THE DEVELOPMENT OF MEDICATION ADHERENCE SCALE FOR PERSONS WITH CORONARY ARTERY DISEASE

Commander Kanoklekha Suwannapong

A Dissertation Submitted in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy Program in Nursing Science
Faculty of Nursing
Chulalongkorn University
Academic Year 2014

การพัฒนาเครื่องมือประเมินพฤติกรรมการใช้ยาตามเกณฑ์การรักษา สำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

นาวาโทหญิงกนกเลขา สุวรรณพงษ์

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาพยาบาลศาสตรดุษฎีบัณฑิต
สาขาวิชาพยาบาลศาสตร์
คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
ปีการศึกษา 2557

Thesis Title	THE DEVELOPMENT OF MEDICATION ADHERENCE SCALE FOR PERSONS WITH CORONARY ARTERY DISEASE
By	Commander Kanoklekha Suwannapong
Field of Study	Nursing Science
Thesis Advisor	Associate Professor Sureeporn Thanasilp, D.N.S., APN
Thesis Co-Advisor	Associate Professor Waraporn Chaiyawat, D.N.S., APN

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 Sureeporn Thanasilp, D.N.S., APN)

THESIS COMMITTEE

.....Chairman

(Associate Professor Jintana Yunibhand, Ph.D., APN)

.....Thesis Advisor

(Associate Professor Sureeporn Thanasilp, D.N.S., APN)

.....Thesis Co-Advisor

(Associate Professor Waraporn Chaiyawat, D.N.S., APN)

.....Examiner

(Choosak Khampalikit, Ph.D.)

.....Examiner

(Associate Professor Police Captain Yupin Aungsuroch, Ph.D., RN)

.....External Examiner

(Associate Professor Orasa Pankpakdee, D.N.S., APN)

กนกเลขา สุวรรณพงษ์ : การพัฒนาเครื่องมือประเมินพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ (THE DEVELOPMENT OF MEDICATION ADHERENCE SCALE FOR PERSONS WITH CORONARY ARTERY DISEASE) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: รศ. ดร. สุรีพร ธนศิลป์, อ.ที่ปรึกษาวิทยานิพนธ์ร่วม: รศ. ดร. วราภรณ์ ชัยวัฒน์, 204 หน้า.

การศึกษาครั้งนี้มีวัตถุประสงค์เพื่อพัฒนาและทดสอบคุณสมบัติการวัดทางจิตวิทยาของแบบสอบถามพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ กระบวนการพัฒนาแบบสอบถามประกอบด้วย 7 ขั้นตอนคือ 1) การสังเคราะห์แนวคิดเกี่ยวกับพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับ ผู้ที่เป็นโรคหลอดเลือดหัวใจ จากการทบทวนวรรณกรรมที่เกี่ยวข้องและความคิดเห็นจากผู้เชี่ยวชาญจำนวน 17 คน โดยใช้กระบวนการเดลฟาย, 2) การสร้างข้อคำถาม, 3) การกำหนดรูปแบบ, 4) การตรวจสอบความตรงเชิงเนื้อหาโดยผู้ทรงคุณวุฒิ จำนวน 7 คน, 5) การนำแบบสอบถามไปทดลองใช้กับผู้ที่เป็นโรคหลอดเลือดหัวใจจำนวน 30 คนเพื่อทบทวนแบบสอบถาม, 6) การนำแบบสอบถามไปใช้กับผู้ที่เป็นโรคหลอดเลือดหัวใจที่มารับการรักษาที่ห้องตรวจโรคหัวใจ แผนกผู้ป่วยนอกของโรงพยาบาลระดับตติยภูมิ 7 โรงพยาบาล จำนวน 457 คน เพื่อทดสอบคุณสมบัติการวัดทางจิตวิทยาของแบบสอบถามฯ, และ 7) การให้คะแนนและแปลผลคะแนนของแบบสอบถามฯ วิเคราะห์ข้อมูลโดยใช้สถิติเชิงบรรยาย ดัชนีความตรงตามเนื้อหา สัมประสิทธิ์สหสัมพันธ์ของครอนบาร์ค การวิเคราะห์องค์ประกอบเชิงยืนยัน และการทดสอบสหสัมพันธ์ของเพียร์สัน

ผลการวิจัยพบว่า แบบสอบถามพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ ประกอบด้วยข้อคำถามแบบประมาณค่า 5 ระดับ จำนวน 25 ข้อ ครอบคลุมองค์ประกอบ 4 ด้านคือ ด้านการรู้เรื่องยาอย่างถูกต้อง (7 ข้อ) การเก็บรักษายาอย่างเหมาะสม (3 ข้อ) การกำกับตนเองในการใช้ยาอย่างถูกต้องและต่อเนื่อง (11 ข้อ) และการมีส่วนร่วมในแผนการรักษา (4 ข้อ) แบบสอบถามพฤติกรรมการใช้ยาฯ มีความตรงและความเที่ยง โดยมีความตรงตามเนื้อหารายข้ออยู่ระหว่าง 0.86-1.00 และความตรงตามเนื้อหารายฉบับเท่ากับ .99 มีค่าความสอดคล้องภายในอยู่ในระดับดี (α=81) มีค่าความเที่ยงแบบทดสอบซ้ำอยู่ในระดับปานกลาง (r =.62, p<.01). ผลการวิเคราะห์องค์ประกอบเชิงยืนยันพบว่าสอดคล้องกับข้อมูลเชิงประจักษ์ (X^2=533.78, *df*=244, *p*=0.00, X^2/df=2.19, GFI=0.91, AGFI=0.89, CFI=0.94, RMSEA=0.05)

สาขาวิชา พยาบาลศาสตร์ ลายมือชื่อนิสิต .....

ปีการศึกษา 2557 ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

ลายมือชื่อ อ.ที่ปรึกษาร่วม .....

5377971836 : MAJOR NURSING SCIENCE
KEYWORDS: MEDICATION ADHERENCE, CORONARY ARTERY DISEASE, INSTRUMENT DEVELOPMENT

KANOKLEKHA SUWANNAPONG: THE DEVELOPMENT OF MEDICATION ADHERENCE SCALE FOR PERSONS WITH CORONARY ARTERY DISEASE. ADVISOR: ASSOC. PROF. SUREEPORN THANASILP, D.N.S., APN, CO-ADVISOR: ASSOC. PROF. WARAPORN CHAIYAWAT, D.N.S., APN, 204 pp.

This study aimed to develop and test psychometric properties of the new instrument namely the Medication Adherence Scale (MAS). The instrument development composed of seven steps included 1) synthesizing the concept of medication adherence using literature review and consensus of 17 experts through Delphi technique, 2) generating an item pool, 3) determining the format for measurement, 4) reviewing the initial item pool by seven professional experts, 5) conducting preliminary item tryout in 30 persons with CAD, 6) conducting field-test for psychometric property testing in 457 persons with CAD who attended at heart clinic of seven tertiary hospitals in Thailand, and 7) developing scoring and interpretation of the scale score. Data was analyzed by using descriptive statistics, content validity index, Cronbach's alpha coefficient, confirmatory factor analysis by LISREL, and Pearson product moment correlation.

