived self-efficacy is low the outcome expectation is also low and there is high tendency of not doing it. And if people with high self-efficacy normally have high outcome expectation too but people with low self-efficacy will have a medium or low outcome expectation.

In addition, for developing in self-efficacy and maintaining in positive behavior, self regulation is the one recommend to modify in this process (Bandura, 1997).

The relationship of Self efficacy and Self regulation

Self efficacy: Self efficacy means learners self confidence towards learning. Individual is more likely to engage in certain behaviors when he believe he is capable of implementing those behaviors successfully, this means that he has high self-efficacy (Bandura, 1997).

Self-regulation : self-regulation is when the individual has his own ideas about what is appropriate or inappropriate behavior and chooses actions accordingly (Baumeister, Heatherton, and Tice, 1994). According to Maddux and Gosselin (2003), one of the most important consequences of the development of self-efficacy beliefs is the development of capacity for self-regulation. Self-efficacy beliefs encourage self-regulation by influencing goal-setting, activity choice, persistence, effort expenditure, and problem-solving. In the other way self-efficacy beliefs are considered essential to successful self-regulation (Barone et al., 1997; Maddux and Gosselin, 2003)

There are four key components to the self-regulation of behavior: 1) setting goals, 2) self-monitoring, 3) self-evaluation, and 4) self-reinforcement or punishment. These four components are conceived as forming a feedback loop. Therefore, the four components are not steps or stages, but rather points along a process that continually feeds back on itself (Carver and Scheier, 1998) (Figure 7)

Thus, self regulation include goal setting, self-monitoring, self-reinforcement were the advantage factors that adapted in the behavior management nursing program.

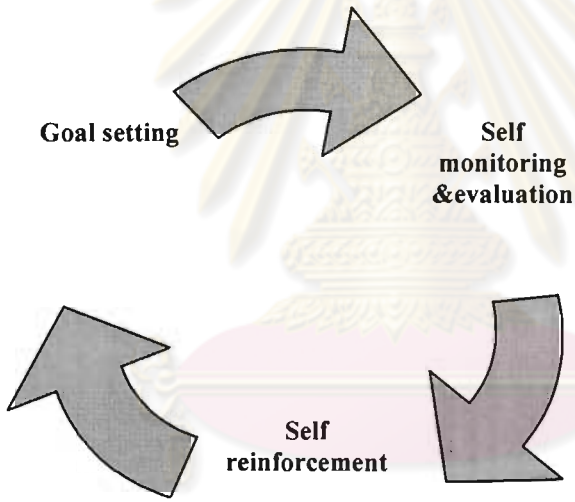


Figure 7 Four key components to the self-regulation of behavior

6. The relationship between self-efficacy and risk behavior

6.1 Self-Efficacy and Low-Fat Diet

There is substantial evidence that reducing saturated fat in the diet decreases the risk of recurrent cardiac events (Kromhout and Lezenne-Coulander, 1984; Kushi et al., 1985; Keys et al., 1986). Efforts to alter dietary habits through various programs have met with limited effectiveness (Advisory Board - IHHC, 1992). One reason for the limited success is the failure to fully understand the cognitive mediators of dietary change (Plotnikoff and Higginbotham, 1995) .One recent study by Plotnikoff and Higginbotham (1995) found significant positive association between self-efficacy for following a low-fat diet (dietary self-efficacy) and outcome measures related to low-fat diet. Future research is needed focusing specifically on dietary self-efficacy to determine whether substantial saturated fat reductions can be obtained by treatment programs developed to increase dietary self-efficacy.

6.2 Self-efficacy and Physical Activity

Of course, physical activity is not only important to functional recovery in cardiac rehabilitation but also to decrease the risk of CAD. The United States Center for Disease Control reviewed existing observational studies and found a significant and graded relationship between physical activity and the risk of CAD (Powell et al., 1987; Littman, 1993). Exercise is widely recommended for secondary-risk reduction in revascularized patients. However, relatively few people engage in regular exercise for a period of time to secure the benefits of moderate exercise to

physical health (Dubbert, 1992). Social-cognitive variables, including self-efficacy, seem to play a major role in this attrition." Research suggests that self-efficacy expectancy, outcome expectancy, and outcome value are important in the initiation and maintenance of a variety of exercise programs (Brawley and Rogers, 1993; Brawley and Horne, 1988; Desharnais et al., 1986; Dzewaltowski et al., 1990; Garcia and King, 1991; McAuley, 1991, 1994; McAuley and Courneya, 1993; McAuley and Jacobson, 1991; Poag-Ducharme and Brawley, 1991a, 1991b; Rogers and Brawley, 1991a, 1991b).

The relative influence of self-efficacy and outcome expectancy on exercise behavior has been shown to differ at different stages of exercise experience (Marcus et al., 1992; McAuley, 1991; McAuley and Jacobson, 1991; McAuley and Rowney, 1990; Poag-DuCharme and Brawley, 1993). Although initial experience with exercise may base their decision to try it largely upon their beliefs of the value of the benefits of exercise, this initial experience with exercise strongly influences self-efficacy (Ewart et al., 1983) which become the primary determinant of persistence (Maddux et al., 1995).

Recently, studies have attempted to learn more about what types of self-efficacy best predict exercise behavior over time. Self-efficacy for the exercise components, self-efficacy for scheduling, and self-efficacy for overcoming barriers have been studied by Poag-DuCharme and Brawley (1993). The types of self-efficacy that predicted exercise intentions varied at different points in their 12-week community-based exercise program. This study and others (Poag-Charme, 1993; McAuley, 1992, 1993) suggest the need for further study concerning changes in the relationship between self-efficacy and exercise over time (Maddux et al., 1995).

6.3 Self-efficacy and Weight Loss

Being overweight is a significant risk factor for the development of recurrent cardiac events in revascularized patients. Weight control self-efficacy to perform behaviors that lead to weight loss has been examined in a number of ways. In fact, the assessment of self-efficacy varies greatly from study to study. Due to the great variety in assessment of the construct of weight control self-efficacy, it should be noted that it is difficult to summarize the findings and make generalizable conclusions. The closest thing to a standard assessment in the field of weight control self-efficacy is Glynn and Ruderman's (1986) Eating Self-Efficacy scale (ESES) (DiClemente et al., 1995).There is a large amount of evidence suggesting that weight control self-efficacy plays an important role in weight loss.

Chambliss and Murray (1979) have found cross-sectional evidence that a self-efficacy enhancing treatment group had greater weight loss than a comparison group. However, this effect was only apparent for those with an internal locus of control. Much stronger evidence comes from numerous prospective studies investigating the predictive powers of weight control self-efficacy on weight control. "Efficacy to resist the urge to overeat increases during the course of treatment (Glynn and Ruderman, 1986; Forster and Jeffrey, 1986).

Expectations that seem more like outcome expectancies than efficacy expectancies (i.e., subjects' confidence in reaching their goal weight, confidence in losing a certain amount of weight, or confidence in their ability to lose weight and maintain that loss) have been able to predict dropout from a weight control program (Mitchell and Stuart, 1984), as well as weight loss (Weinberger et al., 1984), and the maintenance of that weight loss (Blair et al., 1989). Most studies that use efficacy to

resist the urge to eat or refrain from overeating have found these efficacy evaluations to be predictive of weight loss during the active phase of treatment (Glynn and Ruderman, 1986; Forster and Jeffrey, 1986). In addition, posttreatment efficacy evaluations have been related positively to maintenance of weight loss (Patsis and Hart, 1991; Rodin et al., 1988; DiClemente et al., 1995).

Despite all the difficulties and differences in the assessment of self-efficacy related to eating behavior in weight control, Efficacy evaluations appear to be useful and unique predictors of weight loss. Few constructs predict weight loss and maintenance of that loss in as consistent a fashion as self-efficacy focused on overeating behaviors (DiClemente et al., 1995).

Summary, The theoretical framework of this program is base on the TLC recommended by NCEP ATPIII, 2001 with using four sources of self-efficacy (Bandura, 1997) to motivate sustained healthy behavior and using self-regulation include goal setting, self-monitoring, self-reinforcement, and social support to running in the process for change and maintain behavior.

The program has aimed to improve perceive self-efficacy expectation of patients in improving healthy lifestyle and also explored the changes in completed lipid profile as following: decreased total cholesterol, triglyceride, LDL-C, and increased HDL- C level .

7. The secondary prevention program in patients with coronary artery disease

The secondary coronary prevention refers to the implementation of therapies that aims to prevent further coronary events in individuals who already have signs of CAD

and thus targets patients with angina pectoris, survivors of MI, and post revascularized patients through risk factor identification and modification (Murray and Lopez, 1998; O'Connor et al., 1989; Murchie et al., 2004; Berna et al., 2005). From literature reviews and synthesis many studies involved in the secondary coronary prevention program, there were various design of programs. Most of these studies demonstrated the significantly improved outcomes such as decreased subsequent mortality and morbidity, decreased recurrent cardiac events, reduced risk factors, improved quality of life and also having positive effects on lipid profiles (Gordon et al., 1977; Hubert et al., 1983; Bush et al., 2001). The variety of programs from these studies could be analyzed in separated items as following:

7.1 Patient education patterns

Patient education is one of the major key of success in lifestyle intervention which have aims to increase patients' knowledge in diseases, risk factors, healthy behaviors, and also psychological support to increase self-efficacy, empowerment, and motivation in change behaviors (Cantley, Parker, Knight, and Perdomo, 2003; Park, 2006). The design of education model in these studies were varied from individualized approach by face-to-face or group education approach which depend on teaching objectives, patients' background (Steptoe et al., 1999; Ornish et al., 1998; Nordmann et al., 2001; Cantley, Parker, Knight, and Perdomo, 2003; Cantley, Parker, Knight, and Perdomo, 2003; Park, 2006). Many studies reported that the learning need of patients was the single indicator of the success of programs (Bijlani et al., 2005).

Thus, the identification learning needs of patients is the first step in the effective education program. Wang and Qu (2000) explored the learning needs of post MI patients. They found the two studies rated risk factors, anatomy and physiology, and medications as the top of learning need of this patients group during the post CCU period whereas the other study rated risk factors, medicine, diet, physical activity, medical follow-up, pulse-taking, and emotional response as the most priority learning.

Many studies demonstrated the learning needs of CAD patients in rehabilitation have the topic of learning needs similar to patients during hospitalization and after discharge as following: symptoms management, medication information, anatomy and physiology of disease, lifestyle factors which represent to knowledge in diet, physical activity, smoking cessation, psychological, and social support (Wang and Li, 2002; Timmins and Kaliszer, 2003; Zheng and Shun, 2003). These evidences were useful in education program design for revascularized patients.

Education interventions which had aim to change patients' behavior were effected in disease management, reduced hospitalizations, reduced risk factors, improved survival, and lower cost for treatment (Stewart et al., 2002; Haskell et al., 1994; Schuler et al., 1992; Stampfer et al., 2000; Steptoe et al, 1999; Gould et al., 1992; Ornish et al., 1998; Nordmann et al., 2001). Moreover these program also provided significantly higher rate of blood lipid test and rate of lipid lowering medication using in CAD patients (Cantley, Parker, Knight, and Perdomo, 2003)

7.2 Lifestyle behavior patterns

NCEP ATP III recommended TLC as the main model in lifestyle therapies for CAD patients which including: 1) diet reductions in saturated fat and cholesterol intakes. 2) weight reduction and 3) increased physical activity (National Cholesterol Education Program, 2001)

7.2.1 Physical activity: increased physical activity have clearly demonstrated benefits on dyslipidemia by increasesd HDL cholesterol, reduced LDL cholesterol and triglycerides (Wannamethe et al., 2002) and weight reduction. Moreover, the exercise also has non-lipid effects in improvement of endothelial function caused vasodilatation responses, reduced platelets adhesion (Fletcher, Blair, Blumenthal et al., 1992) reduced the anginal frequency , increased functional capacity (Gerard and Sue, 1993; Blair et al., 1995). As in a recent randomized trial that compared the effects of daily exercise with those of PCI in patients with chronic stable angina and single-vessel coronary artery disease. They demonstrated better major adversed events and improved exercise capacity at one year in the exercise group than in the PCI group (Hambrecht et al., 2004). Thus, the physical activity motivation should be the part of secondary prevention program for dyslipidemia management in CAD patients (Thomson et al., 2003).

The beneficial effects of exercise in cholesterol profile from clinical trials was shown as followed. A meta-analysis of 52 exercise training trials of 12 weeks' duration including 4700 subjects demonstrated an average 4.6% increase HDL cholesterol and reductions triglyceride and LDL cholesterol by 3.7% and 5.0%, respectively (Leon and Sanchez, 2001). The Health, Risk factors, exercise Training, And Genetics (HERITAGE) study, included 675 normolipidemic subjects who

participated in 5 months of exercise training (Leon et al., 2000) also had similarly increased HDL cholesterol, and decreased both LDL cholesterol and triglycerides. However we could not identified the studies that have addressed the effect of exercise in subjects with dyslipidemia.

Many studies have reported the benefits of exercise-based cardiac rehabilitation to reduce mortality rates in post MI patients (Blair et al., 2005; Lee et al., 2004; Elley et al., 2003)

The Center of Disease Control and Prevention and the American College of Sports Medicine (CDC-ACSM) has recommended the goal of exercise to achieve at least 30 minutes in each for 5 days per week (Pate et al., 1995). Even Thailand's national health policy has planned to motivate physical activity with target 60 % of people to have 30 minutes of moderate physical activity for 3-5 days per week in general population by the year 2006 (National Health Policy Committee, 2001) and implemented many projects to promote exercise but from the national survey reported only 24.2 % (29.1% in men, 19.3 % in women) of people having regular exercise with 30 minutes duration for 3 days per week (National Statistical Office, 2001), these reflected to the failure of preventive strategy in health care system.

Taylor et al. (2004) reported in meta-analysis based on a review of exercise-based rehabilitation with usual medical care. The results shown that the mortality rates did not differ between programs limited to exercise and those providing more comprehensive secondary interventions, and trend were noted for a lower incidence of nonfatal myocardial infraction and revascularization in cardiac

patients who received exercise-based rehabilitation, but did not significance in statistical.

The Health, Risk factors, exercise Training, And Genetics (HERITAGE) study, included 675 normolipidemic subjects who participated in 5 months of exercise training (Leon et al., 2000) also had similarly increased HDL cholesterol, and decreased both LDL cholesterol and triglycerides. However the result could not identified the studies that have addressed the effect of exercise in subjects with dyslipidemia.

The postulated protective effect of aerobic exercise against CHD is provide by experimental evidence of multiple plasusible cardioprotective effects of aerobic exercise at all stages of development of CHD (Leon, Franklin, Costa et al., 2005)

7.2.2 Diet management: The main objectives of diet intervention including; allow the patient to reach and maintain ideal body weight, provide a well-balance diet with fruits, vegetables, and whole grains and the last is restrict in saturated fat and refined carbohydrates. Patient knowledge is important in goal achievement of this recommendation such as the relation of obesity and dyslipidemia, the type of fatty food in their community, the ability to interpret nutrition labels on food products or estimate fat content in unlabeled food and food preparation methods that affect fat content.

Burr et al. (1989) reported the effects of dietary intervention in 2033 post MI patients. This resulted show that group of patients receiving advice had lower mortality rate.

Singh et al. (1992) reported the effect of fat-modified and fruit and vegetable enriched diets on blood lipids in the Indian Diet Heart Study for 12 weeks. There were significant reductions in total cholesterol and LDL-C, triglycerides in and incidence of cardiac events intervention group

Maureen et al. (2002) evaluated the effectiveness of twelve weeks of the dietary education in cardiac rehabilitation program base on self-efficacy theory. The result reported that the treatment group had greater improvement in restaurant and receives scores on the Diet Habit Survey and mean score of cardiac diet self-efficacy more than usual group. Although, the cholesterol-saturated fat index and percent of energy from carbohydrate are significantly in the both group but the treatment group has decrease more than usual group.

7.2.3 Weight control: Weight reduction therapy provides lower LDL cholesterol and also non lipid risk factors in metabolic syndrome. Assistance in the management of overweight and obese persons such by the Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults from the NHLBI Obesity Education Initiative (1998).

A meta-analysis of 70 studies demonstrated the benefit of weight reduction on cholesterol: a significant reduction in LDL-C, triglyceride (Dattilo and Kris-Etherton, 1992). However, HDL-C was decreased during the active weight loss period which could be minimized HDL-C reduction in this phase by exercise and HDL-C was increased after a period of stable reduced body weight (Wood et al., 1991).

Nordmann et al. (2001) compared the effects on lipid profile between reduced fat food and low carbohydrate food. The reduced fat food had more

reduction in total cholesterol, Triglyceride, LDL-C, more increased HDL-C. Whereas low carbohydrate food had more favorable effect in weight loss in 6 months period but in12 months period, there was not different in weight loss.

7.2.4 Psychosocial management

Patients having CAD usually have various stresses and emotional disturbances (Frasure-Smith et al., 1995; Allison et al., 1995), these psychological disturbance refer to psychosocial risk factors which had adverse effect on lipid profile, on cardiovascular responses: increased heart rate, blood pressure, muscle and myocardial oxygen demands, and accelerated blood flow (Wood et al., 2005). At current guideline, psychosocial management is an integral part of the secondary prevention program for example: 1) education and counseling by nurse to reduce anxiety, depression and increase patient satisfaction (Funch, Marshall, and Gebhardt, 1986; Bure et al., 2003). Unden et al. (1993) suggest that patients having continued contact with nurses after discharge could reduce anxiety, depression, and increase quality of life in post MI patients, 2) stress management and relaxation therapy provided significant reduction in stress symptom (Frasure-Smit and Prince, 1995) and improvement in psychological status .

Dusseldorp et al. (1999) presented results from meta-analysis of 37 studies with health education and stress management programs for CAD patients, they found that 34% reduction in cardiac mortality and 29% reduction in recurrence MI by 2 to 10 years follow up. In correspondence with many studies in the impact of psychosocial interventions on the frequency of major cardiac events. They demonstrated the program could significantly reduced cardiac events, rate of PCI or CABG and lower costs compared with control group (Thompson and Meddis, 1990;

Burell, 1994; Nelson et al., 1994; Jones and West, 1996; Frasure-Smith et al., 1997; Blumenthal et al., 2002)

A large randomized multicenter trial, Enhanced Recovery in Coronary Heart Disease Patients (ENRICHD) demonstrated the reduction in recurrent MI and mortality by psychosocial intervention in patient with depression and low social support (Berkman et al., 2003).