The results showed that the MAS is a self-report, five rating categories Likert-scale format, composed of 25 items covering four constructs; knowing about medication properly (7 items), storing medication appropriately (3 items), self-regulating in taking medication correctly and continuously (11 items), and participating in medication treatment plan (4 items). The MAS was valid and reliable instrument to measure medication adherence for persons with CAD. The MAS had item-content validity index ranged from .86-1.0, and scale-content validity index/average was .99. Cronbach's alpha reliability was high (α= .81). Test retest reliability was acceptable (r=.62, p<.01). Confirmatory factor analysis fit to the empirical data (X^2=533.78, *df*=244, *p*=0.00, X^2/df=2.19, GFI=0.91, AGFI=0.89, CFI=0.94, RMSEA=0.05).

Field of Study: Nursing Science
Academic Year: 2014

Student's Signature .....
Advisor's Signature .....
Co-Advisor's Signature .....

ACKNOWLEDGEMENTS

This dissertation would not have been possible without the essential and generous support of many individuals. First of all, I would like to express my deep appreciation and sincere gratitude to Assoc. Prof. Dr. Sureeporn Thanasilp (major-advisor), and Assoc. Prof. Dr. Waraporn Chaiyawat (co-advisor), for their invaluable guidance and support throughout my Ph.D. life.

I am greatly thankful to my dissertation committee members: Assoc. Prof. Dr. Jintana Yunibhand, Assoc. Prof. Pol. Capt. Dr. Yupin Aungsoroch, Dr. Choosak Khampalikit, and Assoc. Prof. Dr. Orasa Panpakdee for their comment and suggestion.

I wish to acknowledge the financial supports from the 90th Anniversary of Chulalongkorn University Fund (Ratchadaphisek–somphot Endowment Fund) for making this study possible.

I would like to thank all Ph.D. students who have encouraged and supported my work. Moreover, I would like to express a special thanks to the nurses who were co-operation for the data collection.

I would like to thank my colleagues at Rayal Thai Navy College of Nursing who worked hard while I was undertaking this Doctoral program.

I am thankful to my beloved family, Mr. Natthaphon, and Ms. Patsawee Suwannapong who always support and take care of me throughout the difficult times of this Doctorate course.

CONTENTS

Page

Page

Page

LIST OF TABLES

Page

Page

LIST OF FIGURES

Page

CHAPTER I

INTRODUCTION

Background and significance of the study

Coronary Artery Disease (CAD) is increasing in low-middle income countries including Thailand (Kiatchoosakun, Sutra, & Thepsuthammarat, 2012). The nature of persons with CAD has a variety of symptoms such as chest pain, fatigue, and dyspnea. The goals for management of CAD are to control angina symptoms, treat underlying cause, and prevent myocardial infarction (White & Truax, 2007). All persons with CAD require long term medication treatment to prevent disease progression and recurrent cardiovascular events (Pflieger, Winslow, Mills, & Dauber, 2011). Therefore, medication adherence is important for them because it associates with improving quality of life and well-being and reducing morbidity, mortality, re-hospitalization, and costs (Bitton, Choudhry, Matlin, Swanton, & Shrank, 2013).

Medication adherence refers to the extent to which a person's taking medication corresponds with agreed recommendations from health care provider (World Health Organization, 2003). However, medication adherence is a complex, multifaceted and challenging patient behavior. In practical reality, persons with CAD cannot follow a recommended course of treatment (World Health Organization, 2003). Discontinuation of therapy is particularly high in the first year following a

hospitalization (Hauptman, 2008). Hence, persons with CAD are faced to poor medication adherence (Evangelista & Shinnick, 2008; Wu et al., 2009). Poor medication adherence in persons with CAD is a concern for healthcare provider because of not only evokes a waste of resources, but also a missed opportunity for therapeutic benefit.

A nurse is a member in a healthcare team who closely involves in every healthcare setting and can grasp the opportunity to help persons with CAD in improving medication adherence. Nurses take an active role in assessment medication adherence. Assessment is the first and most critical phase of the nursing process. The data is used to identify nursing diagnoses, collaborative problems, make referrals, make judgments about the effectiveness of nursing interventions, and evaluate client care outcomes (Weber, Kelley, & Sprengel, 2014). Thus, the instrument used to measure medication adherence that congruence with nursing practice is importance.

Presently, there are various instruments that have been used to measure medication adherence such as the Morisky Medication Adherence Scale (Morisky, Ang, Krousel-Wood, & Ward, 2008; Morisky, Green, & Levine, 1986), Hill-Bone Compliance Scale (Kim, Hill, Bone, & Levine, 2000), the Medication Adherence Scale (MAS) (Wu, Chung, Lennie, Hall, & Moser, 2008), the Medical Outcome Study (MOS) Specific Adherence Scale (Kravitz et al., 1993), and the Medication Adherence Rating

Scale (MARS) (Thompson, Kulkarni, & Sergejew, 2000). Even though, these instruments can be widely used to assess medication adherence in nursing field. However, they focused on determining adherence behaviors, and barriers to non-medication adherence (Lavsa, Holzworth, & Ansani, 2011). Moreover, they did not reflect holistic approach based on nursing perspective that specific for persons with CAD.

In the nursing perspective, nursing practice dealing with human experience. Nurses are guided to recognize the complexity and uniqueness of each person's relating and experiencing (Mitchell & Cody, 1999). Nurses can improve patients' medication adherence by increase their ability. Therefore, nurses must have accurate information and be knowing about existing conditions and circumstances of patients and about emerging change in them (Orem, Taylor, & Renpenning, 2001). Defining medication adherence into well-defined entities is crucial for nurse to assess and develop such intervention. Even if there are varieties of medication adherence definitions, however, medication adherence in the context of persons with CAD has not yet been described, and the number of scientific evidence from nursing perspective is limited. Characteristic or attributes of medication adherence concept that is specific for persons with CAD is still unclear. Therefore, concept synthesis that describes, and explains about medication adherence for persons with CAD in nursing perspective are needed. In addition, the instrument used to assess medication adherence should be compatible with medication adherence for persons with CAD, and nursing practice.

This study aimed to synthesize the medication adherence for person with CAD, and develop the Medication Adherence Scale (MAS) to measure medication adherence for persons with CAD in nursing perspective. This instrument will be a benefit for nurses to assess medication adherence of persons with CAD. The correct data of specific medication adherence will be benefited for nurses to establish the appropriate intervention to improve medication adherence for persons with CAD, and will be a valid and reliable instrument for future research.

Research questions

1. How is an instrument to measure medication adherence for persons with CAD?

2. What are the psychometric properties of an instrument to measure medication adherence for persons with CAD?

Objectives of the study

1. To develop the medication adherence scale for persons with CAD.

2. To test psychometric properties of the medication adherence scale for persons with CAD.

Scope of the study

This study aimed to develop the MAS to measure medication adherence for persons with CAD. The instrument development procedures consist of seven steps including 1) clarifying and determining the concept, 2) generating an item pool,

3) determining the format for measurement, 4) the initial item pool reviewed by experts, 5) conducting preliminary item tryout for item review, 6) conducting field-test for psychometric property testing, and 7) developing scoring and interpretation of the scale score.

Population and sample in this study were divided into two groups. Firstly, the population was nurses who were experts in medication adherence for person with CAD. The sample consisted of nurses who expert in medication adherence for person with CAD and met with inclusion criteria. Secondly, the population was persons with CAD who attended at out-patient heart clinics of tertiary hospitals (from five geographic areas of Thailand including Bangkok, Central, North, Northeast, and South). The sample was persons with CAD who attended at out-patient heart clinics of seven tertiary hospitals including Ramathibodi Hospital, Police Hospital, Chonburi Hospital, Thammasat Hospital, Songkhlanakarin Hospital, Sappasitthiprasong Hospital, and Buddhachinaraj Phitsanulok Hospital.

Conceptual framework

The MAS was established followed the instrument development procedures which was proposed by Crocker and Algina (1986), and Devellis (2003). The instrument development procedures consist of seven steps including 1) clarifying and determining the concept, 2) generating an item pool, 3) determining the format for measurement, 4) the initial item pool reviewed by experts, 5) conducting preliminary

item tryout for item review, 6) conducting field-test for psychometric property testing, and 7) developing scoring and interpretation of the scale score.

According to the instrument development in this study starting with the concept synthesis of medication adherence to clarify and determine the concept through Delphi technique. Therefore, conceptual framework to develop the MAS in this study was draw based on the concept synthesis results which were presented in Chapter III.

Operational definitions

Medication adherence refers to cognitive and physical actions of person with CAD related to medication taking as prescribed. Cognitive action consists of knowing about medication properly. Physical actions consist of storing medications appropriately, self-regulating in taking medication as prescribes correctly and continuously, and participating in medication treatment plan. The details are as follows:

Knowing about medication properly includes benefit, disadvantage, side effects and solving, preparing, taking, evaluating, and storing medicines,

Storing medications appropriately includes keeping medicines in the right place, right package, and sealed container, discard drug expired and never leaves pills out of foil before time to take.

Self-regulating in taking medication as prescribes correctly and continuously includes never use drugs of the other even same medicine or symptom, taking medicine as prescribed by their doctor, completely, right medicine, right method, right time, right dose, and regularly, never use supplementary food, herb, fruit juice that interfere drug effectiveness, and never adjust dose without a doctor order.

Participation in medication treatment plan includes observing common side effect of the drugs, evaluating their symptom after medication taking, sharing information with a doctor for adjusting the medication treatment harmonize with daily life pattern, informing the doctor in case of having possible side effect or complication to adjust drug prescription, informing the doctor if they have any questions about drug usage, and set agreement with their doctors to select appropriate medication treatment.

Medication adherence was measured by the MAS developed by the researcher.

Scale refers to a composite measure of an attribute, involves the combination of several items that have a logical and empirical relationship to each other, resulting in the assignment of a score to place people on a continuum with respect to the attribute.

Validity refers to a degree to which an instrument measures what it is intended to measure. In this study, two types of validity were tested including content validity and construct validity, the details were as follows:

Content validity refers to the degree to which the items in an instrument adequately represent the universe of content for the concept being measured. Content validity was measured by item-content validity index (ICV-I), and scale-content validity index/average (S-CVI/Ave).

Construct validity refers to the degree to which it measures the construct under investigation. Construct validity was measured by confirm factor analysis.

Reliability refers to the degree to which a measurement is free from measurement error, its accuracy and consistency. In this study, two types of reliability were tested include internal consistency, and stability, the details were as follows:

Internal consistency refers to the degree to which the subparts of an instrument are measuring the same attribute or dimension. Internal consistency was measured by Cronbach's alpha coefficient.

Stability refers to the degree to which similar results are obtained on separate occasions. Stability was assessed through test-retest reliability procedures.

Expected benefits

The MAS will be used as beneficial instrument for nurses to assess medication adherence among persons with CAD that congruence with holistic approach, and nursing perspective. At out-patient heart clinics, nurses can be used this scale when persons with CAD come for follow-up visit. At community area, home health care nurses can be used this scale when they take charge of home visit. The correct data of specific medication adherence will be utility for nurse to find the appropriate intervention to improve medication adherence for persons with CAD. Moreover, this scale can be used as a valid and reliable instrument to measure medication adherence for persons with CAD for future research.

CHAPTER II

LITERATURE REVIEW

This chapter focused on literature reviews that related to develop the Medication Adherence Scale for persons with CAD in nursing perspective. The literature reviews were showed as the follows:

1. Persons with Coronary artery disease (CAD)
2. Medication treatment for persons with CAD
3. Medication adherence
    3.1 Definition of medication adherence
    3.2 Existing instrument to measure medication adherence
4. Medication adherence for persons with CAD
5. Nursing role and medication adherence
6. Concept synthesis
7. Delphi technique
8. Instrument development procedure

Persons with Coronary Artery Disease (CAD)

Coronary Artery Disease (CAD) is also known as coronary heart disease (CHD) and ischemic heart disease. CAD is one of the most deadly diseases posing health hazards to the humankind in our time. The global statistical reports about the news of overwhelming incidence and prevalence of CAD in the world over seem to be very high and ever on the increase. According to World Health Organization, an estimated 17.5 million people died from cardiovascular disease in 2005, representing 30 % of all global deaths. Of these deaths, 7.6 million were due to heart attacks and 5.7 million due to stroke. About 80% of these deaths occurred in low- and middle income countries. If the current trends are allowed to continue, by 2015 an estimated 20 million people will die from cardiovascular disease – mainly from heart attacks and strokes (World Health Organization, 2008).

CAD is narrowing (stenosis) of the coronary arteries as a result of deposition of atherosclerotic plaque, which results in an insufficient supply of oxygen to the heart muscle. CAD may affect one or more arteries, which may be of different diameters. The stenosis of arteries may be partial or total. Coronary artery stenosis may be asymptomatic or may lead to angina – chest pain that may be severe enough to restrict or prevent exertion. A critical reduction of the blood supply to the heart may result in myocardial infarction (MI) or death.