7.2.5 Social support

Social support in CAD patient is defined as a quality of the structure and function of social relationship that could provide the beneficial effects on the patients having diagnosed CAD to change and maintained healthy lifestyle by reduced risk factors, emotional distress, increase self-esteem and self-efficacy (Rozanski, Blumenthal, and Kaplan, 1999; Berkman et al., 2003). The studies in patients without social support liked single patients (Case et al., 1992), MI or heart failure patients, high marital distress women were associated with higher risk of recurrent cardiac events (Frasure-Smith and Lesperance, 1997; Rozanski, Blumenthal and Kaplan, 1999) especially in 6 months after cardiac event, in the other way, the psychosocial support could provide positive effects liked emotional recovery at 12 months, and 5 years after cardiac events , less cardiac invalidism after MI (Riegel, 1993) and improved healthy lifestyle. Social support had been set as a part of the secondary prevention program.

8. The Behavioral Management Program

In this study, the behavioral management program was modifying for lifestyle intervention, as a part of secondary coronary intervention in recruited revascularized patients. For the goal set up and management in each lifestyle in this

program, we used the guideline from NCEP ATPIII. Whereas the concept of activities to motivate each patient to have sustained healthy lifestyle were base on four sources that could increased patients' self-efficacy in self-efficacy theory (Bandura, 1977, 1982).

The activities in this program had been planned to three phases.

1) Pre -phase

The activities in preparation phase (pre-phase) had aimed to assess and also to identify individual risk factors burden, the unhealthy behavior according to NCEP ATPIII.

1.1 Assessed lifestyle at baseline by short questionnaires (less than 20 minutes interview) as following: a) The exercise behavioral questionnaire, b) Thai version Morisky Medication Adherence Scale (MMAS), c) Thai version Heart Healthy Eating Self-Efficacy (HHESE), and d) The Coronary Heart Disease Preventive Self-Efficacy Scale.

1.2 Completed lipid analysis included total cholesterol, LDL-C, HDL-C, and triglyceride level.

2) Action phase

The activities in this phase were set up at outpatient department of community hospital, and also follow at home. The activities had aimed to educate and to manage unhealthy lifestyles. The education process was either face to face or group approach and was provided by trained research assistance.

For face to face approach, we will explore individual risk burden, and manage each patients in different way depend on each type of risks they had. This approach will motivate self-monitoring, self-reinforcement of patients and Enactive

self-mastery is achieved when patients experience success in change behavior, these can enhance beliefs of personal efficacy. The other one of four factors that can motivate self-efficacy called vicarious experience, or the process of learning from other people's behavior as a role-modeling, is a central idea of Social Cognitive Theory and self-efficacy. This idea asserts that individuals can witness observed behaviors of others and then reproduce the same actions. As a result of this, individuals refrain from making mistakes and can perform behaviors better if they see individuals complete them successfully.

Moreover, group moderators will encourage and praise individuals for their competence and ability to improve their effectiveness as a verbal persuasion to motivate self-efficacy. The education process will be present as many medias e.g. Power Point program, Take home handbook. A checklist was developed to ensure that key topics of this education process were covered, but sessions varied in their content based on the needs and expressed interest areas of each patient. In addition, telephone follow up at 3rd week, 9th week, and home visit at 6th week after 1st education activity at outpatient department.

The education detail in these medias were base on the *therapeutic lifestyle changes* from NCEP ATPIII that included knowledge of lifestyle behavior (lowering cholesterol diet, exercise skill, medical adherence) by providing information and education on vascular risk in general, and specific base pertinent to an individual's problem in a effort to clarify the connection between lifestyle behavior, blood cholesterol and cardiac events in the future.

3) Post-phase

This phase was started in 12th week after 1st education activity in action phase at outpatient department, we selected this time period because this period of lifestyle intervention is enough to declare the effects of lifestyle on lipid profile (NCEP ATP III, 2001). The activities in this period are evaluation completed lipid profile and also lifestyle to compare with their baseline data.

The behavioral management program including;

1. Goal setting

Goal-setting for health behavior change is a process by which health provider and patient agree on a health-related goal (Bodenheimer and Handley, 2009). This patient-centered approach to behavior change is the central to the self-regulation process and is the skills that try to challenge thing of the human to practice or done some activity for success in purpose. It's the one skill that helping human in attention process and success in change behavior (Bandura, 1997).

Goal-setting is generally performed in a collaborative manner, negotiating goals and action plans with patients rather than telling patients what their goals should be. Patients are encouraged to choose their own goals and in particular to choose only those goals that they feel they can realistically achieve since too high of goal setting may be negative effect to changing behavior (Kalory, 1977). Goals do not automatically activate the self-evaluative process that govern performance. In the social learning analysis (Bandura, 1977), certain properties of goals determine the likelihood that self-evaluation contingencies will become enlisted in any given

activity. The degree to which goal setting creates incentives and guidelines for performance is partly determined by the specificity of the goals.

In agreement with patients, we set up the goal as following examples: increasing moderate level physical activity, selecting leaner meats and lower fat dairy products, preparing foods in ways that minimize the fat content (e.g., baking instead of frying), medical adherence, the action plan are walking for 15 minutes four times a week, drinking water rather than coca-cola

After setting a goal, patients were encouraged to have a next three follow-up visits either at OPD in community hospital or by phone to evaluate their goal attainment and to set new goals.

Properties of Goals

To use goal setting, it is important to consider the properties of effective goals. There are three critical properties of goals:

1. Specificity - Goals should be well defined and set clear standards. This provides the patients with a thorough understanding of what is expected. This will also make it easier for them to gauge their progress e.g. "I will loss1kg each month for the next 6months" rather than "I will loss weight".

2. Difficulty - This refers to how challenging the goal is for the individual. It is important to set goals at a moderate level of difficulty for the patient. Goals should be set at a level of difficulty so that the patient has to put forth effort and utilize resources, but are still attainable. Setting goals that can be achieved with little or no effort will not increase a patient's motivation; setting goals that are too difficult will be overwhelming for patients. Burke et al. (2005) reported that goal setting in patient with dyslipidemia which assign into easily managed component that

progressed in a step-wise manner to facilitate success could lower blood cholesterol effectively.

3. Proximity - Proximal goals are goals that can be completed in the near future. Distal goals are goals set to be completed only in the future (i.e. long-term goals). Proximal goals produce greater performance because they are more immediately attainable. Distal goals should be broken down into to several proximal goals set to reach that long-term goal.

2. Health education: research assistant will attempt to improve participants' knowledge of lifestyle behavior (lowering cholesterol diet, exercise skill, medical adherence) in which the basic need of patients with cardiovascular disease (Wang, 1994; Bijlani et al., 2005; Taylor, 2003) by providing information and education on atherosclerosis and vascular risk in general, and specific base pertinent to an individual's problem in a effort to clarify the connection between lifestyle behavior, blood cholesterol and cardiac events in the future. In term of health behavior, the prior goal of health education need to increase perceive self-efficacy for management in risk behavior (low-diet cholesterol, exercise behavior, and drug adherence) that effected to be control in blood cholesterol level including: total cholesterol, triglyceride, LDL-cholesterol, and HDL-cholesterol. So that this intervention composed with health education in risk behavior that effected to blood cholesterol level including; exercise skills, diet management and medication, as follow;

Exercise skill in this program mean that aerobic exercise, take time at least 15-30 minutes, and 3-5 days per week that the high effective to patients with CAD (National Health Policy Committee, 2001; National Statistical Office, 2001). Target Heart Rate (THR) is one indicator that show in effectiveness of this program by THR

could be calculate with 220-age (year). However, this population was the patients with revascularization, so that 50-60% of THR is the result that could be accept in this program. There were many studies that supported in exercise skill such as;

Hambrecht et al. (2004) studied in a recent randomized trial that compared the effects of daily exercise with those of PCI in patients with chronic stable angina and single-vessel coronary artery disease. They demonstrated better major adversed events and improved exercise capacity at one year in the exercise group than in the PCI group. As well as, A meta-analysis of 52 exercise training trials of 12 weeks' duration including 4700 subjects demonstrated an average 4.6% increase HDL cholesterol and reductions triglyceride and LDL cholesterol by 3.7% and 5.0%, respectively (Leon and Sanchez, 2001). And the same studied in The Health, Risk factors, exercise Training, And Genetics (HERITAGE) study, included 675 normolipidemic subjects who participated in 5 months of exercise training (Leon et al., 2000) also had similarly increased HDL cholesterol, and decreased both LDL cholesterol and triglycerides. However we could not identified the studies that have addressed the effect of exercise in subjects with dyslipidemia.

Diet management as follow by TLC Diet was mean that limiting the intake of foods with a high content of saturated fatly acids and cholesterol. And substitute grains and unsaturated fatty acids from vegetable, fish, legumes, and nuts (NCEP ATPIII, 2001). Adjust all of menu in low cholesterol Thai food (Nutrition Division, 2010) was the challenge in this program. Low cholesterol diet management was the world wide study and high effect to control cholesterol level such as;

Intensive dietary counseling (to more closely follow the NCEP Step II diet) to lowered LDL cholesterol during the recruitment phase of a 5-year clinical trial

in post CABG patients. The treatment group had a 10.7% decrease in total cholesterol and a 12.4% decrease in LDL cholesterol (Shenberger, Helgren, Peters et al., 1992).

Maureen et al. (2002) to evaluate the effectiveness of the nutrition education in outpatient cardiac rehabilitation program base on self-efficacy theory, duration for follow up in 12 weeks. The result reported that the treatment group had greater improvement in restaurant and receives scores on the Diet Habit Surrery and mean score of cardiac diet self-efficacy more than usual group. Although, the cholesterol-saturated fat index and percent of energy from carbohydrate are significantly in the both group but the treatment group has decrease more than usual group. Although, the cholesterol-saturated fat index and percent of energy from carbohydrate are significantly in the both group but the treatment group has decrease more than usual group. More than low cholesterol diet education, the participant would to be practice skill in manage menu in low cholesterol diet and balance in energy of each of participant. The varies kind of Thai food in low cholesterol was proposed in hand book.

Medication adherence or drug adherence is a concept that refers to the patient's ability and willingness to follow recommended health practices in medication (Morisky, Alfonso, Marie, and Harry, 2008; Lars and Terrence, 2005). Lower medication adherence was significantly associated with an increased number of cardiovascular-related emergency department visits (Hope, Wu, Tu et al., 2004) and the incidence of disease exacerbation relative to patients who were drug adherent (Chapman, 2002). Improved medication adherence can lead to decreased emergency department visits, fewer hospital readmissions, and reduced mortality in patients with heart disease (Jia-Rong et al., 2008). Approaches to assess medication adherence

include patient self-report, pill counts, pharmacy records, drug levels, biological surrogates, and medical event monitoring system caps (Lars and Terrence, 2005). Self-report measures include interview, diaries, and questionnaires, which are generally and easy to use, and are seen as a cost-efficient and cost-effective method. The designs of self-report tools vary significantly, with some being designed to measure adherence in a specific disease population (Thompson, Kulkarni, and Sergejew, 2000; Kim, Hill, and Bone, 2000). Thus, More than health education in medication, the participants would to be practice skill in drug self-report in hand book for follow in drug adherence.

3. **Social support**: is associated with how networking helps people cope with stressful events. Besides it can enhance psychological well-being (Gleason et al., 2002). In addition, social support is the driver that motivation process of participants to matching pattern (Bandura, 1997). Social support distinguishes between four types of support including; *Emotional support* is associated with sharing life experiences. It involves the provision of empathy, love, trust and caring; *Instrumental support* involves the provision of tangible aid and services that directly assist a person in need. It is provided by close friends, colleagues and neighbors; *Informational support* involves the provision of advice, suggestions, and information that a person can use to address problems., and *Appraisal support* involves the provision of information that is useful for self-evaluation purposes: constructive feedback, affirmation and social comparison. Social relationships have a great impact on health education and health behavior. There were some studies reported that PCI patients with high level perceived social support had significantly less psychological stress and uncertainty than patients with low social supported . So that Participants with the assistance of the

researcher will attempt to stimulate social support by cooperating with important members of the patient's social circle. Social support is strongly related to behavior change; it can increase exercise behavior, assist in the selection low cholesterol diet, and a better medical adherences. Informational support in term of health policy (30 baths for treatment all disease) is the pin point that decrease the loss opportunities treatment in patients and this information could be help support in physiology and psychology feedback for increase self-efficacy.

4. Self-monitoring: is the process that engages the individual in systematically observing his or herself in behavior and the circumstances surrounding or prompting behavior. In addition self-monitoring is the driver tool that motivation process to promo in self-efficacy (Bandura, 1997) by participants will need to record in daily logs their day to day activities related to their specific goals, this includes diet for each meal, the type and duration of exercise, and medication adherence. Participants can then use these recordings to self-evaluate, such as comparison of exercise performances to pre-set goal. This self monitoring would be discuss when research assistance follow up with patients by telephone call and home health care. There were some studied that adopted the process of self-monitoring in the intervention for change and maintain behavior of patient with coronary heart disease(Sol et al., 2005; Burke et al., 2005)

5. Self-reinforcement: refer the one type of the motivation process (Bandura, 1997) by contingent self rewards consist of positive statements regarding goal achievements. Diary reading will assist patients in developing positive statements in an effort to achieve behavior change and reassurance, also it re-enforces that patients and their caregivers are the key to a change in lifestyle. Sol et al. (2005)

and Burke et al. (2005) as the same studies that adopted the process of self-reinforcement in the intervention for change and maintain behavior.

The education media; Researcher would be constructed from review literature and follow by content in the behavioral management nursing program, including; 1) Planning to teach for research assistance, 2) Power-point presentation for research assistance, 3) Hand book for participants. Power-point presentation that had adopted in this studied because some part of content if using the moving media would be help in clearly meaning such as pathos-physiology, exercise skill and so on. Telephone contacts have demonstrated efficacy in promoting behavior change to improve adherence and some studied comment that telephone contacts as the most helpful strategy in promoting behavior change (Park, 2006; Castro, King, ans Brassington, 2001; Cantley, Parker, Knight, and Perdomo, 2003). So that telephone contacts and question guideline had adopted in this intervention.

Conclusion

According to many previous intervention programs in revascularized patients in Thailand, there was not the study that assessed patient's perceptions of their needs and individual problem, in addition most of the studies in Thailand were set up in secondary and tertiary care unit. In our study, we assigned the intervention in accompany with patient's perceptions and their needs. We set up the program in primary care unit because primary care unit is the health care unit that having a good relation with patients on the base of rural Thai culture and this unit has a good location in patients community. Since the lifestyle intervention need long term

educations and regular follow up then these factors will provide the positive effects to our program outcomes both of successful lifestyle change which can be encouraged and facilitated for long-term success, and the improved lipid profiles.

CHARPTER III

RESEARCH METHODOLOGY

In this chapter, the research design and method were described it included; research design, research setting, population, sample, sample size, sampling procedure, instrumentation, research assistants' preparation, data collection, protection of right of human subjects, and data analysis.

Research Design

A quasi-experimental study design is represented in this study. Purposive sampling was used to select a primary care setting within a community hospital; a 60 bed hospital located in rural, Thailand, and established by the Ministry of Public Health was used. Specifically, there were two groups; one is intervention and the other is control; a pre-test/post-test design was used in this study (Polit and Hungler, 1999). Outcomes of the study were the difference of blood cholesterol at program entry (before) and program complete (after) in the intervention group and blood cholesterol between the intervention and control group after receiving the intervention and usual care. The research design is shown in figure 3.1

	Pretest		***Posttest***
Intervention group	***O1***	***X***	***O3***
Control group	***O2***		***O4***

Figure 3.1 Research Design

***O1*:** Refers to blood cholesterol in the intervention group before receiving intervention and usual care

***O2*:** Refers to blood cholesterol in the control group before receiving usual care.

X: Refers to the behavioral management program

***O3*:** Refer to blood cholesterol in the intervention group after receiving the behavioral management program and usual care.

***O4*:** Refer to blood cholesterol in the control group after receiving usual care.

The participants who met inclusion criteria would receive usual care given to a control group as well as usual care and attention of the behavioral management nursing program in an intervention group.

The term "usual care" meant caring for a participant when visiting the outpatient clinic at Bangnamprieo Hospital including early assessment, checking vital signs, blood check based on order of the last treatment, physician treatment, health education based on conditions and schedules made by nurses and receiving medication from the pharmacy.

Research setting

The purposive sampling was used to select a primary care setting within a community hospital at the outpatient clinic of Bangnamprieo Hospital, Chachoengsao in Thailand. The researcher selected this hospital because it was a primary care hospital that contained a cardiac clinic in outpatient department (OPD) and was

managed by a cardiologist and a nurse who had extensive experience in caring patients with coronary revascularization and community nurse. Because the clear transferring system to and from a tertiary care unit by following the policy of The Cardiac Excellence Center Project (CECP) was set up in 2002 by the Ministry of Public Health (MoPH) and National Health Security Office (NHSO) to establish a cardiac network throughout the country, other primary care hospitals in the nearby area would like to transfer patients with coronary heart disease for continuous treatment and caring in this hospital. In addition, they were willing to develop a set of guidelines for these patients. Although this study is conducted in only one primary care setting, the effectiveness of this program can be used in other primary care centers in Thailand because of the similarity in culture, perceived participants health care, the processes associated with care providers, and the health care policy in Thailand (Ministry of Public Health, 2010).

Later, the behavioral management nursing program sessions is conducted at outpatient department (OPD), Bangnamprieo Hospital and participant's home to enhance the follow-up care.

Population and sample

Population: Participants having had percutaneous coronary intervention (PCI) or patients who had already had coronary artery bypass graft surgery (CABG) who were also receiving medication for the treatment of dyslipidemia.

Sample: Adult participants having had percutaneous coronary intervention (PCI), or patients that already had coronary artery bypass graft surgery (CABG) more

than three months ago and are presently having treatment for dislipsidemia. They must be willing to participate in the study and meet the inclusion criteria below.

The principle reason why these subjects were selected in this program more than three months after having had PCI and CABG was because they were in the phase III in cardiac rehabilitation program for maintenance-lifelong, community facility at home (ASCM, 2010).

Inclusion criteria

1) Aged 45 to 65 years old

2) Having had percutaneous coronary intervention (PCI) or having had coronary artery bypass graft surgery (CABG) more than three months ago

3) Ambulatory or physically independent (able to attend and participate in aerobic exercise)

4) Unable to control blood cholesterol in the past 3 months and having an above average blood cholesterol level including total cholesterol of more than 200 mg/dl, HDL of less than 40 mg/dl, LDL of more than 130mg/dl, and triglyceride of more than 150 mg/dl or receiving drug management for hypercholesterol under a physicians order

5) Having a stable heart disease (e.g. no uncontrolled dysrhythmia or an absence of angina)

6) Having the ability to communicate by speaking, reading and writing Thai

Exclusion criteria

1) Patients that have a severe cardiac disease with a poor prognosis (EF < 40%); patients that have substance abuse morbidity, or those that a physician has recommended not to exercise

2) Patients with cardiac events such as having re-admittance for a repeated revascularization or unstable-angina or an acute myocardial infraction

3) Patients having been diagnosed with a mental illness that could affect the continuity and integrity of study

4) Patients unable or unwilling to adhere to the follow-up requirements such as moving out of the hospital's follow-up area or being unable to maintain the follow-up throughout the intervention

Sample size

The sample size of this study was divided into two groups: the intervention and control groups. Each group had at least 26 participants; the effectiveness of the number was determined based on power analysis using a large effect size (Polit and Hungler, 1995); effect size(d=0.8) and power test of (0.8), an alpha of 0.05,a t-test of the difference between the mean was performed with a two-tailed t-test. Taking into consideration a dropout rate not exceeding 20% (Cohen, 1992), the total sample size in this study was 60 participants. On program completion, the number of patients in both groups totaled 57; 29 subjects in the experimental and 28 subjects in the control group. Total dropout in this study was 3 subjects because they had severe chest pain and had to be re-admitted before completing this program.

Previous studies indicated that significant improvement in blood cholesterol can be achieved within 2 to 3 months intervention duration. (NCEP, 2001 ; Ade., et al, 2000; Ford., et al, 2001). Then, three months period was therefore chosen for the current study.

Sampling Procedures

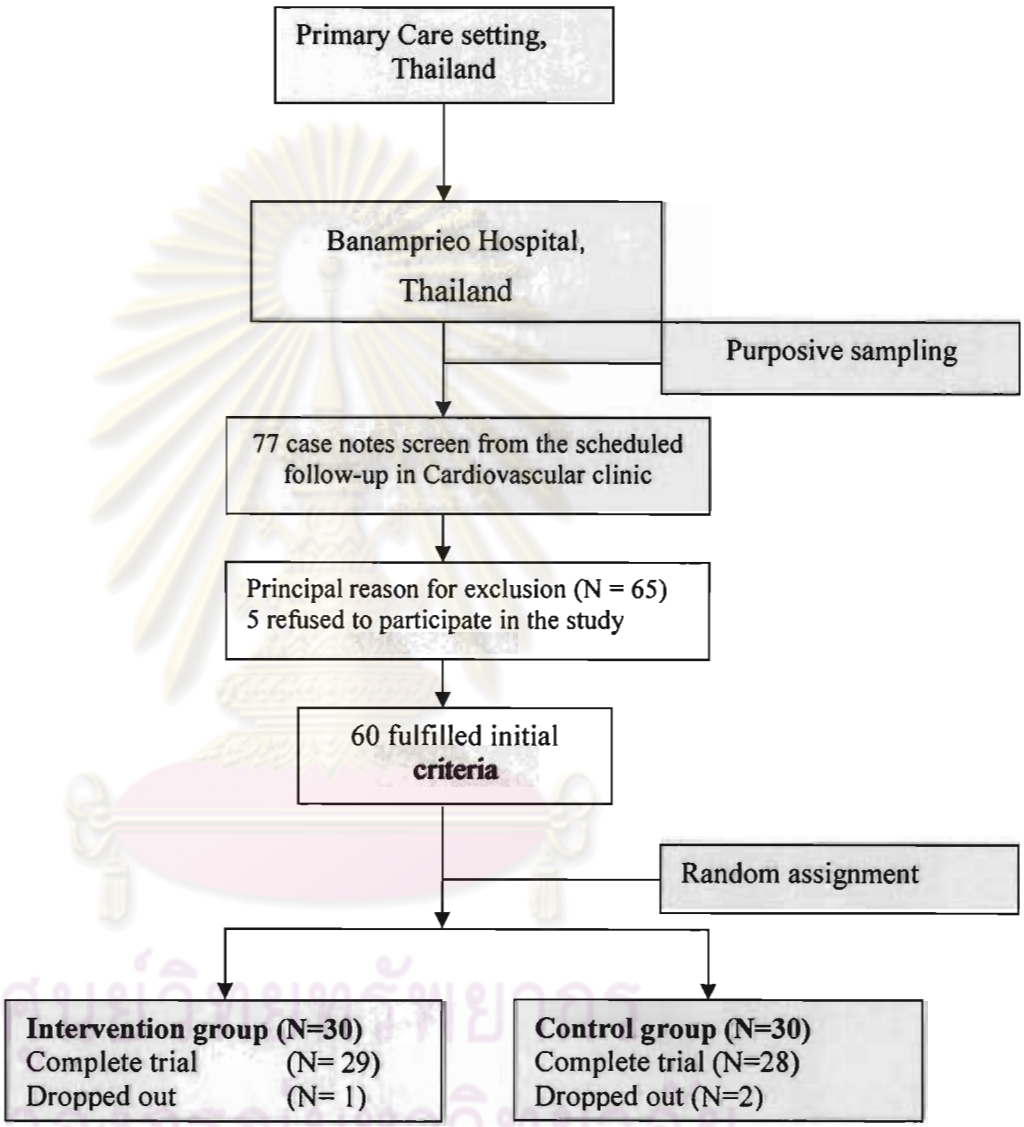


Figure 3.2 Details of the sampling procedure

The procedure sampling started two days before the scheduled follow-ups in the cardiovascular outpatient clinic at Bangnamprieo Hospital, Chachoengsao, Thailand. The list of outpatient attendees was pulled from the Out-patients Clinic Appointment System and printed out in order of booking sequence. Participants were

screened by the principal investigator according to the study's inclusion criteria and none of the exclusion criteria. After the list was obtained, potential subjects' appointments were confirmed by phone and taken as random assign by simple random sampling into the control and intervention groups. Details of the sampling procedure are presented in Figure 3.2

Instrumentation

Four types of instruments adopted in this study were as follows:

1. The general information questionnaire and clinical profile

The general information questionnaire and clinical profile were constructed by the researcher for assessing demographic and clinical characteristics; they included checklists of demographic data (age, gender, marital status, education level, occupation, religion, family illness in CHD) and clinical characteristic (diagnosis, vascular stenosis, Ejection Fraction (EF), treatment, number of present illnesses and number of medication taken daily).

2. The intervention research instruments which consisted of

2.1 The behavioral management program

The behavioral management program base on Therapeutic Lifestyle Change (TLC) that the main method used in The National Cholesterol Education Program Panel III (NCEP, 2001) and modified by researcher. The self-efficacy theory framework was adopted. The program consisted of 3 phases as follows:

Table 3.1 The behavioral management program

Phase/ time	Objective	Activity intervention group	Activity control group
I. Pre- phase:			
Start on the first day of follow- up at outpatients, primary care setting.	To assess, identify individual risk factors burden, the unhealthy behavior, and also lipid profiles	1. Assessed lifestyle behavior at baseline by questionnaires (less than 20 minutes interview) as follows: a) The exercise behavioral questionnaire, b) Thai version Morisky Medication Adherence Scale(MMAS), c) Thai version Heart Healthy Eating Self-Efficacy(HHESE) d) The Coronary Heart Disease Preventive Self-Efficacy Scale. 2. Completed lipid analysis included total cholesterol, LDL-C, HDL-C, and triglyceride level.	The same as in the intervention group

Table 3.1 The behavioral management program

Phase/ time	Objective	Activity intervention group	Activity control group
II. Action phase : Start at out-patient, primary care setting after finish in pre-phase and prolong to 12 weeks as follows: two follow-up telephone calls in the 3rd and 9th weeks and home health care on 6th week by the research assistant	To educate and to manage unhealthy lifestyles.	-Usual care like the control group -The education process was face to face and was provided by research assistance. The program include; a) goal setting, b) health education, c) social support, d) self-monitoring and e) self-reinforcement. All the activities took approximately 45-60 minutes. The education media e.g. Power Point program, take home handbook with a self-monitoring.	Usual care including physician health education based on conditions and schedules made by nurses and receiving medication from the pharmacy.

Table 3.1 The behavioral management program

Phase/ time	Objective	Activity intervention group	Activity control group
III Post- phase :			
Start in 12th week at outpatient, primary care setting	To evaluate lipid profiles and also to identify individual risk factors burden, the unhealthy behavior	The participation would be tested the same way as in the pre-test including 1. Lifestyle behavior a) The exercise behavioral questionnaire, b) Thai version Morisky Medication Adherence Scale(MMAS), c) Thai version Heart Healthy Eating Self-Efficacy(HHESE) d) The Coronary Heart Disease Preventive Self-Efficacy 2. Completed lipid analysis included total cholesterol, LDL-C, HDL-C, and triglyceride level.	The same as in the intervention group

2.2 The education media; the researcher would develop the education media from the literature review and follow-up content in the behavioral management program including a) planning to teach for research assistants, b) Power Point presentation for research assistants, and c) hand book for participants.

Both the behavioral management program and the education media would be to test for content validity index (CVI) by 8 experts (2 specialists in adults nursing and heart disease, 1 specialist in cardiologist, 1 specialist in practical nurse and community-care in heart disease, 2 specialist in self-efficacy theory, 1 specialist in nutrition, and 1 physiotherapy professional). Researcher modified the instruments by following suggestion of experts and did the pilot test with a group of 10 participants for understanding in wording and meaning of sentence (Flahertyet al., 1988).

3. Monitoring research instrument in this study; lifestyle behavior was a significant factor in blood cholesterol. Therefore, the instruments for assessing lifestyle behavior were required and included.

3.1 The Coronary Heart Disease Preventive Self-Efficacy Scale

The Coronary Heart Disease Preventive Self-Efficacy Scale was used to assess self-efficacy behavior of patients with revascularization; both exercise and diet were modified from The Coronary Heart Disease Preventive Self-Efficacy Scale for Midlives (Supatana, Wichit, Linchong, and Ouyporn, 2007). This original instrument was developed basing on self efficacy theory (Bandura, 1997) and related to risk factors of CHD including unhealthty diet, unregular exercise, and smoking. The number of items after having been reviewed and confirmed by five experts was 49; 5-point Likert-type scale ranging from "0" was not at all confident to "4" was

extremely confident. All of the tests confirmed that this scale was good psychometric by having CVI at 0.90; range of internal consistency of each subscale was using Cronbach's alpha was 0.89-0.97 and the total scale was 0.94 while each of items estimated about 0.25s in construct reliability.

In the previous study, there were two subscales (diet and exercise self-efficacy) that related to the behavioral management nursing program. The researcher modified the questionnaire on the self-efficacy behavior of patients with revascularization in two subscales having 31 items. The average of the content validity index (CVI) was 0.95 which was acceptable. After the analysis of suggestions and comments, the final number of total items was reduced to 30; subscale score of 5 was used; and the topic of the questionnaire was adjusted to clarify more about self-efficacy for the participants. The 5 scores shown on a Likert-type scale were "0" which was not at all confident, "1" was a little confidence, "2" was moderately confident, "3" was very confident, and "4" was extremely confident. The total scores on a scale ranging from 0-120 meant that a higher score indicated a greater likelihood of resisting.

The internal consistency or reliability of the scale was established from trial data in 30 participants who had the same characteristics as in the sample of the study. The results showed that Cronbach's alpha was 0.93, that was a high reliability and the reliability for all the samples in the study at pretest (n=57) was 0.96.

3.2 The exercise behavior questionnaire

The exercise behavior questionnaire was to assess the exercise behavior of patients with revascularization and was modified from the exercise

behavior of CHD in studying the factors that related to exercise behavior of patients with coronary heart disease. (Pannchit, 2007; Yuwarate, 2004). The questionnaire was developed basing on the health promoting lifestyle of Pender, including 12 items(positive score in 11 items except in the 11 item), and 4-point Likert-type scale ranging from "1" meaning not exercise in a week to "4" meaning exercise more than three times per week. High scores meant that patient had good exercise behavior and low scores meant poor exercise behavior. The psychometric properties included confirmatory factor analysis which was conducted to ensure construct validity; content validity was checked by six experts and found acceptable. Internal consistency of each subscale using Cronbach's alpha were 0.86 and 0.91 (Yuwarate, 2004; Pannchit, 2007). Establishing Content Equivalence: content equivalence of each item was established by eight experts both in health care provider and physiotherapy professional in face and content validity.

After modifying, the questionnaire included 13 items (positive score in 12 items except for the 12th item which was a negative score) and a 4-point Likert-type scale with "1" doing no exercise at all, "2" doing exercise one time per week, "3" doing exercise two times per week, and "4" doing exercise more than three times per week. The evaluation of the total scores was done taking total scores divided by total items. The final score could be described using a score ranging between"1.0-1.49" as poor behavior, "1.5-2.49" as moderate behavior, "2.5-3.49 as good behavior, and "3.5-4" as excellent behavior. The average of the content validity index (CVI) was 0.95, which was acceptable.

Reliability was established from trial data in 30 participants who had the same characteristics as in the sample of the study. The result showed that

Cronbach's alpha was 0.90 and presented a high reliability; the reliability for all the samples in the study at pre-test (n = 57) was 0.95.

3.3 Thai version of Heart Healthy Eating Self-Efficacy (HHESE)

Thai version of Heart Healthy Eating Self-Efficacy (HHESE) for assessing the dietary behavior of patients with revascularization was modified from Heart Healthy Eating Self-Efficacy (HHESE) which was an effective tool for managing eating behavior change for patients with hyper-cholesterol (Margaret, 2003) based on concepts of diet from the National Cholesterol Education Program(NCEP) (NCEP, 2000). This tool was developed and derived from Bandura's Social Cognitive Theory (SCT) (Bandura, 1977, 1997).

The starting for development in HHESE tool consists of 3 subscales which measure both self-efficacy and outcome-expectation. Subscale I was designed to measure self-efficacy beliefs for specific eating habits described as heart healthy and 33 items. Subscale II describing situational factors likely to influence eating habits or there were referred to as environmental efficacy was a part of Bandura's SCT, and 13 items. Subscale III was the positive health outcomes or outcome expectation that may result from heart healthy eating, and 5 items. The 6-point Likert scales, ranging from "1" meaning not at all confident to"6" meaning completely confident. Scores were computed by summing across all items then divided by the total number of items for each scale. In these cases, missing scores were treated as indicating none of the attribute and no correction was made. The high score was the good diet behavior and low score was the poor diet behavior.

The result of reliability and validity of tool showed that nine items in subscale had to be deleted because they had high scoring patterns, and the 24-item scale was shortened to be better understood by participants. Finally, the total items in subscale were 24 items. The factor loading for all items was positive, ranged from 0.45 to 0.85. Subscale II and III also had positive factor loading ranged from 0.45 to 0.77 and 0.68 to 0.84, respectively. Coefficients for the test-retest procedure was high at 0.85 to 0.90, indicating acceptable stability of the instrument (Maegaret, 2003).

After having obtained permission from the original constructer, the researcher considered the absolute content of the behavioral management program and the questionnaire of HHESES. Then, the researcher selected and specially modified the subscale I (24 items) then translated to a Thai version using the 4 step translation process of the Brislin'model (Brislin, 1970, 1986). After eight experts' consideration, some experts advised to change the original kind of food to Thai food which was suitable in Thai culture. For the next step the researcher consulted with expert professors in nutrition and adjusted the original menu to Thai food. However, the new menu of Thai food had the same objective as the original instrument which was to measure self-efficacy beliefs for specific eating habits. The average of the content validity index (CVI) was 0.95 which was acceptable.

The scale was then used in a pilot test with a group of 10 participants for understanding in wording (Flaherty et al., 1988). The final number of items after adjustment was 17; 5 subscale score of "1" was never eating the diet, "2" was no practice of the behavior, "3" was sometimes practicing the behavior, "4" was frequently practicing the behavior, and "5" was practicing the behavior all of the time.

Calculating a scale score using the sum of all scores meant a high score demonstrated good diet behavior but a low score showed poor diet behavior.

Reliability was established from trial data in 30 participants who had the same characteristics as the sample of the study. The results showed that Cronbach's alpha was 0.84 and that it had a high reliability; the reliability for all the samples in the study at pretest (n = 57) was 0.92.

3.4 Thai version of Morisky Medication Adherence Scale (MMAS)

Thai version of Morisky Medication Adherence Scale (MMAS) which was used to assess the drug adherence of patients with revascularization was modified from the Thai version of the 8-item Morisky Medication Adherence Scale (MMAS) (Phantipa, Rossamalin, and Rungpetch, 2009).

MMAS was translated into Thai, and that version was used to assess the validity and reliability of the measure in Thai Type 2 diabetic patients in a tertiary care setting. The study showed that the internal reliability was moderate (Cronbach's α reliability value was 0. 61), but the test-retest reliability was excellent (intraclass correlation coefficient = 0.83, $p<0.001$). Concerning convergent validity, it showed a high correlation with the 3 items MMAS ($r = 0.77$, $p<0.01$) and a medium correlation with the Medication Adherence Visual Analog Scale MA-VAS($r = 0.57$, $p<0.01$). Regarding known-group validity, discrimination validity was supported when a significant difference between MMAS and Hb A1c levels was found ($x^2 = 6.7$, $p<0.05$). The sensitivity was 51%; the specificity was 64%; the positive predictive value was 71%; and negative predictive value of the MMAS was 43%.

The scale score of the 8-item MMAS were positive scores except item 5 that was a negative score. The positive score meant that the response "Yes" was zero score and "No" was one score. The negative score in item 5 was opposite of this. The item 8 was 5 scale that the response "never/rarely" was 1 score, "once in a while" was 0.75 score, "sometimes" was 0.5 score, "usually" was 0.25 score, and "all the time" was 0 score. The value of total scores of MMAS was low adherence (MMAS<6), medium adherence (6<MMAS<8), and high adherence (MMAS = 8).

Pilot study of the reliability MMAS Thai-version in patients with Cardiovascular Heart Disease (CHD) (n = 100) found that the Cronbach's α reliability value was 0.34 which was very low. Modification of this instrument was a necessary process; it went as follows:

Content equivalence of each item was established by eight experts in face validity and content validity. The average of the content validity index (CVI) was 0.90 which was acceptable. Reliability was established from trial data in 30 participants who had the same characteristics as the sample in the study. The results showed that Cronbach's alpha was 0.69 and if deleted item 8, the Cronbach's alpha increased to 0.72 but it was not good when considering in construct validity by the eight experts and the researcher. Then, in this study, MMAS Thai-version still had 8 items, the same as the previous study and the reliability for all the samples in the study at pre-test (n=57) was 0.69.