Medication treatment for persons with CAD

Medication treatment is important for persons with CAD. Medications are recommended in persons with CAD as details below:

Lipid Therapy

Lipid management is essential for coronary artery disease patients with have blood lipid levels higher than normal. There are various medications to lower blood cholesterol levels. American Heart Association (2014) stated that statins were recommended for most patients because it is only cholesterol-lowering drug class that directly associated with reduced risk for heart attack and stroke. Current international guidelines of the American College of Cardiology recommend the goal of treatment with lipid-lowering therapy in patients with established coronary artery disease (CAD) should be a low-density lipoprotein cholesterol level of < 100 mg per dL, and less than 70 mg per dL (1.81 mmol per L) for those who had very high risk (Josan, Majumdar, & McAlister, 2008).

Antihypertensive Agents

Lowering blood pressure to 140/90 mmHg or less for persons with CAD, and also a goal of 130/80 mmHg or less, just as for those who had diabetes or chronic kidney disease were recommended (Rosendorff et al., 2007). Antihypertensive drugs decreased blood pressure, it was affected to improve mortality in persons with CAD following MI. Moreover, they can relieve angina symptoms. Antihypertensive drugs

function by decreasing myocardial oxygen demand, lowering left ventricular ejection fraction, and preventing left ventricular hypertrophy (Rosendorff et al., 2007).

Beta blocker

Beta blockers are first-line antihypertensive agents for persons with CAD (Brunzell et al., 2008). Beta blocker had benefit for persons with CAD to decrease heart rate, increase diastolic filling time, and decrease in cardiac contractility. Beta blockers are beneficial for persons with CAD who had angina symptoms because they decrease cardiac oxygen demand (Pflieger et al., 2011).

Angiotensin-converting enzyme inhibitors

Persons with CAD following MI, those who had diabetes, or those who had left ventricular dysfunction were recommended to use .Angiotensin-converting enzyme (ACE) inhibitors. They had benefit treatment for decreasing hypertension in persons with CAD (Fraker et al., 2007). They were reducing vasoconstriction and peripheral vascular resistance and decreasing blood pressure, and also preventing ventricular dilation that can occur in persons with CAD following MI.

Calcium channel blockers

Calcium channel blockers are recommended in case of beta blockers are not tolerated, although beta blockers more effectively relieve angina symptoms and improve exercise tolerance (Pflieger et al., 2011). Calcium channel blocker can increase coronary vasodilation, reduce myocardial oxygen demand, and relieve

symptoms of angina. Moreover, it was associated with increasing in mortality, and improving in cardiovascular events (Nissen et al., 2004).

Nitrates

Nitrates was recommended to use when persons with CAD continues to have angina symptoms despite using a beta blocker, calcium channel blocker, or both. Nitrates can be relaxed vascular smooth muscle and primarily cause vasodilation, reducing preload and decreasing myocardial oxygen demand. Other antihypertensive drugs and drug classes, such as hydralazine, aldosterone antagonists, and diuretics, should be considered based on comorbidities such as heart failure in persons with CAD.

Antiplatelet agents

Antiplatelet therapy is an important component of CAD management because platelet aggregation at atherothrombotic plaque sites can produce clinically significant thrombosis and resultant MI (Pflieger et al., 2011). The most common antiplatelet agents used are aspirin, and clopidogrel (Plavix). Both aspirin and clopidogrel can be prevented platelet aggregation. Aspirin is associated with an increased risk of hemorrhagic events (Berger, Brown, & Becker, 2008). Clopidogrel is approved for the treatment of acute coronary syndrome, recent MI, stroke, and peripheral arterial disease.

Medication Adherence

Definition of medication adherence

Currently, there is no universally accepted definition of “medication adherence” in the wider healthcare field. Indeed, the term “medication adherence”, “adherence to medication”, “adherence to medication regimen”, and “adherence to prescribe medication” have been used interchangeably in the literatures.

Adherence has been defined as the extent to which a person’s behavior (in terms of taking medications, following diets, or executing lifestyle changes) coincides with medical or health advice (Haynes, McDonald, & Garg, 2002). This is the most widely quoted definition in the literatures and retains its usefulness because it specifies several important elements related to adherence. The word “extent” is an important qualifier related to adherence. It conveys that adherence is not a dichotomous, all-or-nothing phenomenon (Rapoff, 2010).

A more recent definition has been offered by the World Health Organization (2003) which defines adherence as the extent to which a person’s behavior – taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a healthcare provider. This definition retains the important elements of the Haynes definition but adds “agreed recommendations,” which implies that agreement to follow regimens has been secured from the patient (Rapoff, 2010). This definition is also consistent with a more patient and family centered approach to adherence that acknowledges that patients and their families

make the initial decision to follow a prescribed regimen and to sustain adherence over time. It also places the responsibility on health-care providers to explain treatment options and negotiate with patients and families on what they are willing to do (Adams, Dreyer, Dinakar, & Portnoy, 2004).

Cohen (2009) explored and clarified the concept of adherence in the context of cardiovascular risk reduction. The result showed that adherence is dependent on the collaborative relationship between patient and healthcare provider. Adherence is influenced by the meaning of health, heart disease, and sense of personal risk as well as socioeconomic status, decision support, motivation, and desire for change, self-efficacy, and sources of credible health information. Attributes of adherence include alignment of patient behavior and health recommendations, mastery of new health knowledge and behavior, continued collaborative relationships between the patient and healthcare provider, and ability to meet outcome targets.

According to definition of adherence it brings the focus on specific behaviors which are required of a prescribed medical regimen such as medication adherence. Medication adherence is a concern for healthcare providers because it associated with reduced morbidity, mortality, re-hospitalization, costs, and also improved well-being and quality of life (Bitton et al., 2013). However, discrepancies between other healthcare providers and nurses occur due to their different perspectives when they assessed medication adherence.

In area of general medicine, medication adherence focused on taking medication as prescribed in relation to dose and frequency. Cramer et al. (2008) described medication adherence as “the degree or extent of conformity to the recommendations about day-to-day treatment by the provider with respect to the timing, dosage, and frequency”. It may be defined as the extent to which a patient acts in accordance with the prescribed interval and dose of a dosing regimen. Anderson (2010) defined medication adherence as “the extent to which the patient's verbal account of medications taken coincides with prescribed-medication orders in relation to dose and frequency”.

Literature from discipline of pharmacy very much mirrors the approach of general medicine and focuses on developing tool to measure medication adherence. Medication adherence refers to taking medication at the appropriated time and in the required number of dosed per day (Dunbar-Jacob, Bohachick, Mortimer, Sereika, & Foley, 2003). Klein et al. (2006) defined medication adherence as “taking a medication or performing a therapy as directed, following both proper schedule and proper technique”. Hauptman (2008) defined medication adherence as “the extent to which patients take medications as prescribed by their health care providers and reflects the broad influences on patient behaviors”. Ho, Bryson, and Rumsfeld (2009) stated that medication adherence usually refers to “whether patients take their medications as prescribed (e.g., twice daily), as well as whether they continue to take a prescribed medication”.

In psychology area, medication adherence focused on taking medication and feelings of embarrassment about having to take medication for a mental health-related illness (Hui et al., 2006; Pope & Scott, 2003).