4. Evaluation research instrument (pre-test and post-test)

Blood biomarkers, the measures associated with dyslipidemia including total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglyceride was obtained

according to standard laboratory protocols. Markers were processed at the local institution of Bangnamprieo Hospital's laboratory for analysis. Blood will be drawn when the participants are at rest, following an overnight fast, at Bangnamprieo Hospital, Chachoengsao Province, Thailand and in the pre-test and post-test of the study.

Program research assistants' preparation

The research assistance in this study was registered nurse who has experience in caring for patients with revascularization and has caring for participants in community. The scope of work that she must to manipulate everything in this process of program by herself. Finally, the research assistance was RN that had experience in practice and community nurse about 4 years and she was trained by cardiologist, nurse specialist in cardiology, specialist nurse in self-efficacy theory, nutrition professional, and physiotherapy professional in conference day that setting at one hospital. The aims of the training were to increase the knowledge of lowering cholesterol levels, physical activity, drug adherence, health, behavior change base on self-efficacy theory, self-monitoring, and self-reinforcing, introducing and practicing with the behavioral management program, and answering questions. In term of skills, the research assistance was trained one by one basis in the intervention and research procedures for a half-hour session. All of this program training take time total 30 hours.

In addition, researcher spent a 2-3 hours for orientation and training research assistance in this program including: the purpose of study, the methods, process and detail in this study; concerning and safety awareness during taking care

for the participants; protection of the participant rights. Demonstrate understandings of the instruction until surely understand in every test that accepts in one hundred percent. The training curriculum for research assistance is shown in table 7, as follow;

Table 3.2 Training program for the research assistances

Content	Time(Hrs)
1. Learning all forms in instruments and practice in community	3
2. The behavioral management program - Coronary Artery Disease and Revascularization, Lifestyle behavior, Health education; Diet management, Physical activity, Drug adherence, Social support, Self-monitoring and self-reinforcement, Behavioral theory (Self-efficacy theory), Nurse management and nurse community	30
Total	33

Data collection

Data collection was conducted after obtaining permission and following a process protecting the human subjects. The process of data collection was as follows:

1. Procedure in checking participants' identification and initial screening for eligibility for random sampling: All participants had had prior revascularization (post-CABG or PCI), were taking cholesterol drugs, and had consent to participate in the study. All of the participants received full information about the study and possible groups to which they would be randomly assigned.

The Process of Informed Consent: Potential subjects for participation in the study, while in a scheduled visit to the outpatient clinic, were asked to review the consent form and engage in an informed consent process. To be eligible for participation, individuals would need to express a willingness to be assigned to any intervention group to participate in all of the program over 12 weeks including all follow-up activities of the group that they may be assigned to; telephone calls in the 3rd and 9th weeks as well as the follow-up visit at home in the 6th week must be signed for on a study consent form.

2. Procedure in data collection was as follows:

2.1 The researcher arranged a meeting with the physician, head nurse of OPD and IPD, nurse practitioners in OPD and IPD to explain the purpose of the study, the lifestyle behaviors, blood cholesterol, and instruments to be used in the study.

2.2 The researcher discussed the required cooperation from the health care providers including the physician, head nurse of OPD and IPD, nurse

practitioners in OPD and IPD, and the health provider especially in terms of time trying to adapt the program into the routine care of participants.

2.3 The researcher random sampling by purposive sample for the good sample and could be generated to population in the primary care setting, Thailand.

2.4 The researcher random assignment the subjects into the control and intervention groups by sample random sampling. To have better organization in bias between the control and experimental groups, the researcher planned to collect the experimental group data and the control group data in parallel within six months.

2.5 The researcher assessed each participant on the obtained baseline data (01 and 02) and also included a) the general information questionnaire, b) the Coronary Heart Disease Preventive Self-Efficacy Scale, c) the exercise behavior questionnaire, d) Thai version of Heart Healthy Eating Self-Efficacy (HHESE), e) Thai version of Morisky Medication Adherence Scale (MMAS), and f) test of blood cholesterol (total cholesterol, LDL, HDL, triglyceride).

2.6 The sample in the control and the intervention group still received the usual care from the practice nurse with the hospital routine for outpatients with diseases.

In addition, the participants in the intervention group were then orientated for health assessment, health education, counseling prevention, health behavior skills in exercise, and home visits as well as health care services. This program included 3 phases: 1) Pre-phase began with a follow-up day at the outpatients to prepare and assess the participants (01 and 02), 2) Active-phase began on the day after the pre-phase throughout the behavioral management nursing program. Follow-up was conducted by the provider in the 6^{th} week at the individual's home and follow-up

phone calls were conducted on the 3rd and 9th weeks, and 3) Post-phase was done in the 12th week when the conclusion and summation of behavior change and outcome evaluation were carried out.

2.7 After 3 months, the researcher evaluated 03 and 04, both in the intervention and control groups by following the same processes as in the pre-phase (01 and 02).

Protection of human subjects

The research proposal, research instruments, and subjects consent form were submitted for review and approval to the ethical Review Committee for Research Involving Human Subjects and /or Use of The Animal in Research, Health Science Group Faculties, Colleges and Institutes, Faculty of Nursing, Chulalongkorn University, Thailand (Appendix) and the local setting at Bannamphrean hospital, Chacherngsao Province, Thailand.

Process of Informed Consent: Potential subjects for study participation, while in the a scheduled visit to the clinic (Out-patient clinic) will be asked to review the consent form and engage in informed consent process. To be eligible for study participation, individuals would need to express a willingness to be assigned to any intervention group and to participate all of the program in 12 weeks and follow-up activities of the group that they may be assigned by dial up in 3-week and 9-week, by the follow up at home in 6-week and must sign a study consent form

The written inform consent is obtained from each patient after a through and clear explanation of the purposes and procedures of the study (Appendix), as well as the patient's right to participate and freedom to withdrawal from the study at any time and

without affecting the medical and nursing care that they should received. The data of patients obtained were solely for use in this study, name of participants will be replaced by code numbers and the anonymity and confidentiality will be guaranteed.

Data Analysis

1. Descriptive statistics were used to describe general information including the frequency mean and percentages for demographic variables; descriptive statistics mean and standard deviations were summarized with the behavior in exercise scale, Thai version of Morisky Medication Adherence Scale (MMAS), Thai version Heart Healthy Eating Self-Efficacy (HHESE), and the Coronary Heart Disease Preventive Self-Efficacy Scale.

2. MANOVA was used to examine the differences of mean blood cholesterol (total cholesterol, LDL, HDL, triglyceride) within the control and intervention groups during pre-test and post-test.

3. MANOVA was used to examine the differences in blood cholesterol (total cholesterol, LDL, HDL, triglyceride) at post-test between control and intervention groups.

4. t-test was used to examine the differences in mean exercise behavior, drug adherence, low-cholesterol diet behavior, and self-efficacy within the control and intervention groups at pre-test and post-test.

CHAPTER IV

RESEARCH RESULTS

In this chapter, study findings is presented in three parts. The first part describes and compares demographic and clinical characteristics of participants in the intervention and control groups. The second part presents the result of study in lifestyle behavior. The last phase presents the findings that are related to the research objective.

PART 1: THE DEMOGRAPHIC AND CLINICAL CHARACTERISTICS OF THE PARTICIPANTS

Sixty-five participants met the criteria in this study, and sixty subjects that agreed to join. Five subjects (7.8%) were unable to join and follow through in this study. To make the presentation of the study results more clearly, designs of study is divided into two times-point (program entry and program complete) according to the data collection design.

There were 30 subjects in the intervention group and 30 subjects in the control group. During the study, one patient (3.33%) in the intervention group dropped out because he had severe chest pain and had to be readmition before completing the program. Two patients (6.66%) in the control group dropped out, one case (3.33%) was due to time conflicts with their works then couldn't follow in post-test and the other case (3.33%) were transferred to another province and couldn't participate in the post-test. These the drop out rates of 3.33%, 6.66% in the

intervention group and control group, respectively. Thus, the numbers of remaining patients in both groups were fifty-seven, 29 subjects in the intervention group and 28 subjects in the control group. Data were collected twice in both groups: the recruited date and 12th week after recruitment.

Demographic Characteristics of the Participants

1. Demographic characteristics of the participants regarding gender, age, marital status, occupation, education, religion, and family illness in CHD

Table 4.1 Demographic characteristics of the control group and the intervention groups

Characteristics	Intervention (29)		Control (28)		χ^2	df	p-value
	N	%	N	%			
Gender							
Male	16	55.2	17	60.7	.1	1	.79
Female	13	44.8	11	39.3			
Age							
Mean (SD)	59.2 (5.2)		59.7 (2.5)		.1	3	.51
45-49 years	1	3.4	-	-			
50 - – 54 years	13	44.8	13	44.8			
55 -- 59 years	10	34.5	12	41.4			
60 +	5	17.3	3	13.8			
Marital Status							
Single	1	3.4	-	-	2.4	2	.29
Married	26	89.7	23	82.1			
Widow/divorced/ separated	2	6.9	5	17.9			

Table 4.1 Demographic characteristics of the control group and the intervention groups

Characteristics	Intervention (29)		Control (28)		χ^2	df	p-value
	N	%	N	%			
Occupation							
Not work	6	20.6	9	32.1	2.4	2	.29
Stayed home and took care of children	15	51.4	11	39.2			
Labor and Farmer	8	28	8	28.7			
Education							
Elementary	3	10.3	3	10.7	.9	2	.61
Secondary	25	86.3	25	89.3			
Bachelor degree	1	3.4	-	-			
Religion							
Buddhistm	2	6.9	5	17.9	2.4	2	.29
Christian	1	3.4	-	-			
Muslim	26	89.7	23	82.1			
Family illness in CHD							
No	19	65.5	15	53.5	.8	1	.35
Yes	10	34.5	13	46.5			

From Table 4.1 revealed the demographic characteristics of the control group and the intervention group.

In the intervention group, the majority of the participants were as males (55.2%). Mean of age 59.2 years, the major of them between 50-54 years of age (44.8%), married (89.7%), House keeper and caring for a in child (51.4%). Eighty six point two percents were graduated from secondary school, was Muslim (89.7%), 65.5 %did not have a family illness in CHD.

In the control group, about two-thirds of the participants were males (60.7%). Mean of age 59.71 years, the major of them between 50-54 years of age (44.8%), married (82.1%), house keeper and caring for a child (39.2%). Eighty nine point two percents were graduated from a secondary school, was a Muslim (82.1%), 53.5% did not have a family illness in CHD.

Chi-square tests revealed no statistically significant difference between demographic characteristics of the control and the intervention group regarding gender, age, marital status, occupation, education, religion, and family illness in CHD. The two groups did not differ in demographic characteristics in ways that are likely to affect the study results.

2. Clinical characteristics of the intervention group and control group regarding diagnosis, vascular stenosis, Ejection Fraction (EF), treatment, number of present illnesses and medications taking daily.

Table 4.2 Clinical characteristic of the intervention group and the control group

Characteristics	Intervention (n=29)		Control (n=28)		χ^2	df	p-value
	n	%	n	%			
Diagnosis							
Single Vessel Disease*	7	24.2	10	35.7	11.3	3	0.05
Double Vessel Disease*	6	20.6	5	17.9			
Triple Vessel Disease*	11	37.9	9	32.1			
Left-main with any number of vessel disease	5	17.3	4	14.3			
Vascular Stenosis							
LAD	26	45.6	20	39.2	3.2	3	0.19
LCX	7	12.3	10	19.1			
RCA	19	33.3	17	33.3			
Left main	5	8.8	4	7.8			
Ejection Fraction (EF)							
<40	-		-		8.6	3	0.07
40-49	3	10.3	1	3.6			
50-59	14	48.3	14	50.0			
>60	12	41.4	13	46.4			
Treatment							
CABG	6	20.7	7	25.0	0.8	1	0.18
PTCA	23	79.3	21	75.0			
Number of Co-morbidity							
1-2	11	37.9	15	53.6	0.3	2	.17
3-4	15	51.7	12	42.8			
5+	3	10.4	1	3.6			

Table 4.2 Clinical characteristic of the intervention group and the control group

Characteristics	Intervention (n=29)		Control (n=28)		χ^2	df	p-value
	n	%	n	%			
Number of Medications Taking Daily							
1-2	2	6.8	2	7.3	0.2	3	.31
3-4	19	65.6	15	53.5			
5-6	7	24.2	7	25.0			
6+	1	3.4	4	14.2			

* Diagnosis vessel without left main

The majority of participants in the intervention group had a diagnosis of triple vessel disease in diagnosis (37.9%), vascular stenosis at LAD (45.6%), Ejection Fraction (EF) 50-59 (48.3%), PTCA (79.3%), Fifty two percent of participants had 3-4 in co-morbidity, and 65.6% had 3-4 numbers of medications taking daily. Like the control group, the majority of the participants had a diagnosis of single vessel Disease in diagnosis (35.7%), vascular stenosis at LAD (39.2%), Ejection Fraction (EF)50-59 (50%), PTCA (75%). Fifty four percent of the participants had 1-2 in co-morbidity, and 53.5 % had 3-4 numbers of medications taking daily (Table 4.2)

The similarities between the intervention and control groups in the demographic and clinical characteristics were compared. No significant difference was found between in the two groups by chi-square tests but the diagnosis was borderline significance (p-value=0.051). The most of the participants in co-morbidity both intervention and control group were hypertension (50%), diabetes (35%), and 15% in stroke, osteoarthritis, and peptic ulcer. The medications taken daily including:

anti-platelets, nitrates, beta-blockers, ACE inhibitors, calcium antagonists, and lipid-lowering drugs. 100% in Lipid lowering drug (Statin) that taking in participants.

PART 2: THE STUDY RESULTS IN LIFESTYLE BEHAVIOR

Descriptive data of the research result in lifestyle behavior in the intervention group and control group at program entry (pre-test) and program completion (post-test)

Table 4.3 Mean, standard deviation of lifestyle behaviors including: low-cholesterol diet, exercise behavior, drug adherence, and self-efficacy of subjects including diet and exercise between the intervention and the control groups at program entry by t-tests.

Variable	Total (n=57)		Control (n=28)		Intervention (n=29)		t	p-value
	Mean	SD	Mean	SD	Mean	SD		
Low-cholesterol diet behavior	48.85	5.6	47.03	6.77	50.43	6.39	1.21	.11
Exercise behavior	38.12	14.24	37.10	10.49	29.68	12.53	-5.67	.21
Drug adherence	6.73	1.36	6.80	1.42	6.53	1.36	-1.14	.17
Diet	38.87	10.66	42.00	9.04	38.42	10.76	0.31	.37
Exercise	30.45	10.56	32.00	8.31	38.66	10.73	0.44	.33

The data on lifestyle behavior and self-efficacy were compared at before participant of program between intervention and control group by t-test value. There were no significantly difference between the mean score of the intervention and control group (Table 4.3)

Table 4.4 Mean, standard deviation of lifestyle behaviors : low-cholesterol diet behavior, exercise behavior, drug adherence, and self-efficacy of subjects in the intervention and the control groups at program entry (pre-test) and program completion (post-test) by paired t-tests.

Variables	Pre-test		Post-test		Paired t-test	p-value
	Mean	SD	Mean	SD		
Lifestyle behavior						
Low-cholesterol diet behavior						
Intervention(n=29)	50.43	6.39	49.03	7.51	0.45	.65
Control(n=28)	47.03	6.77	47.78	5.54	0.44	.65
Exercise behavior						
Intervention(n=29)	29.68	12.53	37.20	8.31	3.67	.00
Control(n=28)	37.10	10.49	35.40	10.46	3.39	.10
Drug adherence						
Intervention(n=29)	6.53	1.36	7.27	.74	2.64	.01
Control(n=28)	6.80	1.42	6.94	1.34	0.62	.54
Self-efficacy						
Diet						
Intervention(n=29)	38.42	10.76	42.00	9.04	3.04	.00
Control(n=28)	38.66	10.73	32.00	8.31	0.82	.41

Table 4.4 Mean, standard deviation of lifestyle behaviors : low-cholesterol diet behavior, exercise behavior, drug adherence, and self-efficacy of subjects in the intervention and the control groups at program entry (pre-test) and program completion (post-test) by paired t-tests.

Variables	Pre-test		Post-test		Paired t-test	p-value
	Mean	SD	Mean	SD		
Exercise						
Intervention(n=29)	31.06	11.94	49.03	12.16	3.25	.00
Control(n=28)	38.86	9.21	31.10	11.51	1.43	.16

The paired t-test was performed to compare the difference in the mean scores for Low-cholesterol diet behavior, Exercise behavior, Drug adherence, and Self-Efficacy in diet and exercise within each group at program entry (pre-test) and program completely (post-test) (Table 4.4). There was a significant difference for the intervention group in the mean scores of Exercise behavior (p = 0.00), Drug adherence (p = 0.01), and Self-Efficacy in diet and exercise (p = 0.00 and 0.00, respectively) but Low-cholesterol diet behavior not significantly. For the control group, not a significant difference in lifestyle behavior and self-efficacy

PART 3: THE STUDY RESULTS RELATED TO RESEARCH OBJECTIVE

Descriptive data of the research result in total cholesterol, LDL, HDL, and triglyceride in the intervention group and control group at program entry (pre-test) and program completion (post-test) and net change values (Post test - Pre test) (Table 4.5).