In nursing perspective, nurses must have accurate information and be knowing about existing conditions and circumstances of patients and about emerging change in them (Orem et al., 2001). The nursing assessment about medication adherence consists of both the action requirements demanded by a specific illness or situation as well as the agent's ability and competence to perform the required actions (Cox & Taylor, 2005). Therefore, medication adherence in nursing perspective not only taking medication but also thinking, assessing, judgment and decision making.

Even though, the term "medication adherence" is already used, but it has not been clarified or described in area of persons with CAD, especially in nursing perspective. Defining medication adherence into well-defined entities is crucial for nurse to assess and develop such intervention. Even though there are varieties of medication adherence definitions. However, medication adherence in the context of persons with CAD has not yet been described, and the number of scientific evidence from nursing perspective is limited. Characteristic or attributes of medication adherence concept that specific for persons with CAD is still unclear. Therefore, describing, and explaining about medication adherence for persons with CAD in nursing perspective are needed.

Existing Instrument to measure Medication Adherence

Medication adherence has been measured in different way by using objective and subjective measurements. However, each measurement has both advantages and disadvantages, and there are no gold standard measurement for assessing medication adherence (Ho et al., 2009; Murray et al., 2004; Osterberg & Blaschke, 2005). The existing instruments for measuring medication adherence were presented as follows.

Objective measurements

Objective measurements include measurement of the level of medicine or metabolite in blood, measurement of the biological marker in blood, pill count, pharmacy refill, and the medication event monitoring system (MEMS).

1) Measurement of the level of medicine or metabolite in blood, and measurement of the biological marker in blood are considered to be more robust than the others, but there are also limitations to these methods of adherence assessment. For example, patients may hide pills in their mouth and discard them later, or there may be variations in metabolism that can affect serum levels. Furthermore, these methods are not practical for routine clinical use (Osterberg & Blaschke, 2005).

2) Pill count is another objective and commonly used method for evaluating medication adherence. Ask the patients to return medications to the

study center or arrange a home visits to count the pills left in their medication bottle and compare to prescription and the date patients refill the medication to calculate their pill count adherence (Wu, Moser, Chung, & Lennie, 2008). Kalichman et al. (2008) studied the reliability and validity of a telephone-based unannounced pill count assessment of antiretroviral adherence. The participants were 89 HIV positive men and woman in Atlanta GA. They were asked to complete a telephone-based unannounced pill count and provide contemporaneous blood specimens to acquired viral loads. In addition during an unannounced home visit, 68 participants also received an immediate second pill count. The result manifested that a high degree of concordance was observed between the number of pills counted on the telephone and in the home (Intraclass Correlation, ICC, = .981, $p < .001$) and percent of pills taken (ICC = .987, $p < .001$). Adherence obtained by the telephone count and home count reached 92% agreement, Kappa coefficient = .94. Adherence influenced by telephone-based pill counts also coincided with patient viral load. These results give a powerful evidence for criterion-related validity. As a result the researchers suggested that for monitoring medication adherence, a telephone-based unannounced pill count offer a practicable objective method.

3) Pharmacy refill is an objective measure. Refill adherence or whether patients refill their medications according to a regular schedule before medications run out (Chui et al., 2003). Pharmacy refill measure is extracted patients' pharmacy refill record from pharmacy claims database. Presently, there are two most

commonly used measures of medication adherence based on pharmacy data are the medication possession ratio and the proportion of days covered methods, which essentially are defined by the number of doses dispensed in relation to a dispensing period. The main difference between these two measures is that the maximum proportion of days covered is 1.0, which indicates full adherence, whereas the medication possession ratio accounts for oversupplies and can have a value >1.0 (Andrade, Kahler, Frech, & Chan, 2006; Halpern et al., 2006).

4) The medication event monitoring system (MEMS) is an objective measure considered as the criterion standard for the measurement of medication adherence (Bouvy, Heerdink, Leufkens, & Hoes, 2003; Dunbar-Jacob et al., 2003). This instrument is drug packages with integral electronic micro circuitry designed to compile the dosing histories of ambulatory patients' prescribed medications. Each monitor consists of a conventional medicine bottle fitted with a special closure that records the time and date of each opening and closing of the container through integrated micro circuitry. Monitors are designed to be used by one patient with one drug. A Reader transfers the dosing history data from the MEMS monitor to a MS-Windows based computer. Throughout the year-long study, there was close correspondence between MEMS-projected and directly measured concentrations of drug in plasma. The ability to use dosing history data to project reliably the continuous course of drug concentration in plasma is the gold-standard

test of any method that purports to compile drug dosing histories in ambulatory patients.

Subjective measurements

1) The Morisky 4-Item Medication Adherence Scale (MMAS-4) (Morisky et al., 1986) comprises of four questions with a yes/no answer format. This instrument was developed from the original five item self-reported scale measuring medication-taking behavior in outpatients being treated for high blood pressure that was described by Green, Levine, and Deed (1975). The theory underlying this instrument was that drug errors of omission could occur in any or all of several ways: forgetting, carelessness, stopping these drugs when feeling better, or starting the drug when feeling worse. The resulting score ranges from 0 to 4 points, and the authors suggested a definition of high (0 points), medium (1-2 points), and low medication adherence (3-4 points). The reliability of the scale is reflected in its relative high (0.61) measure of internal consistency. Principal component analysis was used to determine the extent to which the set of item measure the same construct. In addition to the unidimentionality and reliability of this measure, the scale also demonstrated concurrent validity with blood pressure control at baseline. Data on patient adherence to the medical regimen were collected at the end of a formalized 18-month educational program. Blood pressure measurements were recorded throughout a 3-year follow-up period. The result showed the scale to demonstrate

both concurrent and predictive validity with regard to blood pressure control at 2 years and 5 years, respectively. Seventy-five percent of the patients who scored high on the four-item scale at year 2 had their blood pressure under adequate control at year 5, compared with 47% under control at year 5 for those patients scoring low ($P<0.01$) (Morisky et al., 1986).

2) The Morisky 8-Item Medication Adherence Scale (MMAS-8) is a self-report measure of medication-taking behavior. It was developed from a previously validated four-item scale and supplemented with additional items addressing the circumstances surrounding adherence behavior (Morisky et al., 1986). The theory underlying this measure was that failure to adhere to a medication regimen could occur due to several factors such as “do you sometimes have problems remembering to take your medication”, “do you sometimes forget to take your medication,” and problems with the complexity of the medical regimen such as, “do you ever feel hassled about sticking to your treatment plan”. The questions are phrased to avoid the “yes-saying” bias by reversing the wording of the questions about the way patients might experience failure in following their medication regimen since there is a tendency for patients to give their physicians or other health care provider's positive answers. Each item is measuring a specific medication-taking behavior and not a determinant of adherence behavior. Response categories are yes/no for each item with a dichotomous response and a 5-point Likert response for the last item. Morisky et al. (2008) examined the psychometric properties and tested

the concurrent and predictive validity of a structured, self-reported medication adherence measure in 1,367 patients with hypertension. The eight-item medication adherence scale was reliable (α= 0.83) and significantly associated with blood pressure control (P<0.05). Using a cut point of less than 6, the sensitivity of the measure for identifying low versus higher adherers was estimated to be 93%, and the specificity was 53%. The medication adherence measure proved to be reliable with good concurrent and predictive validity in primarily low income, minority patients with hypertension, and might function as a screening tool in outpatient settings with other patient groups.

3) The Medical Outcomes Study (MOS) Specific Adherence Scale, it was developed for patients with diabetes, hypertension, and heart disease. This scale uses six responses ranging from “none of the time” to “all of the time.” The questions are: 1.) “I had a hard time doing what the doctor suggested to do,” 2.) “I found it easy to do the things my doctor suggested I do,” 3.) “I was unable to do what was necessary to follow my doctor’s treatment plans,” 4.) “I followed my doctor’s suggestions exactly and 5) “Generally speaking, how often during the past 4 weeks were you able to do what the doctor told you?” Items 1 and 3 are reversed such that higher scores indicate better adherence. The total scores of the five items are then average and put on a 0 to 100 distribution. Kravitz et al. (1993) reported a Cronbach alpha coefficient of .78. The scale has adequate reliability and validity, and has been used successfully to measure adherence in persons with CAD. Several

studies used one item from the Medical Outcomes Study (MOS) Specific Adherence Scale assessed self-report medication adherence. In one study, only the one question from the MOS Specific Adherence Scale that is related to medication adherence was used. Patients were asked to rate "how often did you take medication as prescribed (on time without skipping doses) in the past four weeks?" on a scale from 0 (none of the time) to 5 (all of the time). Higher scores indicated higher reported medication adherence (Wu, Chung, et al., 2008)

4) The Medication Adherence Scale (MAS) developed by Wu, Chung, et al. (2008) and tested its reliability and validity in 100 patients with HF. Principal component analysis yielded three factors that explained 63% of the variance in medication adherence: knowledge, attitudes, and barriers to medication adherence. Cronbach's alphas for these subscales ranged from .75 to .94, which supported their internal consistency. The Spearman rho correlation coefficients between the Medication Event Monitoring System and Knowledge, Attitudes, and Barriers scores were .25 to .31 ($P < .05$), demonstrating support for construct validity. The researcher stated that these results support the reliability and validity of the MAS as a measure of knowledge, attitudes, and barriers of medication adherence.

5) Medication Adherence Rating Scale (MARS) was created by Thompson et al. (2000) for assessment of adherence in psychiatric patients. The scale includes 10 items and was first validated in patients with schizophrenia. In the initial validation study, an internal consistency reliability of α = 0.75 was found. A

second validation study in a larger population of patients with schizophrenia, schizoaffective disorder, or delusional disorder found an internal consistency reliability of α = 0.60 (Fialko et al., 2008). The sensitivity and specificity of MARS have not been reported. The scale has also been used in patients with bipolar disorder (Rosa et al., 2007). Development of MARS drew questions from MAQ and another commonly used psychiatric adherence survey, Depression Item Access (validated in schizophrenia). MARS examines adherence behaviors and attitudes toward medication with relatively simplistic scoring. However, it is limited in application to chronic mental illness. MARS is useful in psychiatric practices or psychiatric clinic settings.

6) The Hill-Bone Compliance Scale was developed by Kim et al. (2000) to provide a simple method for health care professionals to determine patient-reported compliance levels. While originally tested in an urban black population, it was later assessed in community-dwelling patients attending an internal medicine clinic (Krousel-Wood, Muntner, Jannu, Desalvo, & Re, 2005). The scale contains 14 items in three subscales that assess medication adherence, sodium intake, and appointment keeping. Each item is assessed on a four-point Likert-type scale. For the overall 14-item scale, internal consistency reliability was high (α = 0.74) in the black population. Using only the nine-item medication adherence subscale in the community- dwelling population, an internal consistency reliability of

α= 0.68 was found. The medication adherence subscale also has been validated in patients with inflammatory bowel disease (Nguyen et al., 2009). The Hill-Bone Compliance Scale is similar to the MAQ in regard to determining barriers to nonadherence such as forgetfulness and adverse effects. The nine adherence questions of the Hill-Bone Compliance Scale are worded specifically in regard to high blood pressure medications. In addition, two questions pertain to keeping appointments and three questions pertain to sodium intake, thus limiting the generalizability across patient populations. The scale is useful in a cardiovascular practice or cardiovascular clinic setting.

Even thought, there are various instruments that have been used to measure medication adherence. However, there are limitations to use in persons with CAD. For instance, the Morisky Medication Adherence Scale focused on determining barriers to nonadherence to medication taking (Lavsa et al., 2011). It is similar to the Hill-Bone Compliance Scale (Kim et al., 2000) that has been used to assess medication adherence focused on determine barriers to nonadherence such as forgetfulness and adverse effects (Lavsa et al., 2011). The Medication Adherence Scale (MAS) developed by Wu, Chung, et al. (2008) has been used to measure three factors that explained the variance in medication adherence: knowledge, attitudes, and barriers to medication adherence. Thus, it isn't measure medication adherence directly. Lastly, the Medication Adherence Rating Scale (MARS) (Thompson et al., 2000) has been used to measure adherence behaviors and attitudes toward

medication in psychiatric patients. Again, it isn't measure medication adherence directly, and limit in application to chronic illness (Lavsa et al., 2011).

Even though, these instruments can be widely used to assess medication adherence in nursing field. However, medication adherence for persons with CAD does not exist, especially in nursing views. There is no the existing instrument that can measure characteristic or attributes of medication adherence directly, especially for person with CAD. Therefore, the instrument development to measure medication adherence for persons with CAD is needed.

Medication adherence for persons with CAD

The natures of persons with CAD have a variety of symptom such as chest pain, fatigue, and dyspnea. The goals for management of CAD are to control angina symptoms, treat underlying cause, and prevent myocardial infarction (White & Truax, 2007). All persons with CAD require long term medication therapy to prevent disease progression and recurrent cardiovascular events (Pflieger et al., 2011). Therefore, medication adherence is important for them because it associates with improving quality of life and well-being and reducing morbidity, mortality, re-hospitalization, and costs (Bitton et al., 2013).

Specification of medication adherence for persons with CAD from literature reviews

The existing characteristics of medication adherence among person CAD have not been described. According to the literature reviews, it was found that specifications of medication adherence are explained as shown in table 1.