Net change means scores of total cholesterol in intervention group (mean = -3.48, SD = 43.40) was negative decrease but in control group was positive increase

(mean = 17.03, SD = 46.19), LDL-cholesterol (mean = -17.3, SD = 6.35) in the intervention group negative decrease more than control group (mean= -12.25, SD = 6.47). HDL-cholesterol positive increase (mean = 6.42, SD = 3.05) in intervention group but negative decrease (mean = -1.31, SD = 13.15) in control group. Triglyceride were positive increase both in intervention (mean = 29.92, SD = 27.44) and control group (mean = 64.93, SD = 107.74) (Table 4.5)

Table 4.5 Mean, standard deviation of the difference in total cholesterol, LDL, HDL, and triglyceride in the intervention group and the control group at program entry (Pre-test) and program completion (Post-test) and the net change (Post test- Pre test)

Variables	Pre-test		Post-test		Net change (Post -Pre test)	
	Mean	SD	Mean	SD	Mean	SD
Total cholesterol						
Intervention(n=29)	204.71	41.035	187.67	41.43	-3.48	43.40
Control(n=28)	198.24	53.30	201.72	44.57	17.03	46.19
LDL-cholesterol						
Intervention (n=29)	108.30	39.24	94.46	39.19	-17.31	6.35
Control(n=28)	116.57	31.59	104.32	30.91	-12.25	6.47
HDL-cholesterol						
Intervention (n=29)	43.85	17.34	50.28	8.64	6.42	3.05
Control(n=28)	43.10	13.82	41.79	7.31	-1.31	13.15
Triglyceride						
Intervention (n=29)	167.89	117.77	197.82	85.38	29.92	27.44
Control(n=28)	252.26	179.44	305.60	151.22	64.93	107.74

Table 4.6 Cholesterol blood level and category in the intervention and the control group at program entry (pre-test) and program complete (post-test)

Variables	Cholesterol blood level (Pre-test)		Cholesterol blood level (Post-test)	
	Mean(mg/dl)	**Category**	**Mean(mg/dl)**	**Category**
Total cholesterol				
Intervention(n=29)	204.71	Borderline high	187.67	*Desirable*
Control(n=28)	198.24	Desirable	201.72	Borderline high
LDL-cholesterol				
Intervention (n=29)	108.30	Above optimal	94.46	*Optimal*
Control(n=28)	116.57	Above optimal	104.32	Above optimal
HDL-cholesterol				
Intervention (n=29)	43.85	Medium	50.28	Medium
Control(n=28)	43.10	Medium	41.79	Medium
Triglyceride				
Intervention (n=29)	167.89	Borderline high	197.82	Borderline high
Control (n=28)	252.26	High	305.60	High

Mean score of total cholesterol, LDL-cholesterol in the intervention group were decrease and HDL-cholesterol was increase when compare between the program entry (pre-test) and program complete (post-test) or the better in category after program complete. Triglyceride, mean score was slightly increase in borderline high. But mean score of total cholesterol, LDL-cholesterol, HDL-cholesterol in the control group were not difference when compare between program entry (pre-test) and program complete (post-test). Triglyceride, mean score was increase so much in high category.

Table 4.7 Comparison of the total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglyceride between the intervention and the control groups at program entry (pre-test)

Variable	Hotelling's Trace	Multivariate F-test	p-value
Program entry(Pre-test)	0.23	0.98	0.44

The result show that the baseline values were examined between the intervention and the control groups at program entry (pre-test) were not significant different (F=0.98, P= .44) but the results in program complete (post-test) were significantly different (F=4.2, P< .05) as demonstrated by MANOVA (Table A in Appendix D)

The results related to research objectives as follows:

1. To compare total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglyceride in patients with coronary revascularization who participated in the behavioral management nursing program before and after the intervention.

Table 4.8 Comparisons of total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglyceride in the intervention group at program entry (pre-test) and program completely (post-test)

Multivariate Tests (C)

Variable	Hotelling's Trace	Multivariate F-test	p-value
Intervention group	0.81	2.44	0.04

Tests of Between –Subjects Effects

Variables	Sum of Squares	df	Mean Squares	Multivariate F-test	p-value
Total cholesterol	1490.2	1	1490.2	3.5	.04
LDL- cholesterol	6945.9	1	6945.9	5.1	.02
HDL-cholesterol	149.7	1	149.7	4.1	.04
Triglyceride	89857.5	1	89857.5	3.6	.06

The results show the comparisons between the mean scores for total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglyceride within the

intervention group at program entry (pre-test) and program completion (post-test) (Table 4.7).

There was a significant difference for the intervention group (F=2.44, P< .05) by Hotelling's Trace. Tests between variables show significant differences in total cholesterol (F=3.5, P<.05), LDL- cholesterol (F=5.1, P<.05), and HDL-cholesterol (F=4.17, P<.05). Triglyceride was not significantly differences (F=3.6, P=.06). However, when compared in the control group, the result show that not significantly in total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglyceride (Table B in Appendix A)

2. To compare total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglyceride before and after the intervention in order to show that the net change from the intervention group are more than those of the control group.

Table 4.9 Comparisons of differences in before and after the intervention (net change) in total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglyceride between the intervention and the control groups

Multivariate Tests (C)

Variable	Hotelling's Trace	Multivariate F-test	p-value
Net change	0.26	2.80	0.03

Tests of Between-Subjects Effects

Net change in Variables	Sum of Squares	df	Mean Squares	Multivariate F-test	p-value
Total cholesterol	8903.4	1	8903.4	4.2	.04
LDL- cholesterol	13335.2	1	13335.2	10.4	.00
HDL-cholesterol	93.7	1	93.7	4.3	.04
Triglyceride	9350.4	1	9350.4	.4	.51

After receiving the behavioral management program, there was a significant difference between the net change when the intervention and control groups were compared (F=2.80, P<.O5), as shown by multivariate analysis. Tests between variables show that the differences between before and after program (net change) in the intervention group were significantly more than that the control groups for total cholesterol (F=4.2, P< .05), LDL- cholesterol (F=10.4, P< .05) , and HDL-cholesterol (F=4.30, P< .05). Triglyceride was not significantly different between the intervention and control group (F=.4, P=.51) (Table 4.8).

Summary

The data of 57 subjects in this study were analyzed by MANOVO test to test the hypothesis; The demographice and clinical characteristics of the participants both in the intervention and the control groups were not significantly different in the program entry (pre-test). The results show that before beginning the behavioral management nursing program, participants in both the intervention and the control

groups were not different in total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglyceride. After the patients with coronary revascularization who participate in the behavioral management program were significantly different for the intervention group in total cholesterol (F=3.5, P<.05), LDL-cholesterol (F=5.1, P<.05), and HDL-cholesterol (F=4.1, P<.05). Triglyceride was not significantly (F=3.6, P=.o6). These the results were responded in the first research objectives.

After receiving the behavioral management program, net change scores of total cholesterol, LDL-cholesterol ,and HDL-cholesterol in the intervention group was significantly more than that in control group (F=4.2, p<.05, F=-10.4, p<.05, and F=4.3, p<.05), respectively) but triglyceride was not significantly more than that in control group (F=.4, P=.51). It could be concluded that the behavioral management program had effects on blood cholesterol by lowering in total cholesterol, LDL-cholesterol and increasing in HDL-cholesterol but had not affection to triglyceride in patients with coronary revascularization. These results were answering the second study hypothesis.

In addition, the results show that lifestyle behavior who participated in the behavioral management program at program entry (pre-test) and program completion (post-test) were significantly different regarding to the exercise behavior, drug adherence, self-efficacy diet, and self-efficacy exercise but there was not significantly differences to low cholesterol diet behavior. On the other hand, the control group were not significantly differences in lifestyle behavior and self-efficacy (Table 4.4).

CHAPTER V

DISCUSSION

This document presents a summary and discussion of a study which explores the effects the behavioral management nursing program had on blood cholesterol in patients with coronary revascularization. Therefore, theoretical aspects of a behavioral management program, implications for nursing practices and education, health policies, as well as limitations and recommendations for further research are also considered and described.

Summary of the study

Research Design

A quasi-experimental study design is represented in this study. Purposive sampling was used to select a primary care setting within a community hospital; a 60 bed hospital located in rural, Thailand, and established by the Ministry of Public Health was used. Specifically, there were two-groups, one in the intervention and a control; a pre-test/post-test design was used in this study (Polit and Beck, 2004).

Research Objectives

1. To compare total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglyceride in patients with coronary revascularization who participated in the behavioral management program before and after the intervention.

2. To compare total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglyceride before and after the intervention in order to show that the net change from the intervention group are more than those of the control group.

Research Hypotheses

1. Patients with coronary revascularization who participate in the behavioral management program will have significant differences in total cholesterol, LDL, HDL, and triglyceride before and after the intervention.

2. Patients with coronary revascularization who participate in the behavioral management program will have differences in total cholesterol, LDL- cholesterol, HDL- cholesterol, and triglyceride before and after; the net change will be significantly more than the control group.

Population and sample

Population were participants having had percutaneous coronary intervention (PCI) or patients which had already had coronary artery bypass graft surgery (CABG) who were also receiving medication for the treatment of dyslipidemia. Sample were adult participants having had percutaneous coronary intervention (PCI), or patients that already had coronary artery bypass graft surgery (CABG) more than three months ago as mean that they were in phase III in Cardiac Rehabilitation Program (ASCM, 2010) and are presently having treatment for dislipsidemia. They must be willing to participate in the study and meet the inclusion criteria.

Sample size

The sample size of this study was divided into two groups: the total sample size in this study was 60 participants that determined based on power analysis using a large effect size (Cohen, 1992). On program completion, the number of patients in

both groups total 57: 29 subjects in the intervention and 28 subjects in the control group. Total dropout in this study was 3 subjects because they had severe chest pain and had to re-admition before completing this program.

Sampling procedures

The procedure sampling started two days before the scheduled follow-ups in the cardiovascular outpatient clinic at Bangnamprieo Hospital, Chachoengsao, Thailand. Participants were screened by the principal investigator according to the study's inclusion criteria and none of the exclusion criteria. After the list was obtained, potential subjects' appointments were confirmed by phone and taken as random assignment by sample random samplings into the control and experimental groups.

Instrumentation

Four types of instruments adopted in this study are as follows: 1) The general information questionnaire and clinical profile, 2) The Intervention research instruments which consisted of The behavioral management program (Pre-phase, Active-phase, and Post-phase) and the education media, 3) Monitoring research instrument for assessing lifestyle behavior, and 4) Evaluation research instrument (pre-test and post-test) to measures associated with dyslipidemia including total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglyceride.

All of the instruments would be to test for content validity index (CVI) by 8 experts (2 specialists in adults nursing and heart disease, 1 specialist in cardiologist, 2 specialist in practical nurse and community-care in heart disease, 1 specialist in self-efficacy theory, 1 specialist in nutrition, 1 physiotherapy professional). Researcher was modified by suggestion of experts and then pilot test with a group of 10

participants for understanding in wording and meaning of sentence (Flaherty., et al, 1988).

Data collection

Data collection was conducted after obtaining permission and following a process protecting the human subjects. The process of data collection was as follows: the participants in intervention group were then orientated for health assessment, health education, counseling prevention, health behavior skills in exercise, and home visits as well as health care services. This program included 3 phases: 1) Pre-phase began with a follow-up day at the out-patients to prepare and assess the participants (01 and 02), 2) Active-phase began on the day after the pre-phase throughout the behavioral management program. Follow-up was conducted by the provider on the 6^{th} week at the individual's home and follow up phone calls were conducted on the 3^{rd} and 9^{th} weeks, and 3) Post-phase was done in the 12^{th} week when the conclusion and summation of behavior change and outcome evaluation were carried out. After 3 months, the researcher evaluated 03 and 04, both in the intervention and control groups by following the same processes as in the pre-phase (01 and 02).

Data Analysis

1. Descriptive statistics were conducted to describe general information including the frequency mean and percentages for demographic variables; descriptive statistics mean and standard deviations were summarized with the behavior in exercise scale, Thai version of Morisky Medication Adherence Scale (MMAS), Thai version Heart Healthy Eating Self-Efficacy(HHESE), and the Coronary Heart Disease Preventive Self-Efficacy Scale.

2. MANOVA was used to examine the differences of mean blood cholesterol (total cholesterol, LDL, HDL, triglyceride) within the control and intervention groups during pre-test and post-test.

3. MANOVA was conducted to examine the differences in blood cholesterol (total cholesterol, LDL, HDL, triglyceride) at net-change between control and intervention groups.

4. T-test was conducted to examine the differences in mean exercise behavior, drug adherence, low-cholesterol diet behavior, and self-efficacy within the control and intervention groups at pre-test and post-test.

Result of the study

1. The patients with coronary revascularization who participated in the behavioral management program had a significant difference in mean scores for total cholesterol, LDL-cholesterol, and HDL-cholesterol ($p < .o5$), but triglyceride slightly increased in post- test though not significantly ($p = .06$)

2. The patients with coronary revascularization who participated in the behavioral management program had different total cholesterol, LDL cholesterol and triglyceride before and after the intervention. Net change of total cholesterol, LDL-cholesterol, and HDL- cholesterol ($p < .05$) were more than that in the control group, but triglyceride was not significantly different ($p = .51$).

This part presents a discussion of the research findings. It presents characteristics of the participants, elaborates the effects of the management program on blood cholesterol of patients with revascularization, discusses the theoretical aspects, and, finally, considers methodological issues.

Discussion of the study

The demographic and clinical characteristics of the participants

Participants in this study both in the intervention and control groups are similar in demographic and clinical characteristics in the majority of participants. Moreover, these characteristics were likely in the most of Thai patients with coronary heart disease including mean age of 59.5 ± 17.7 years and 48.56% were male, and education in secondary and elementary level (Ministry of Public Health, 2007). In term of clinical characteristics, it has been found that patients with cardiovascular were classified as ST elevation myocardial infarction (STEMI) (40.9%), non- ST elevation myocardial infarction (NSTEMI) (37.9%), and unstable angina (UA) (21.2%) (Srimahachota et al., 2007).

A chi-square test revealed no statistically significant differences between the control and intervention groups regarding gender, age, marital status, education, occupation, diagnosis, vascular stenosis, Ejection Fraction (EF), treatment, number of illnesses, and number of medications taking daily. The participants in this study, both PCI and CABG, passed these treatment more than three months which meant that they were recovery in phase III of Cardiac Rehabilitation Program for maintenance-lifelong, community facility at home (ASCM, 2010). In addition, participants were random assignment into groups, thus, it could be assumed both groups were of similar demographic and clinical characteristics.

The advantage research result found in this study was most of population more than 80% were Muslim. Although there was not clearly correlation study between religion with patient with heart disease, some behavior or activities in Muslim group (Ramadan) had effected to risk behavior. One involved in health behaviors and

plasma lipid levels in the month of Ramadan; the findings revealed eating behaviors before fasting and during fasting in the month of Ramadan were suitable. The sample decreased or limited in their exercise during Ramadan because they had more religious practices during the fasting than before the month of Ramadan. Cholesterol, triglyceride, and low-density lipoprotein cholesterol (LDL-C) showed no significant differences but high-density lipoprotein cholesterol (HDL-C) was significantly different between before and during the fasting ($p < .05$) (Sang-Gassanee, 2000)

The effects of the management program on blood cholesterol

The results responded to the research objectives as follows:

Objectives: 1) To compare total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglyceride in patients with coronary revascularization who participated in the behavioral management program before and after the intervention

To respond to this objective, based on the baseline blood cholesterol, lifestyle behavior, and self-efficacy both in diet and exercise (pre-test) were not significant in both groups. However, the difference in the mean score for total cholesterol, LDL-cholesterol, HDL-cholesterol except triglyceride in post-test was significant in the intervention group. It should have been mainly affected by behavioral management program.

Objective: 2) To compare total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglyceride before and after the intervention in order to show that the net change from the intervention group are more than those of the control group

To respond to objectives 2, net change of total cholesterol, LDL-cholesterol, and HDL-cholesterol before and after the intervention were more than that of the control group but triglyceride was not significantly different.

In addition, this result shows that there was no significant difference regarding the demographic and clinical characteristics, blood cholesterol, lifestyle behavior, and self-efficacy in program entry (pre-test). Therefore, the results in this study when program complete (post-test) could be explained that net change in blood cholesterol were resulted from the behavioral management program and were not affected by other variables.

There were several elements of program that could have contributed to blood cholesterol: 1) a low cholesterol diet, 2) exercise, 3) lipid-lowering drugs, and 4) improvements in perceived self-efficacy (which is discussed in the part of the theoretical aspects).

Health education in this program was a successful concept leading to lifestyle changes and maintaining behavior because it increased knowledge of disease, risk factors, modification to good behavior; it also increased self-efficacy and empowerment which enhanced motivation for lifestyle changes and possibility to control blood cholesterol with reduction of total cholesterol, LDL-cholesterol and increase in HDL-cholesterol level after completion of the program (Cantley, Parker, Knight, and Perdomo, 2003; Park, 2006).

The influence of a low cholesterol diet on blood cholesterol could be explained by the substitution of carbohydrates and/or unsaturated fatty acids for saturated and trans fatty acids resulting in a reduction of LDL cholesterol (Mensink, Zock, Kester et al., 2003). On average, an increase of 100 mg/d of dietary cholesterol

increased total serum cholesterol by about 2-3 mg/dl, of which approximately 70% was in the LDL fraction. Dietary carbohydrate induced increase in plasma triglyceride which was often accompanied by decrease in HDL cholesterol and increase in levels of small and dense LDL particles with total LDL cholesterol levels that were generally average. This is commonly found in metabolic syndrome or diabetes (Krauss et al., 2OO1). In addition, the relationship of blood cholesterol could be calculated using the LDL equation, following LDL-C= TC-HDL-C-CTG/5 (Friedewald et al., 1972).

However, there were several studies that recommended and shared similar results in blood cholesterol changes to this study (Allen et al., 2002; Senaratne et al., 2001; Vale et al., 2003; Carlson, Johnson, Franklin, & Vanderlaan, 2000). The intervention group for management in modified fat, fruit and vegetables enriched diets on blood lipids in the Indian Diet Heart Study in CHD for 12 weeks; the result showed that there were significant reductions in total cholesterol and LDL cholesterol, and triglyceride ($p<0.001$)(Singh et al., 1992). The same studies of intensive dietary counseling (to more closely follow the NCEP Step II diet) lowered LDL cholesterol during the recruitment phase of a 5-year clinical trial in post CABG patients. The treatment group had a 10.7% decrease in total cholesterol and a 12.4% decrease in LDL cholesterol.

On the contrary, Maureen et al. (2002) to evaluate the effectiveness of nutritional education in an outpatient cardiac rehabilitation program based on a self-efficacy theory with duration of 12 weeks for follow-up calls. The results reported that the treatment group had greater improvement in diets and received scores on the Diet Habit Survey and mean score of cardiac diet self-efficacy more than the usual

group. Although the cholesterol-saturated fat index and percent of energy from carbohydrate were not significant in both groups, the values of the treatment group decreased more than the usual group's. The study in coronary risk factor modification in CHD patients after program exit of 3 to 4 months (Levie and Milani, 2004) showed unsignificant reduction in lipid profile at 2%, 1%, 3% in TC, TG, and LDL; this was the same as the studies of Nikolsky et al. (2005) showing that blood lipid in the intervention group after having received the program remained unchanged except for TG. The studies of Xiaolian, Janet, and Thomas (2006) showed significance in lipid profile except HDL-C; the studies of Yu-Poth, Zhao, Etherton., et al. (1999) reported that LDL and HDL were significant but not TC and TG.

Following the results of this study, it has been found that the participants in behavioral management program had significant decrease in LDL-cholesterol and total cholesterol. Triglyceride was not significantly different but the serum level slightly increased more than at program entry. HDL-cholesterol significantly increased. In the same way, net change of total cholesterol, LDL-cholesterol, and HDL-cholesterol before and after the intervention were more than that of the control group but triglyceride was not significantly different. When considering in low-cholesterol diet behavior, it has been found not significant in both groups at program entry and exit (pre-post test). In addition, the culture and environment had affected diet-lifestyle behavior and blood cholesterol (discussed in the section of the effects on lifestyle behavior). Thus, low-diet cholesterol behavior is unlikely to be the major cause for control of blood cholesterol and should consider other behaviors.

The benefits of physical activity or exercise on blood cholesterol are recommended by several points: increased HDL cholesterol, reduced LDL cholesterol and triglyceride (Hambrecht et al., 2004; Thomson et al., 2003; Wannamethe et al., 2002; Leon and Sanchez, 2001). The effect of aerobic exercise on blood lipids is of a modest increase in HDL-c from 2 to 3 mg/dl, or about 4% to 5%, associated with an increase in apo A-1 and an increase in LPL activity, a decrease in LDL-c, triglyceride, and total cholesterol (Kodama, et al., 2007; Durstine, Grandjean, Cox and Thompson, 2002; Leon, et al., 2005; Piperidon and Bliss, 2005).

A meta-analysis of 52 exercise training trials over a 12 week duration with 4,700 subjects participating demonstrated an average 4.6% increase in HDL cholesterol and reduction in triglyceride and LDL cholesterol by 3.7% and 5.0%, respectively (Leon & Sanchez, 2001). The Health, Risk Factors, Exercise Training and Genetics (HERITAGE) study including 675 normal lipidemia subjects who participated in 5 months of exercise training (Leon et al., 2000) also had similarly increased HDL cholesterol, and decreased both LDL cholesterol and triglyceride. However the result could not identify the studies that have addressed the effect of exercise in subjects with dyslipidemia.

Durstine, Grandjean, Cox and Thompson (2002), meta-analysis on the effect of exercise training on blood cholesterol suggested that the changing of lipoprotein not occur below a threshold of brisk walking or jogging 15 to 20 miles per week or running 8 miles per week. Wood,et al.(1991). Results of this study showed significant differences in the net change of TG, TC, and LDL, but not responding in HDL. As far as the study in programme of rehabilitation to improvements in physiological risk parameters was concerned, the intervention was significant in TC, TG, and LDL but

not significant in HDL (Xiaolian, Janet and Thomas, 2007). Similarly, the results in this study showed that the intervention's effects were lower total cholesterol and LDL-cholesterol, increased HDL-cholesterol, but maintained triglyceride. Although this intervention tried to complete an exercise program and the results showed significance in exercise behavioral, which meant HDL-cholesterol and triglyceride should have been affected, the increase was seen only in HDL-cholesterol. When considering lipid abnormality and associated mechanisms, obesity, smoking, insulin resistance, alcohol intake, diet intake etc. (NCEP, 2001) affected this result. In addition, aging and co-morbidity meant the participants could not have success on the program, the culture and environment that limited physical activity was the advantageous point that could be concerned (which is discussed in the section on effects on lifestyle behavior). Thus, considering in other behavior or related factors should be the best term and adopted in the lipid improvement.

Most evidence supports the use of lipid modifying therapy to reduce the risk of CVD, by reducing LDL-C (Nilsson, Klasson, and Nyber, 2001). Drug therapy is indicated later that it could control lipid level (LDL-C< 100 md/dl) by Therapeutic Lifestyle Change (TLC) (NECP, 2001). Despite the fact, several studies showed improvement in TG, TC, and LDL lipids by using drug management besides lifestyle intervention (Allen et al., 2002; Senaratne et al., 2001; Carlson, Johnson, Franklin, & Vanderlan, 2000; Xiaolian, Janet and Thomas, 2006). The effects of their study should be more related to progressive titration in lowering drug-lipid in addition to improve lifestyle behavior. However, the effectiveness of drug therapy could be affected by taking medication then the concept of medical adherence should be

suggested or recommended in the intervention (which is discussed in the part on the effects on lifestyle behavior).

Summary

However, from the results above and supported by a lot of literature, the effectiveness to improve blood cholesterol could be manipulated in various dimensions such as dietary modification, exercise training, and medication management. The reason is that differences in lipid abnormalities and associated mechanisms such as elevated total cholesterol and LDL- cholesterol related to high dietary intake of saturated fats and cholesterol; elevated Triglyceride related to obesity, physical inactivity, insulin resistance, glucose intolerance, and excessive alcohol intake; low HDL effected by cigarette smoking, physical inactivity, insulin resistance, elevated triglyceride, being overweight and obesity, very high carbohydrate (CHO) by intake (>60% total calories) , certain drugs (B-blockers, anabolic steroids, progestational agents) (National Cholesterol Education Program ; NCEP, 2001). Thus, a management program improving blood cholesterol could be adjusted in various dimensions and adjustments to the lifestyles of participants.

The theoretical aspects of the management program

The management program was proved and applied via the guidelines of The National Cholesterol Education Program (NCEP) Adult Treatment Panel III and using a self-efficacy theory (Bandura, 1977, 1982), and considerations for the primary setting in Thailand. The goal of the program was to reduce total blood cholesterol, LDL cholesterol, triglyceride, and increase HDL cholesterol levels by developing perceptions in self-efficacy which was believed the core concepts to improve

behavior. The construction of this program concerned four sources of self-efficacy and using self-regulatory for motivational processes to modify and maintain behavior. However, there was a need for participants in CAD to adopt this program for a complete change of lifestyle (Wang, 1994; Bijlani et al., 2005; Taylor, 2003). Although this result was not significant in all variables in blood cholesterol because there were other factors that affected blood cholesterol (which is discussed in the part on the effects on blood cholesterol and lifestyle behavior). Other points that affected change, maintaining behavior, and improved in blood cholesterol were the processes to increase perceived self-efficacy.

Perceived self-efficacy of patients with revascularization

Perceived self-efficacy in a person means their belief in the capability to produce designated levels of performance and control over their own functions and over events that affect their lives (Bandura, 1977). High self-efficacy helps increase feelings of serenity in approaching difficult tasks and activities; low self-efficacy may lead to the belief that things are tougher than they really are. Such belief brings anxiety, stress, depression, and a narrow vision looking at problem solving.

The results show that the mean score on perceived self-efficacy at pretest for both intervention and control groups were not significant. However, the mean score of patients with revascularization after participating in the program improved with significant changes in perceived self-efficacy in both diet and exercise ($p<.05$). Meanwhile, the values of the control group decreased with significant negative results ($p<.05$). Thus, the management program affected perceived self-efficacy in terms of a positive score significantly when compared with the control group. Many studies have

demonstrated that increasing self-efficacy could change and maintain positive behavioral (Burke et al., 2005; Sol et al., 2005; Dehdari et al., 2008; Song et al., 2000; McKenna, Higgins and Hayes, 1995; Allen, 2002; Berna et al., 2005; Hiransai, 2007).

The important strategies in the management program for achieving competence were the goal settings, health education, social support, self-monitoring, and self-reinforcing as follows:

Goal setting is central to the self-regulation process and is a skill that tries to challenge the human to practice or do some activities for success in the purpose. It's a skill that helps humans in the attention processes for success in changing behavior (Bandura, 1997). There are some studies that supported goal setting saying it helped decrease risk behavior and blood cholesterol (Burke et al., 2005; Resnick et al., 2009).

Health education: improving participants' knowledge of lifestyle behavior (lowering cholesterol, diet, exercise skills, and medical adherence) for the basic needs of patients with cardiovascular disease (Bijlani et al., 2005; Taylor, 2003). In terms of health behavior, the prior goal of health education is the need to increase perceived self-efficacy for management of risk behavior (low-diet cholesterol, exercise behavior, and drug adherence) that is effective for the control of blood cholesterol levels including total cholesterol, triglyceride, LDL-cholesterol, and HDL-cholesterol.

Social support: this is associated with how networking helps people cope with stressful events. Besides, it can enhance psychological well-being (Glanz et al., 2002). In addition, social support is the driver for motivation processes of participants to match patterns (Bandura, 1997). There were some studies that reported PCI patients with high levels of perceived social support had significantly less psychological stress and uncertainty than patients with low social support.

Self-monitoring: this is the process that engages individuals in systematically observing his or her own behavior and the circumstances surrounding or prompting behavior. In addition, self-monitoring is the driver tool for motivational processes that promotes self-efficacy (Bandura, 1997). Participants will need to record in daily logs their day-to-day activities related to their specific goals; this includes the diet of each meal, the type and duration of exercise, and medication adherence. Participants can then use these recordings to do self-evaluation, such as comparison of exercise performances to the pre-set goal. There were some studies that adopted the process of self-monitoring in the intervention for change and maintained behavior of patients with coronary heart disease (Sol., et al, 2005; Burke, et al, 2005).

Self-reinforcement: this refers to a type of motivation process (Bandura, 1997) contingent on self-reward; it consists of positive statements regarding goal achievements. Diary reading will assist patients in developing positive statements in an effort to achieve behavior change and reassurance; also it re-enforces that patients and their caregivers are key to a change in lifestyle, Sol et al. (2005) and Burke.et al (2005), the same in the studies that adopted the process of self-reinforcement in the intervention for change and maintaining behavior.

These strategies were essential to increase perceived self-efficacy that could positively help in the management of lifestyle behavior including low-diet cholesterol, exercise behavior, and drug adherence. The final outcome was the fact that the participants could have control of blood cholesterol. Although the results in this study were not significant in low-diet cholesterol, and triglyceride levels, the mean score of these in the intervention group were improved when compared with the control group.

Thus, other factors that related to behavior such as outcome expectation should be considered and added in the study.

The effects of the management program on lifestyle behavior

Positive lifestyle behavior was the main factor that improved blood cholesterol and protection in cardiac events. Lifestyle behavior that responded to this outcome in this study included:

Low cholesterol dietary behavior was an important behavior that related to blood cholesterol levels; the baseline low cholesterol diet behavior of both groups was not different and not significant. At the end of the program after three months, the intervention and control groups were not significantly different and not when compared in the program entry. Although this result showed that low cholesterol dietary behavior was not changed after the success of this program, it did not mean that the behavioral management nursing program was not effective to dietary behavioral because there were many factors that related to self-efficacy such as environment, cultural context, habit in dietary behavior, and demographics (Rockwell and Riegel, 2001; Friedman, 2003) However, several studies supported the intervention group in a way that increased efficacy could change and maintain positive lifestyle behavioral (Song et al., 2000; Higgins, Hayes, and McKenna, 2001; Allen, 2002; Berna, et al., 2005; Burkeet al, 2005; Hiransai, 2007). Moreover, studies of Wang, (1994) and Xie, Zhang, and Chen (2002) found that patients with CHD who received health education programs demonstrated a significantly better improvement in food habits than in a control group and maintained effects for 6 months.

When giving deep consideration to Thai patients, primary care setting found that there were three factors that related to diet behavior and were specific in this setting. Firstly, most of Thai patients in a primary care setting tended to be submissive; they respected and believed in health care providers and took their advice seriously. Secondly, most of the population in this setting were Muslim (70%) and had the month of Ramadan (October-November) during phase three of this study. The festival culture during the month of Ramadan means the activities and daily lives of participants would change from normal patterns to affect behavior, such as in diet behavior that using palm oil for cooking (high cholesterol), exercise behavior, and belief in religion. Thirdly, Chachoengsao province is an area rich in seafood with high cholesterol. It is very hard to avoid those foods, and it is the habit of local people to eat fresh and dried seafood; the participants in this study could not change to a low cholesterol diet. Future health care providers should be concerned with all of factors and may consider specific intervention for changes to a low cholesterol diet.

Exercise behavior; the mean score in exercise behavior of both groups were not different and not significant at the program entry. At the program exit after three months, the intervention group's mean score increased and was significant, but the control group's was not different and not significant when compared with the program entry. Reasons for effectiveness and success were the behavioral management program including goal setting, health education, social support, self-monitoring, and self-reinforcement for positive behaviour. In addition, the processes for following up using the telephone, home health care, and booklets were helpful in monitoring and motivating participants in the intervention group to change behavior and maintain

their exercise behavior. This was the same in many studies that supported exercise programs (Kodama, Tanaka, Saito et al., 2007; Durstine, Grandjean, Cox, and Thompson, 2002; Leon, Franklin, Costa et al., 2005; Piperidon and Bliss, 2005; Leon and Sanchez, 2001).

Wu et al. (2003) reported that patients who had undergone an exercise training program with regular telephone calls and follow-ups at home demonstrated a significantly higher adherence in the rate of exercise, a lot more than the control group, Gilliss et al. (1993) by applying the program with physical exercise and telephone follow-ups in patients with cardiac surgery, the results showed that the intervention group had higher walking scores which were significant as assessed by Jenkin's walking checklist. Taylor et al. (2004) reported in meta-analysis based on a review of exercise-based rehabilitation with usual medical care. The results showed that the mortality rates did not differ between programs limited to exercise and those providing more comprehensive secondary interventions; trends were noted for a lower incidence of nonfatal myocardial infraction and revascularization in cardiac patients who received exercise-based rehabilitation, but were not significant statistically. The health risk factors, exercise training, and genetics (HERITAGE) study, included 675 normal lipidemia subjects who participated in 5 months of exercise training (Leon et al., 2000) also had similarly increased HDL cholesterol, and decreased LDL cholesterol and triglyceride. However, the result could not identify the studies that have addressed the effect of exercise in subjects with dyslipidemia.

There are other factors that affected exercise behavior including demographics, environment, and cultural context (Rockwell and Riegel, 2001;

Friedman, 2003). In Thailand's national health policy has planned to motivate physical activity with a target of 60 % of people to have 30 minutes of moderate physical activity 3-5 days per week in general population (National Health Policy Committee, 2001). Many projects were implemented to promote exercise; thus it is the motivating drive for patients to change exercise behavior and maintain it in the long term. However, the severity of symptoms such as chest pain, dizziness, aggressive treatment in CABG, PCI are important points that obstruct patients from changing to a positive behavior because of their suffering physically and psychologically.

Drug adherence was a behavior that affected control of blood cholesterol levels. From this study the baseline medication of both groups in medium adherence (6<MMAS<8) was not significant. At the program exit after three months, the intervention group's drug adherence significantly increased, more than at program entry, but the control group's was not different and not significant. Repeated exposure to the behavioral management program included goal setting, health education, social support, self-monitoring, and self-reinforcement for positive behaviour. Moreover, using telephone contact and home care follow-up maintained behavior. It was worth mentioning that some participants in the intervention group tended to demonstrate non-adherence such as medication sometimes forgotten, medications missed in the last two weeks, medication stopped when feeling bad, medication forgotten when traveling, medication taken yesterday, medications stopped when condition was well-controlled, feelings of being hassled regarding the medication treatment regime, and frequently difficult in remembering to take medication. There are several studies

saying the same as in this study (Ford, 2004; Allen et al., 2002 Senaratne et al., 2001; Carlson et al., 2000; Xiaolian, Janet, and Thomas, 2006). However, there are some studies that unfortunately failed to find the parallel results about drug adherence in cardiac patients (Guthrie, 2001; Laramee et al., 2003).

Although the intervention group showed significant increased values at the program exit which meant that patients had improved behavioral, the mean score was found in medium adherence; it should have been in higher level. Factors that related to drug adherence should be identified such as 1) health care team/health system (knowledge of evidence-base practice, compliance with guidelines, clinical decision making, importance conveyed to patients, and limited communication with patients), 2) socioeconomic factors (financial, social stigma, positive relationships with health care providers and supportive families) , 3) therapy related (adverse events, medical interaction or the effectiveness of medicine, and the characteristics of medication (schedule, frequent dosing, side-effects), 4) psychosocial demographic factors, patient relatives (age, gender, education levels, fear of adverse events or co-morbidity, lack of perception of medications importance, style of attachment or developing habits, and understanding their symptoms) , and 5) condition related (symptom burden, cognitive impairment) (WHO, 2003; Jia-Rong, Debra, Terry et al., 2008; Morisky et al., 2008; Chin and Goldman, 1997) and should be mentioned in future studies.

In Thailand, nowadays there are many policies regarding national health that try to promote good behavior such as " the campaign to have a check up and take care of blood cholesterol", " weight control", " overweight in adolescents" etc. Thus, the

behavior management program is considered a motivational activity which could be successful by following national health policy.

Research implication and recommendations

The findings of this study have implications related to nursing practices, education and national health policy. The limitation and recommendations for future research are also presented and discussed.

Implications for Nursing Practice

The behavioral management program was affective in 1) modifying blood cholesterol levels, 2) enhancing lifestyle behavior including low-diet cholesterol, exercise behavior and drug adherence, 3) improving perceived self-efficacy both in diet and exercise. Although some variables were not significantly different, all of these looked like improvement in outcomes. Thus, these results provide evidence about nurses' contribution to promoting the recovery and preventive processes of patients with revascularization in cardiac events as well as the significant role they can play in the domain of cardiac rehabilitation and secondary prevention. Implementation of outpatient's primary care settings in Thailand should be considered. However, modifying this program in the future can be established as a part of health promotion at all levels of healthcare services.

Nowadays, the failure of taking care of cardiac rehabilitation is caused by the lack of knowledge and recognition of the importance of the role nurses can play in the field, as well as processes of management (Guo & Yan, 2002; Xiaolian, Janet & Thomas, 2006). The goal of the behavioral management program, more than to

improve education but the processes for managing behavior for success in modifying blood cholesterol are the advantageous objectives of this program. Patients' health values and life-attitude also grow with the process, improved self-efficacy and health self-management capabilities. These strategies are suggestive for educational behaviour rehabilitation initiatives for other chronic diseases, and can be adopted for promoting the effectiveness of patient/family education in a community care setting.

Thai nurses represent the largest proportion of the health care workforce especially in primary care settings. Thus the role of rehabilitation and secondary prevention were included in the routine of care for nurses. The good relationship and nature of nurses in primary care provided a golden time to enhance lifestyles and modify physiological risk factors more than other health care providers. However, the culture of Thai people leads to a belief in physicians and nurses; thus the co-operation in terms of care is the best way in caring for patients.

Implication for nursing education and professional training

Nowadays, all of the curriculum in nursing education should be developed for training advanced nurse practitioners. Cardiac rehabilitation requires a wide range of knowledge and skills, including exercise adaptations and prescriptions, behavioural change and motivational strategies, cardiovascular assessments, knowledge of the pathophysiology of cardiovascular disease and current medical treatments, risk factors, and adult education (ANAC, 1993). Therefore, to promote the development of cardiac rehabilitation and secondary prevention, nursing and its frontline implementation efforts should be devoted to training nurses, and to continuous professional development. Health education, attitudes and skills for assuming the cardiac rehabilitator role should be a part of this curriculum to promote the patient's

ability to respond for their own health needs. The suitable intervention in a primary care setting is most important for patients with revascularization, especially training nurse practitioners in cardiac rehabilitation and secondary prevention nursing.