Table 1 Specifications of medication adherence from literatures

No.	Specifications of medication adherence
1	Taking medication at the appropriated time and in the required number of dosed per day
2	Taking medications as prescribed by their health care providers.
3	Taking a medication or performing a therapy as directed, following both proper schedule and proper technique
4	Acting in accordance with the prescribed interval and dose of a dosing regimen
5	Taking medications as prescribed by their health care providers and reflects the broad influences on patient behaviors
6	Medication-taking behavior corresponded with the medication regimen prescribed by their healthcare provider

Table 1 Specifications of medication adherence from literatures (Continued)

No.	Specifications of medication adherence
7	Ability and willingness to follow recommended health practices regarding medication management
8	Taking medications as prescribed (e.g., twice daily), as well as whether patient continue to take a prescribed medication
9	Verbal account of medications taken coincides with prescribed-medication orders in relation to dose and frequency
10	Taking medication corresponds with agreed recommendations from a healthcare provider
11	Alignment of patient behavior and health recommendations
12	Mastery of new health knowledge and behavior
13	Continued collaborative relationships between the patient and healthcare provider
14	Ability to meet outcome targets
15	Medication taking corresponds with prescriptions on the current medicine container or the pharmacist's list accompanying prefilled packs
16	Involvement in decision making regarding their medications so that they have a sense of ownership and they are partners in the treatment plan
17	Knowing key information about the drugs (what, why, when, how, and how long)
18	Knowing common side effects of the drugs which they are taking, how to prevent an adverse drug reaction

Table 1 Specifications of medication adherence from literatures (Continued)

No.	Specifications of medication adherence
19	Using medication calendars or schedules that specify the time to take medications, drug cards, medication charts or medicine related information sheets or specific packaging's such as pill boxes, 'unit-of-use' packaging, and special containers indicating the time of dose
20	Collaborate with healthcare provider to incorporate the medication regimen into daily regimen (essential in those on complex drug regimens, those having unintentional difficulties in adherence e.g. elderly)
21	Scheduling appropriate follow up

Medication adherence for persons with CAD from nursing perspective

According to medication adherence is a complex, multifaceted and challenging patient behavior. In practical reality for persons with CAD, they cannot follow a recommended course of treatment (World Health Organization, 2003). Poor medication adherence in persons with CAD is a concern healthcare provider because of not only entails a waste of resources but also a missed opportunity for therapeutic benefit.

Nurse is the one of healthcare team who are present in virtually every healthcare setting, can grasp the opportunity to help persons with CAD in improving medication adherence. Nurses take an active role in assessment medication adherence to select the appropriate intervention.

In nursing perspective, nurses must have accurate information and be knowing about existing conditions and circumstances of patients and about emerging change in them (Orem et al., 2001). The nursing assessment about medication adherence consists of both the action requirements demanded by a specific illness or situation as well as the agent's ability and competence to perform the required actions (Cox & Taylor, 2005). Therefore, medication adherence in nursing perspective not only taking medication but also thinking, assessing, judgment and decision making.

However, medication adherence in the context of persons with CAD has not yet been described, and the number of scientific evidence from nursing perspective is limited. Characteristic or attributes of medication adherence concept that specific for persons with CAD is still unclear. Therefore, the development of medication adherence for persons with CAD in nursing perspective is needed.

Regarding to there is no medication adherence concept development, (Walker & Avant, 2005) states that the concept synthesis is useful in this case. Therefore, this study used concept synthesis to develop medication adherence concept. Specifications of medication adherence for persons with CAD from nursing perspective were showed in chapter III.

Concept Synthesis

There are several ways to synthesize concepts: (1) by discovering new dimensions of old concepts; (2) by examining sets of related concepts for similarities or discrepancies; or (3) by observing new phenomena or clusters of phenomena that have not been described previously.

Concept synthesis is used to generate new ideas. It is useful in several areas: (1) in areas where there is little or no concept development; (2) in areas where concept development is present but has had no real impact on theory or practice; and (3) in areas where observations of phenomena are available but not yet classified or named (Walker & Avant, 2005).

Approaches to concept synthesis

There are several approaches to concept synthesis. Qualitative, quantitative, and literary approaches may be used either alone or together to do concept synthesis.

Qualitative synthesis requires using sensory data such as that gained from listening or observing to obtain information. It speaks to properties of things without assigning a numerical value to the amount of the property present.

Quantitative synthesis requires using numerical or statistical data. It may use any study such as experimental or non-experimental, single case or group design as long as they provide quantitative data about the phenomenon of interest. Statistical methods may be employed to extract clusters of attributes comprising a new

concept as well as depicting those attributes that do not belong to the concept. Measures such as Q sorts, factor analysis, and Delphi techniques are especially helpful for generating meaningful cluster.

Literary synthesis requires the careful examination of literature in order to acquire new insights about phenomena of interest. This examination may yield previously unrecognized concepts for study. Particular to literary concept synthesis is the idea that the literature itself becomes the database.

Mixed methods, any of the three approaches to concept synthesis may be used alone or together. There is no rule of thumb about how or when they may be used. Thus the needs of the theorist and the state of science are what drive decisions and choices of method.

The objective of concept synthesis in this study was to clarifying and determining medication adherence for persons with CAD from nursing perspective. Thus, this study used quantitative synthesis through Delphi technique to develop medication adherence concept.

Procedures for concept synthesis

Concept synthesis employs pulling together various elements of data into a pattern or relationship not clearly seen before to form a new whole, a new concept. The steps of concept synthesis include becoming thoroughly familiar with an area of interest, loosely classifying the data that have acquired about the area of interest, looking for and combining clusters of classified phenomena that seem to relate

closely or overlap, choosing a name for the cluster that accurately represents the phenomenon and that will facilitate communication about it, verifying the new concept empirically, and determining if or where the new concept fits into current theory and practice (Walker & Avant, 2005).

According to this strategy is limited by the length of time need for full concept development. Thus, the procedures used for concept synthesis in this study were categorized into three steps: (1) classifying; (2) clustering; and (3) verifying the concept of medication adherence.

Utilizing the results of concept synthesis

Concept synthesis is useful because there is a need wholly new concept. According to knowledge development in the nursing discipline requires valid new concept. New concept is useful in both nursing science and in nursing practice. The new concept of medication adherence for persons with CAD may give nurses fresh insights into patient problems, new nursing diagnosis, and possible new nursing interventions. In research and theory building, the new concept may provide fruitful new hypotheses or induce a change in thinking about some phenomenon of concern that in turn will generate more research (Walker & Avant, 2005).

Delphi Technique

The Delphi technique has been defined as “a multi-staged survey which attempts ultimately to achieve consensus on an important issue” (Keeney, Hass, & McKenna, 2011).

Defining expert

Usually, a random sampling technique is not always used to perform Delphi so that depends on each area of interested to get the number of experts. There have been defined the term of expert such as an expert refers to a group of informed individuals” (McKenna, 1994a), a specialist in their field (Goodman, 1987), someone who has knowledge about a specific subject (Green, Jones, Hughes, & William, 1999).