Implication for the National Health Policy

The results of this study show the effectiveness of the behavioral management program in patients with revascularization in a primary care setting. Given these findings, the national health policy should be concerned with the following points:

1. In Thailand, no existing policies have been developed by professional nursing organizations concerning nurses' roles and responsibilities in cardiac rehabilitation and secondary prevention nursing in a primary care setting. Thus, this program contributes to the lack of involvement of nurses in cardiac rehabilitation and secondary prevention efforts.

2. According to the policy of the Ministry of Public Health, effective cardiac rehabilitation and secondary prevention are essential in preventing cardiac events and complications of illness. Promoting models of health care delivery which focus on patient self-efficacy of their diseases should be emphasized because it's the best method for maintaining behavior.

3. Cardiac rehabilitation and secondary prevention nurses should have a network to share the material or resources regarding cardiac rehabilitation knowledge to promote the quality of care for these patients.

4. The establishment of an international cardiac rehabilitation and secondary prevention network for nurses is imperative in promoting communication among nurses throughout the world in this field.

Recommendations for future research

1. This study should be replicated with an extension to the duration of follow-ups and long-term evaluation to 2-6 months because of physiological risk factors (total cholesterol, LDL-cholesterol, HDL-cholesterol, triglyceride) take a long time to adjust.

2. The behavioral management program can be performed in various clinical settings.

3. Family participation and support was used to supplement the patient's rehabilitation intervention during the program. Although social support in this program was adopted, it was not particularly assessed for the changes in perceived family support for the rehabilitation of participants.

4. An intervention program that has scope in special behavior such as low-cholesterol diets, exercise behavior, smoking cessation and puts a lot of time into each activity may be of benefit to participants in changing behavior and modifying risk factors.

5. A study of other risk factors such as blood pressure, body weight and smoking cessation that affects cardiac events as a further study should be mentioned.

6. A study in a normal time for patients that are not affected by the festival of Ramadan should be considered.

7. A study in correlation of religion and prevalence of CHD.

8. A study in group of PCI or CABG because both of group had the difference experience in psychology such as pain after intervention treatments, duration for treatment and medication to forever taken.

Limitations of the study

1. This program can be used for patients with revascularization in a primary care setting which could not be produced in other settings such as a secondary setting or a tertiary care setting.

2. Duration of the study in the Ramadan months October-November that affected lifestyle behavior and blood cholesterol.

3. Sample size (57 patients) in this study may be too small to be used in other population groups (in which the normal limitations of a quasi- experimental design are found).

4. Sample that included participants with PCI and CABG may be affected to the result of the study because both groups had different experiences after intervention treatments.

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APPENDICES

Appendix A:

Intervention program

โปรแกรมการจัดการพฤติกรรมต่อไขมันของผู้ป่วย

The Behavioral Management Program on blood cholesterol

ระยะเวลา : 12 สัปดาห์

คุณสมบัติของผู้เข้าร่วมโครงการ

1. ผู้เข้าร่วมโครงการโรคหลอดเลือดหัวใจที่ได้รับการรักษาโดยการใช้สายสวนหลอดเลือด หรือ การผ่าตัดเปลี่ยนทางเดินหลอดเลือดใหม่เป็นระยะเวลามากกว่า 3 เดือน
2. อายุระหว่าง 35-65 ปี
3. มีระดับไขมันที่ผิดปกติ คือ ไขมันรวมน้อยกว่า 240 มิลกรัมต่อเดซิลิตร, ไขมันชนิด เอช ดี แอล (HDL)มากกว่า 40 มิลกรัมต่อเดซิลิตร, ไขมันชนิดแอล ดี แอล (LDL)

   น้อยกว่า 130 มิลกรัมต่อเดซิลิตรและ ไตรกลีเซอไรด์ น้อยกว่า 200 มิลกรัมต่อเดซิลิตร
4. สามารถสื่อสารโดยการเขียนและอ่านภาษาไทยได้
5. ไม่มีภาวะแทรกซ้อนจนไม่สามารถปฏิบัติพฤติกรรมได้
6. ยินดีที่จะเข้าร่วมการศึกษา

ผู้ดำเนินการ : ผู้วิจัย และ ผู้ช่วยวิจัย

ขั้นตอน: แบ่งเป็น 3 ระยะ ดังนี้

1. ระยะเตรียมการ คือ ระยะการเตรียมผู้เข้าร่วมโครงการและประเมินผู้เข้าร่วมโครงการ ซึ่งจะปฏิบัติที่โรงพยาบาลใช้เวลาประมาณ 45-60 นาที ประกอบด้วย 1) การสร้างสัมพันธภาพ , 2) การประเมินภาวะสุขภาพของผู้เข้าร่วมโครงการประกอบด้วย 2.1) การประเมินสมรรถนะแห่งตนสำหรับการป้องกันโรคหลอดเลือดหัวใจ 2.2) การประเมินพฤติกรรมของผู้เข้าร่วมโครงการในด้านการบริโภคอาหาร การออกกำลังกาย และการรับประทานยาตามแพทย์สั่ง, 2.3) การตรวจระดับไขมันในเลือดซึ่งประกอบด้วยไขมันรวม, ไขมันชนิด เอช ดี แอล, ไขมันชนิดแอล ดี แอล และ ไตรกลีเซอไรด์

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2. ระยะปฏิบัติ คือ ระยะการปฏิบัติตามโปรแกรมที่สร้างขึ้น แบ่งเป็น 3 ช่วง ดังนี้

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.....
.....
.....

แนวคำถามทางโทรศัพท์สำหรับพยาบาลสอบถามผู้ป่วยโรคหลอดเลือดหัวใจที่บ้าน

1. ใน 2-3 วันที่ผ่านมาท่านรับประทานอาหารอะไรบ้าง
2. ท่านได้ควบคุมการรับประทานอาหารไขมันต่ำหรือไม่ อย่างไร
3. รูปแบบการออกกำลังกาย: ท่านได้ออกกำลังกายประเภทใดบ้าง, วันละประมาณ กี่ นาทีต่อครั้ง, อัตราการเต้นของหัวใจก่อนและหลังออกกำลังกายเป็นเท่าไร สม่ำเสมอหรือไม่
4. ท่านได้รับประทานยาตามแพทย์สั่งหรือไม่ อย่างไร
5. ท่านมีปัญหาการลืมรับประทานยาหรือไม่ อย่างไร (ถ้ามี สาเหตุเพราะอะไร)
6. ภายหลังการรับประทานยาท่านมีอาการผิดปกติอะไรหรือไม่
7. ท่านคิดว่าท่านได้ปฏิบัติตนและบรรลุตามเป้าหมายที่วางไว้ หรือไม่ เพราะอะไร
8. ท่านมีปัญหาใดๆเกี่ยวกับการปฏิบัติตนหรือไม่ อย่างไร
9. บุคคลในครอบครัวหรืออื่นๆที่สนับสนุนหรือเป็นอุปสรรคสำหรับท่านในการปฏิบัติตนหรือไม่ อย่างไร
10. อื่นๆ

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โปรแกรมการจัดการพฤติกรรมต่อไขมันของผู้ป่วย

กิจกรรม	ระยะเวลา(สัปดาห์)											
	1	2	3	4	5	6	7	8	9	10	11	12
1.ระยะเตรียมการ	โรงพยาบาล											
2. ระยะปฏิบัติการ												
ช่วงที่1 -ปฏิบัติตามโปรแกรมการพยาบาลฯ	โรงพยาบาล											
ช่วงที่ 2 -ติดตามผลโปรแกรมการพยาบาลฯ			โทรศัพท์ติดตาม (1)						โทรศัพท์ติดตาม (2)			
ช่วงที่3 -ติดตามผลโปรแกรมการพยาบาลฯ						เยี่ยมบ้าน						
3. ระยะประเมินผล ..... -สรุปและปิดโครงการ												โรง-พยาบาล

Appendix B:

Education Media

แผนการสอน เรื่อง การจัดการพฤติกรรมผู้ป่วยโรคหลอดเลือดหัวใจที่มีภาวะไขมันเลือดสูง

ผู้สอน ชื่อ นามสกุล ตำแหน่ง

ผู้จัดทำ ร.ต.ต. หญิง ปชาณัฏฐ์ ตันติโกสุม

ผู้เรียน ผู้ป่วยโรคหลอดเลือดหัวใจหลังได้รับการรักษาโดยการผ่านสายสวนหรือการผ่าตัดทำทางเบี่ยงหลอดเลือดหัวใจ

สถานที่ แผนกผู้ป่วยนอก คลินิกโรคหัวใจ โรงพยาบาลบางน้ำเปรี้ยว อำเภอบางน้ำเปรี้ยว จังหวัดฉะเชิงเทรา

วัตถุประสงค์

1. ผู้ป่วยมีความรู้ ความเข้าใจเกี่ยวกับโรคหลอดเลือดหัวใจ และภาวะไขมันในเลือดผิดปกติ
2. ผู้ป่วยมีความรู้ ความเข้าใจถึงแนวทางการปฏิบัติตนเพื่อควบคุมระดับไขมันในเลือดที่เป็นปัจจัยหลักของการเกิดโรคหลอดเลือดหัวใจในด้านการบริโภคอาหาร การออกกำลังกายและการรับประทานยา
3. ผู้ป่วยรู้และตระหนักถึงการจัดการพฤติกรรมเสี่ยงที่ส่งผลให้เกิดโรคหลอดเลือดหัวใจ
4. ผู้ป่วยมีความรู้ ความเข้าใจและสามารถกำหนดพฤติกรรมเป้าหมายได้
5. ผู้ป่วยมีความสามารถในการใช้แรงเสริม เทคนิคการกระตุ้นเตือนและการใช้แรงสนับสนุนทางสังคมที่จะช่วยในการจัดการกับพฤติกรรมที่ทำให้เกิดโรคและภาวะแทรกซ้อนของโรคหลอดเลือดหัวใจได้

สังเขปหัวข้อ

1. โรคหลอดเลือดหัวใจและภาวะไขมันในเลือดผิดปกติ
2. พฤติกรรมเพื่อควบคุมภาวะไขมันในเลือดผิดปกติ ได้แก่ การบริโภคอาหารที่มีไขมันต่ำ, พฤติกรรมการออกกำลังกาย, พฤติกรรมการรับประทานยาตามแผนการรักษาของแพทย์
3. การกำหนดพฤติกรรมเป้าหมาย,
4. การใช้แรงเสริม, การใช้เทคนิคกระตุ้นเตือน, การใช้แรงสนับสนุนทางสังคม

ใช้เวลาสอนประมาณ 45-60 นาที

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Appendix C:

Instruments

CODE……..

แบบสัมภาษณ์พฤติกรรมการออกกำลังกาย

<u>คำชี้แจง</u> แบบสัมภาษณ์นี้มีวัตถุประสงค์เพื่อต้องการทราบเกี่ยวกับพฤติกรรมการออกกำลังกาย และกิจกรรมที่เกี่ยวข้อง ของท่าน *ในปัจจุบัน* โปรดทำเครื่องหมาย (√) ลงในช่องที่ตรงกับความเป็นจริงมากที่สุด

	ระยะเวลา 1 สัปดาห์			
การออกกำลังกายและกิจกรรมที่เกี่ยวข้อง	**ปฏิบัติ 3 ครั้งขึ้นไป**	**ปฏิบัติ 2 ครั้ง**	**ปฏิบัติ 1 ครั้ง**	**ไม่ปฏิบัติเลย**
1. ท่านออกกำลังกาย				
2. ท่านออกกำลังกายโดยวิธีที่เหมาะสมเช่น การเดิน วิ่งเหยาะๆ หรือฝึกกายบริหาร				
3. ท่านออกกำลังกาย แต่ละครั้งนานประมาณ 20-30 นาที				
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12. หลังการออกกำลังกาย ท่านอาบน้ำ หรือรับประทานอาหารทันที				
13. ท่านได้วางแผนการออกกำลังกายไว้ล่วงหน้า				

แบบสัมภาษณ์พฤติกรรมการรับประทานอาหารที่ส่งผลต่อระบบการทำงานของหัวใจ

<u>คำชี้แจง</u> แบบสัมภาษณ์นี้มีวัตถุประสงค์เพื่อประเมินพฤติกรรมการรับประทานอาหารที่ส่งผลต่อระบบการทำงานของหัวใจ ซึ่งหมายถึง การจำกัดการรับประทานอาหาร ไขมัน, โคเลสเตอเรล และเกลือ และเพิ่มอาหารพวกกากใย

โปรดทำเครื่องหมาย(√) ลงในช่องที่ตรงกับความเป็นจริงมากที่สุดซึ่งแต่ละช่องมีความหมาย ดังนี้

ระดับ 5 หมายถึง ท่านปฏิบัติทุกครั้ง

ระดับ 4 หมายถึง ท่านปฏิบัติบ่อยครั้ง

ระดับ 3 หมายถึง ท่านปฏิบัตินานๆครั้ง

ระดับ 2 หมายถึง ท่านไม่เคยปฏิบัติเลย

ระดับ 1 หมายถึง ท่านไม่เคยรับประทานอาหารดังกล่าวเลย

ทุกครั้งที่จะรับประทานอาหารที่ระบุ ท่านปฏิบัติตามข้อความดังกล่าวอย่างไร	**พฤติกรรมการรับประทานอาหาร**				
	1	**2**	**3**	**4**	**5**
1.ดื่มนมพร่องมันเนยหรือไขมันต่ำเท่านั้น					
2. ตัดและเลาะหนัง หรือส่วนที่มีไขมันของอาหารประเภทเนื้อสัตว์ ก่อนที่จะนำไปปรุงอาหาร					
3. รับประทานเนื้อสัตว์ที่มีไขมันต่ำ เช่น เนื้อไก่, เนื้อปลา, เนื้อวัวไร้ไขมัน, หรือเนื้อหมู นำไปย่าง หรืออบ แทนการรับประทานเนื้อติดไขมัน เช่น ซี่โครง ,สันคอ, เนื้อวัวบดปกติ, เครื่องในสัตว์ทุกชนิด, เบคอน, ไส้กรอก,กุนเชียง,แฮม					
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15. รับประทานผักสด อย่างน้อยวันละ 2 มื้อ					
16.หลีกเลี่ยงการรับประทานอาหารประเภททอด เช่นไก่ทอด,ปลาทอด, หมูทอด, ผัดไท, หอยทอด					
17.ลดการรับประทานอาหารคาวหวาน ที่มีกะทิเป็นส่วนประกอบ เช่น แกงเขียวหวาน แกงคั่ว แกงฮังเล กล้วยบวดชี					

แบบประเมินความร่วมมือในการใช้ยา: Morisky Medication Adherence Scale (MMAS)

คำชี้แจง : กรุณากาเครื่องหมาย ✓ ลงในกล่อง ❒ ในคำถามต่อไปนี้ให้ตรงกับความเป็นจริง

1. มีบางครั้งที่คุณลืมรับประทานยาใช่หรือไม่	❒ ใช่	❒ ไม่ใช่
2. บางคนไม่ได้รับประทานยาด้วยเหตุผลต่างๆนอกเหนือจากลืม คุณคิดทบทวนว่าในช่วง 2 สัปดาห์ที่ผ่านมา มีบางวันที่คุณไม่ได้รับประทานยา	❒ ใช่	❒ ไม่ใช่
3. คุณเคยลดขนาดยาหรือหยุดยา เนื่องจากรู้สึกแย่เวลารับประทานยา โดยที่ไม่ได้บอกแพทย์	❒ ใช่	❒ ไม่ใช่
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8. คุณรู้สึกว่ามีความยุ่งยากมากน้อยเพียงใด ในการจดจำยาทั้งหมดที่ต้องรับประทาน
(กาเครื่องหมาย ✓ ลงในกล่อง ❒ **โดยเลือกเพียง 1 ข้อเท่านั้น)**

❒ 8.1) ไม่รู้สึกหรือแทบจะไม่รู้สึกว่ามีความยุ่งยากในการจดจำยาที่ใช้
(หรือมี 0 ถึง 1 ครั้งต่อสัปดาห์ที่จำไม่ได้ว่ายาตัวไหนทานอย่างไร)

❒ 8.2) รู้สึกว่ายุ่งยากบ้างเล็กน้อย ในการจดจำวิธีทานยาแต่ละอย่างให้ถูกต้อง
(หรือมี 1 ถึง 2 ครั้งต่อสัปดาห์ที่จำไม่ได้ว่ายาตัวไหนทานอย่างไร)

❒ 8.3) รู้สึกว่ายุ่งยากปานกลาง ในการจดจำวิธีทานยาแต่ละอย่างให้ถูกต้อง
(หรือมี 3 ถึง 4 ครั้งต่อสัปดาห์ที่จำไม่ได้ว่ายาตัวไหนทานอย่างไร)

❒ 8.4) รู้สึกว่ายุ่งยากมากในการจดจำวิธีทานยาแต่ละอย่างให้ถูกต้อง
(หรือมี 5 ถึง 6 ครั้งต่อสัปดาห์ที่จำไม่ได้ว่ายาตัวไหนทานอย่างไร)

❒ 8.5) รู้สึกว่ายุ่งยากมากที่สุดหรือตลอดเวลา ในการจดจำวิธีทานยาแต่ละอย่างให้ถูกต้อง
(มีความยุ่งยากทุกวัน จำไม่ได้ว่ายาตัวไหนทานอย่างไร)

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แบบวัดสมรรถนะแห่งตนสำหรับการป้องกันโรคหลอดเลือดหัวใจ

คำชี้แจง: โปรดประเมินสถานการณ์ที่กำหนดและให้คะแนนความเชื่อมั่นของท่านในการควบคุมตนเองให้กระทำพฤติกรรมภายใต้สถานการณ์ดังกล่าว โดยแต่ละระดับคะแนนมีความหมายดังนี้

0 หมายถึง ไม่มั่นใจเลย
1 หมายถึง มีความมั่นใจน้อย
2 หมายถึง มีความมั่นใจปานกลาง
3 หมายถึง มีความมั่นใจมาก
4 หมายถึง มีความมั่นใจมากที่สุด

ตอนที่ 1 ความสามารถในการควบคุมตนเองเกี่ยวกับการรับประทานอาหาร

ท่านเชื่อมั่นว่าตนเองสามารถควบคุมการรับประทานอาหารประเภทของมัน ของทอด กะทิ อาหารรสหวาน อาหารรสเค็ม ได้มากน้อยเพียงใด ถ้าท่านอยู่ในสถานการณ์ต่อไปนี้

สถานการณ์	ระดับความมั่นใจในการคุมตนเองไม่ให้รับประทานอาหารประเภทของมัน ของทอด กะทิ รสหวานจัด รสเค็มจัด				
	ไม่มั่นใจเลย 0	น้อย 1	ปานกลาง 2	มาก 3	มากที่สุด 4
1. เมื่อท่านไปร่วมงานเลี้ยงพบปะสังสรรค์กับเพื่อนสนิท หรือญาติพี่น้อง หรือ สมาชิกในครอบครัว ในงานเทศกาลหรือในวันหยุดพักผ่อน, งานแต่งงาน, งานขึ้นบ้านใหม่					
2. เมื่อท่านได้รับความรู้เพิ่มเติมเกี่ยวกับอาหารเพื่อป้องกันการเกิดโรคหลอดเลือดหัวใจ					
3. เมื่อท่านไปร่วมงานในเทศกาล อาหารและเครื่องดื่มราคาถูก					
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15. เมื่อท่านประสบความสำเร็จสมหวังจนอยากให้รางวัลแก่ตนเอง					

ตอนที่ 2 ความสามารถในการควบคุมตนเองเกี่ยวกับการออกกำลังกาย

ท่านเชื่อมั่นว่าตนเองสามารถควบคุมตนเองให้ไปออกกำลังกายสม่ำเสมอสัปดาห์ละ 3 ครั้งขึ้นไป ครั้งละ 20-30 นาทีได้มากน้อยเพียงใด ถ้าท่านอยู่ในสถานการณ์ต่อไปนี้

ข้อความ	ระดับความมั่นใจในการควบคุมตนเองให้ไปออกกำลังกายสม่ำเสมอสัปดาห์ละ 3 ครั้งขึ้นไป ครั้งละ 20-30 นาที				
	ไม่มั่นใจเลย 0	น้อย 1	ปานกลาง 2	มาก 3	มากที่สุด 4
16. ถึงแม้ว่าท่านมีภาระงานบ้านมากมายที่ต้องทำ					
17. ถึงแม้ว่าท่านอยู่ในช่วงที่ต้องรับผิดชอบงานประจำหรืองานนอกเวลาเพิ่มขึ้น					
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29. เมื่อท่านอยู่ในช่วงหยุดพักผ่อนติดต่อกันหลายวัน					
30. เมื่อท่านได้รับความรู้เรื่องการออกกำลังกายสำหรับการป้องกันโรคหลอดเลือดหัวใจ					

Appendix D:

Research results

Research results

Table A Comparisons of total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglyceride between the intervention group and the control group at program entry (pre-test) and program completion (post-test)

Multivariate Tests (C)

Variable	Hotelling's Trace	Multivariate F-test	p-value
Program completion (Post-test)	0.50	4.20	0.01

Tests of Between-Subjects Effects

Variables	Group	Sum of Squares	df	Mean Squares	Multi-variate F-test	p-value
Total cholesterol	Program entry (Pre-test)	3340.28	1	3340.28	2.71	0.11
	Program completion (Post-test)	8982.70	1	8982.70	6.17	.02

Variables	Group	Sum of Squares	df	Mean Squares	Multi-variate F-test	p-value
LDL-cholesterol	Program entry (Pre-test)	469.23	1	469.23	0.70	.41
	Program completion (Post-test)	11972.47	1	11972.47	14.60	.00
HDL-cholesterol	Program entry (Pre-test)	53.69	1	53.69	.21	.64
	Program completion (Post-test)	293.46	1	293.46	7.26	.01
Triglyceride	Program entry (Pre-test)	86343.28	1	86343.28	3.74	.06
	Program completion (Post-test)	55336.08	1	55336.08	1.63	.21

Table B Comparison of total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglyceride in the control group at program entry(pre-test) and program completion (post-test)

Multivariate Tests (c)

Variables	Hotelling's Trace	Multivariate F-test	p-value
Control group	0.23	0.98	0.44

Tests of Between-Subjects Effects

Variables	Sum of Squares	df	Mean Squares	Multivariate F-test	p-value
Total cholesterol	8783.0	1	8783.0	5.3	.06
LDL- cholesterol	2872.7	1	2872.7	2.2	.13
HDL-cholesterol	472.1	1	472.1	2.2	.14
Triglyceride	15310.8	1	15310.8	1.3	.25

Appendix E:

Documentary proof of the ethical and permission for collecting data

โรงพยาบาลบางน้ำเปรี้ยว
100 หมู่ 2 ตำบลหมอนทอง อำเภอบางน้ำเปรี้ยว จังหวัดฉะเชิงเทรา 24150
โทรศัพท์ (038) 581-285, 581-780-1 โทรสาร (038) 581-103

Bangnamprieo Hospital
100 M 2 T .Monthong A.Bangnamprieo Chachoengsao Province 24150
Tel. (038) 581-285, 581-780-1 Fax (038) 581-103

Documentary Proof of Clearance Committee on Human Rights
Related to Researches Involving Human Subjects
Bangnamprieo Hospital

Title of Project	The Effect of Behavioral Management Nursing Program on Blood Cholesterol in Patients With Coronary Revascularization
Protocol Number	2798
Principal Investigator	Sub.Pol.Lt. Pachanut Tantikosoom
Official Address	Faculty of Nursing Chulalongkorn University

The aforementioned project has been reviewed and approved by Committee on Human Rights Related to Researches Involving Human Subjects, based on the Declaration of Helsinki.

Signature of Secretary
Committee on Human Rights Related to .....
Researches Involving Human Subjects Mrs.Kanjana Madnuch

Signature of Chairman
Committee on Human Rights Related to .....
Researches Involving Human Subjects Mr.Voraches Vechunongcolkorn

Date of Approval June 6, 2010

Appendix F:

List of the experts

LIST OF THE EXPERTS

Asso Prof Dootchai Chaiwanichsiri
Faculty of Medicine, Chulalongkorn University

Police Colonel Bundit Prommete
Police General Hospital, Bangkok

Asso prof Dr. Wiporn Senarak
Faculty of Nursing, Khon Kaen University

Assis Prof Dr.Saovaluck Jirathummakoon
Faculty of Nnursing, Mahidol University

Asso prof Dr Tassanee Prasopkittikun
Faculty of Nnursing, Mahidol University

Assis Prof Warraporn Satheannoppakao
Faculty of Public Health. Mahidol University

Assis Prof Dr. Puangphaka Greethong
Faculty of Kuakarun College Of Nursing

Mrs Jintanna Kruravarnid
Head Nurse, Bangnamprieo hospital, Chachoengsao, Thailand

Appendix G:

Informed consent

หนังสือยินยอมโดยได้รับการบอกกล่าวและเต็มใจ

(Informed Consent Form)

ชื่อโครงการ ผลของโปรแกรมการจัดการพฤติกรรมต่อไขมันของผู้ป่วยที่ได้รับการรักษาโรคหลอดเลือดหัวใจผ่านสายสวนหรือการผ่าตัดทางเบี่ยง

ชื่อผู้วิจัย ร.ต.ต หญิง ปชาณัฏฐ์ ตันติโกสุม นิสิตปริญญาเอก คณะพยาบาลศาสตร์
จุฬาลงกรณ์มหาวิทยาลัย

ชื่อผู้เข้าร่วมการวิจัย .....

อายุ .....เลขที่เวชระเบียน .....

คำยินยอมของผู้เข้าร่วมการวิจัย

ข้าพเจ้า นาย/นาง/นางสาว ..... ได้ทราบรายละเอียดของโครงการวิจัยตลอดจนประโยชน์ และข้อเสี่ยงที่จะเกิดขึ้นต่อข้าพเจ้าจากผู้วิจัยแล้วอย่างชัดเจน ไม่มีสิ่งใดปิดบังซ่อนเร้นและยินยอมให้ทำการวิจัยในโครงการที่มีชื่อข้างต้น และข้าพเจ้ารู้ว่าถ้ามีปัญหาหรือข้อสงสัยเกิดขึ้นข้าพเจ้าสามารถสอบถามผู้วิจัยได้ และข้าพเจ้าสามารถไม่เข้าร่วมโครงการวิจัยนี้เมื่อใดก็ได้ โดยไม่มีผลกระทบต่อการรักษาที่ข้าพเจ้าพึงได้รับ นอกจากนี้ผู้วิจัยจะเก็บข้อมูลเฉพาะเกี่ยวกับตัวข้าพเจ้าเป็นความลับและจะเปิดเผยได้เฉพาะในรูปที่เป็นสรุปผลการวิจัย การเปิดเผยข้อมูลเกี่ยวกับตัวข้าพเจ้าต่อหน่วยงานต่างๆที่เกี่ยวข้อง กระทำได้เฉพาะกรณีจำเป็นด้วยเหตุผลทางวิชาการเท่านั้น

ลงชื่อ

.....(ผู้เข้าร่วมการวิจัย)

.....(พยาน)

.....(พยาน)

วันที่ .....

คำอธิบายของผู้วิจัยหรือผู้ช่วยวิจัย

ข้าพเจ้าได้อธิบายรายละเอียดของโครงการ ตลอดจนประโยชน์ของการวิจัย รวมทั้งข้อเสี่ยงที่อาจจะเกิดขึ้นแก่ผู้เข้าร่วมการวิจัยทราบแล้วอย่างชัดเจนโดยไม่มีสิ่งใดปิดบังซ่อนเร้น

ลงชื่อ..... (ผู้วิจัยหรือผู้ช่วยวิจัย)

วันที่.....

Appendix H:

Participant information sheet

ข้อมูลสำหรับกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย

(Patient/ Participant Information Sheet)

ชื่อโครงการวิจัย ผลของโปรแกรมการจัดการพฤติกรรมต่อไขมันของผู้ป่วยที่ได้รับการรักษาโรคหลอดเลือดหัวใจผ่านสายสวนหรือการผ่าตัดทางเบี่ยง

ชื่อผู้วิจัย ร.ต.ต.หญิง ปชาณัฏฐ์ ตันติโกสุม นิสิตคณะพยาบาลศาสตร์จุฬาลงกรณ์มหาวิทยาลัย

สถานที่ติดต่อผู้วิจัย คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

ที่อยู่ 101/73 ม.มัณฑนา ราชพฤกษ์ ถ.ราชพฤกษ์ ต. บางร่าง อ. เมือง จ.นนทบุรี 11000.

หมายเลขโทรศัพท์ 02-21589825

หมายเลขโทรศัพท์มือถือ 08-9416-7540

ดิฉัน ร.ต.ต.หญิง ปชาณัฏฐ์ ตันติโกสุม นิสิตปริญญาเอก คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย มีความประสงค์ที่จะขอความร่วมมือจากท่านเพื่อเป็นผู้มีส่วนร่วมในการวิจัยเรื่อง ผลของโปรแกรมการจัดการพฤติกรรมต่อไขมันของผู้ป่วยที่ได้รับการรักษาโรคหลอดเลือดหัวใจผ่านสายสวนหรือการผ่าตัดทางเบี่ยง โดยรายละเอียดเกี่ยวกับการวิจัยเป็นดังนี้

1. เนื่องจากผู้วิจัยได้ทำการศึกษาเรื่อง ผลของโปรแกรมการจัดการพฤติกรรมต่อไขมันของผู้ป่วยที่ได้รับการรักษาโรคหลอดเลือดหัวใจผ่านสายสวนหรือการผ่าตัดทางเบี่ยง

2. ผู้เข้าร่วมโครงการวิจัยในครั้งนี้เป็นผู้ป่วยที่มีคุณสมบัติคือ 1) เป็นโรคหลอดเลือดหัวใจที่ได้รับการรักษาโดยการใช้สายสวนหลอดเลือด หรือ การผ่าตัดเปลี่ยนทางเดินหลอดเลือดใหม่เป็นระยะเวลามากกว่า 3 เดือน, 2)อายุระหว่าง 35-65 ปี, 3)มีระดับไขมันที่ผิดปกติ คือ ไขมันรวมน้อยกว่า 240 มิลกรัมต่อเดซิลิตร, ไขมันชนิด เอช ดี แอล (HDL)มากกว่า 40 มิลกรัมต่อเดซิลิตร, ไขมันชนิดแอล ดี แอล (LDL) น้อยกว่า 130 มิลกรัมต่อเดซิลิตรและ ไตรกลีเซอไรด์ น้อยกว่า 200 มิลกรัมต่อเดซิลิตร และเข้ารับการรักษาที่คลินิกโรคหัวใจ แผนกผู้ป่วยนอก โรงพยาบาลบางน้ำเปรี้ยว จ. ฉะเชิงเทรา โดยงานวิจัยนี้จะมีผู้เข้าร่วมโครงการวิจัยทั้งหมด 60 คน

3. ท่านจะได้รับการชี้แจงจากผู้วิจัยถึงเป้าหมายขั้นตอนการเก็บข้อมูล หลังจากนั้นท่านจะได้รับการตรวจระดับไขมันในเลือดซึ่งประกอบด้วยไขมันรวม, ไขมันชนิด เอช ดี แอล, ไขมันชนิดแอล ดี แอล และ ไตรกลีเซอไรด์เลือด ณ.ห้องปฏิบัติการของโรงพยาบาลบางน้ำเปรี้ยว แล้วหลังจากนั้นท่านจะได้รับแบบสัมภาษณ์ 5 ชุด เพื่อให้ผู้เข้าร่วมโครงการวิจัยตอบคำถามในแบบสอบถาม ดังนี้ 1).ข้อมูลทั่วไป, 2) แบบประเมินสมรรถนะแห่งตนสำหรับการป้องกันโรคหลอดเลือดหัวใจ,3) แบบสัมภาษณ์พฤติกรรมการบริโภคอาหาร, 4) แบบสัมภาษณ์พฤติกรรมการออกกำลังกาย 5) แบบสัมภาษณ์พฤติกรรมการรับประทานยา, โดยใช้เวลารวมทั้งหมดประมาณ 15-20 นาที

4. กลุ่มทดลอง หลังจากท่านได้พัก 10-15 นาที ผู้วิจัยหรือผู้ช่วยวิจัยจะให้คำแนะนำการปฏิบัติตนตามโปรแกรมการพยาบาลเพื่อจัดการพฤติกรรมต่อไขมันของผู้ป่วย ใช้เวลาประมาณ

45-60 นาที และท่านจะได้รับสมุดคู่มือผู้ป่วยกลับบ้านและจะมีการติดตามทางโทรศัพท์ในสัปดาห์ที่ 3 และ 9 แต่ละครั้งใช้เวลาประมาณ 20-30 นาที ตามแนวข้อคำถามที่เตรียมไว้ ในสัปดาห์ที่ 6 จะมีการติดตามเยี่ยมที่บ้านโดยใช้เวลาประมาณ 30-45 นาที เพื่อช่วยปรับปรุงและแก้ไขปัญหาที่เกิดขึ้น พร้อมทั้งให้คำแนะนำและทบทวนการปฏิบัติตามโปรแกรมที่สร้างขึ้น และท่านจะได้รับการนัดหมายให้มาพบอีกในสัปดาห์ที่ 12 ณ.โรงพยาบาลบางน้ำเปรี้ยวและมีการตรวจ ทำแบบประเมิน เหมือนครั้งแรก

5. กลุ่มควบคุม ท่านจะได้รับการนัดหมายให้มาพบอีก 12 เดือน ณ.โรงพยาบาลบางน้ำเปรี้ยวและมีการตรวจ ทำแบบประเมิน เหมือนครั้งแรก

6. ท่านจะเสียเวลาในการตอบแบบสอบถามทั้งหมดประมาณ 15-20 นาที และเข้าร่วมโครงการประมาณ 45-60 นาที ซึ่งท่านอาจเกิดอาการดังต่อไปนี้ เช่น รู้สึกไม่สุขสบาย มีอาการเหนื่อย หรืออ่อนเพลียในขณะตอบแบบสอบถามและร่วมโครงการ โดยท่านสามารถพักได้ตลอดเวลาโดยผู้วิจัยหรือผู้ช่วยวิจัยจะดูแลและช่วยเหลือท่าน

7. ท่านอาจไม่ตอบคำถามข้อใดข้อหนึ่งที่ท่านรู้สึกไม่สบายใจที่จะตอบและท่านสามารถถอนตัวจากการวิจัยได้ทุกขณะโดยไม่เสียประโยชน์ที่จะได้รับ

8. ผู้วิจัยจะขอข้อมูลในเรื่องของอาการ โรคประจำตัว และการรักษาที่ได้รับจากแพทย์จากแฟ้มประวัติของท่านด้วย

9. หากท่านมีข้อสงสัยให้สอบถามเพิ่มเติมได้โดยสามารถติดต่อผู้วิจัยได้ตลอดเวลาที่เบอร์มือถือ 08-9416-7540

10. ข้อมูลที่เกี่ยวข้องกับท่านจะเก็บเป็นความลับ หากมีการเสนอผลการวิจัยจะเสนอเป็นภาพรวม

11. เพื่อเป็นการตอบแทนการเสียเวลาในการตอบแบบสอบถามผู้วิจัยขอมอบถุงผ้าใส่ของและกล่องสำหรับใส่ยาให้แก่ผู้เข้าร่วมวิจัยทุกราย

12. หากท่านไม่ได้รับการปฏิบัติตามข้อมูลดังกล่าวสามารถร้องเรียนได้ที่คณะกรรมการสิทธิผู้ป่วยและจริยธรรมองค์กร โรงพยาบาลบางน้ำเปรี้ยว เลขที่ 190/1 หมู่ที่ 5 ตำบลโพรงอากาศ อำเภอบางน้ำเปรี้ยว จังหวัดฉะเชิงเทรา

ขอขอบคุณในการร่วมมือของท่านมา ณ ที่นี้

.....

ร.ต.ต หญิง ปชาณัฏฐ์ ตันติโกสุม

ผู้วิจัย

BIOGRAPHY

Pol. Sub. Lt. Pachanat Tantikosoom was born in 1972. I received a Bachelor of Nursing Science from Police Nursing College of Nursing in 1995. I got a Master of Nursing Science (Adult Nursing), faculty of nursing, Khon Kaen University in 2001.

I had five years clinical experience in Genaral hospital and as a lecturer at Faculty of nursing, Khon Kaen University about 6 years and after that I moved to work at Chulalongkorn University in 2005 until present as a lecturer. I was the visiting scholar at school of nursing, Minnesota, Minneapolis, US as adjunct faculty in I attend study Philosophy Program in Nursing Science, Faculty of Nursing, Chulalongkorn University since 2006-2010.

In 2011, I graduated the doctoral program of Nursing Science from the faculty of nursing, Chulalongkorn University. After that, I go back to work as a lecture at faculty of nursing, Chulalongkorn University.