Sampling criteria

In order to enhance the a variety of recruited sample, researcher identifies very board inclusion criteria e.g. healthcare professionals need to have 3 years post-qualification experience in each area, be educated to postgraduate level, have been working in the required area and have will to join the study (Keeney et al., 2011). Generally, the criteria for selecting expert include 1) have knowledge and experience in the required issue, 2) will to participate, 3) being dedicated to spend the time, 4) have written competence, and the skills and knowledge do need not relate with academic standard (Skulmoski, Hartman, & Krahn, 2007).

Number of the expert panel

The rule of thumb for calculating the expert size is not limited but it is all depended on each topic, the related perspectives required, complexity of the problem, research design, representativeness, resources accessibility and number of required expert (Powell, 2003). There is a recommendation that if the sample is quite similar, then required small sample size e.g. 10-15 sample (Skulmoski et al., 2007).

The Delphi technique process

There is the guideline to perform the Delphi technique as following:

Round 1: it starts with an open-ended questionnaire which serves as the cornerstone to solicit the specific data about a content area from the subjects (Custer, Scarcella, & Stewart, 1999; Hsu & Sandford, 2007). All responses from subjects will be converted into a well-structured questionnaire to use as the instrument for the next round. However, it is acceptable to use a structured questionnaire in Round from the intensive literature review.

Round 2: each subject receives a next questionnaire to review the summarized items. Consequently, the identification disagreement and agreement area will be done (Hsu & Sandford, 2007; Ludwig, 1994).

Round 3, a questionnaire will be delivered to panelist to revise their judgments. Anyhow, only a small degree of consensus is expected from this round (Dalkey & Rourke, 1972; Hsu & Sandford, 2007; Weaver, 1971).

Round 4: the remaining items, their ratings, alternative opinions, and items yielded consensus will be delivered to the panelists. This step provides a final occasion to revise their judgments. It should be kept in mind that the number of Delphi iterations related to n the degree of consensus sought by the investigators and can vary from three to five (Delbecq, Van de Ven, & Gustafson, 1975; Hsu & Sandford, 2007; Ludwig, 1994).

Time Requirements

Delphi study can be time-consuming especially when the instrument has big statements, samples that would need more time to complete the questionnaires. Ludwig (1994) recommended the 45 days for the administrating a Delphi study.

Sample motivation

Sandrey and Bulger (2008) stated that keeping the expert motivated is the key for gaining a high response rate in each round. It is important to keep the expert panel motivated and interested enough to complete and return all the Delphi rounds questionnaires which were sent to them. This can be achieved by keeping the panel up to date with the progress of the Delphi (Keeney et al., 2011).

Data Analysis

It is recommended to achieve 80 percent of subjects' votes fall within two categories on a seven-point scale (Hsu & Sandford, 2007; Ulschak, 1983). Moreover, Green (1982) recommends that 70 percent in minimal of Delphi subjects need to rate

three or higher on a four point Likert-type scale and the median has to be at 3.25 or higher.

Furthermore, measures of central tendency (means, median, and mode) and level of dispersion (standard deviation and inter-quartile range) statistics are used to present the judgments of subjects (Hasson, Keeney, & McKenna, 2000; Hsu & Sandford, 2007). From literature review, median score which based on Likert-type scale was strongly recommended (Hill & Fowles, 1975; Hsu & Sandford, 2007; Jacobs, 1996).

Nursing Role in Medication Adherence

To improve patient's medication adherence, nurses can change patients' understanding about their medications and their willingness to take the drugs. Moreover, the therapeutic relationship can be developed since patients admit to the hospital by nurse's teaching. While patients admit in the hospital, nurses continually inform them about their medication. Nurses who are administered the drugs always explain what kind of medications they are going to take, and the reason why they have to take it. Previous studied found that nurses who educated patients when they leave the hospital and pharmacists who giving advice the patients when they pick up their medicines are the most influential persons in encouraging patients continue to take their medications. At the time of discharged, the patient is very knowledgeable about the actions of the medication and why they should continue the medication.

Patients also need reinforcement once at home, with home visits or a follow-up phone call.

It is difficult to detect whether patients are adherent to therapy. Therefore, it is oppressive on the prescriber to stress the importance of medication adherence and to make an effort to simplify the treatment regimen so that patients take prescribed medications.

Nurses should take an active role in assessment, education, care planning, and strategic implementation efforts that support patients' optimal self-care behaviors and promote medication adherence. Nurses are the primary providers of education. Considerable attention should be focused on ensuring patients' understanding and improving long term adherence.

Critical and intermediate care nurses play a role in both regards. Nurses work collaboratively with other team members to ensure that medications are prescribed. Before discharge, nurses are often responsible for educating patients about how to take prescription drugs according to the plan of care. In addition, nurses assess patients' understanding of self-care principles associated with optimal care for heart failure. Although education is only 1 factor related to optimal self-care, adherence and understanding of self-care expectations provide part of the foundation of success.

Nurses can improve patients' outcomes and self-care by educating patients about the complexities of medication therapies, the potential of adverse events, and the importance of maintaining therapy. Patients who receive limited counseling about medications may be less likely than those who receive more counseling to adhere to their prescribed regimen. When physicians prescribe a new medication for a patient, they may not communicate critical elements of medication use that might contribute to misunderstandings about medication directions or necessity and, in turn, lead to the patient's failure to take medications as directed (Tarn et al., 2006).

At the first several weeks of treatment are the critical period for patients to discontinuing their medications (Kramer, Hammill, Anstrom, & al., 2006). Nurses can play the vital role by providing education to them before their discharge for promoting greater medication adherence. Moreover, the ongoing nursing interventions such as patient reminders to take medications, clinical visits, telephone calls, and simplifying the drug regimen can improve long-term health outcomes (Haynes et al., 2002; Petrilla, Benner, Battleman, Tierce, & Hazard, 2005; Roter et al., 1998; Roumie, Elasy, & Greevy, 2006).

To manage a diversity of chronic conditions, nurse-led management approaches are effective. Both comprehensive discharge planning and immediate outpatient reinforcement were contained in the educational program for patients with heart failure. This intervention was directed through nurse home health care by

a skillful cardiac nurse educator (Anderson, Deepak, Amoateng-Adjepong, & Zarich, 2005). Therefore, in order to improve medication adherence, providing ongoing support after discharge and facilitated dosing regimens are challenged for nurses.

A nurse-directed multidisciplinary intervention program for elderly patients with heart failure that consisted of comprehensive patient and family education, dietary prescription, social service consultation and discharge planning, medication review, and intensive follow-up led to improved morbidity outcomes (Rich et al., 1995).

In summary, nurses is the one of healthcare team who are present in virtually every healthcare setting, can grasp the opportunity to help persons with CAD in improving medication adherence.

Instrument Development

The instrument development procedures consist of seven steps including 1) clarifying and determining the concept, 2) generating an item pool, 3) determining the format for measurement, 4) the initial item pool reviewed by experts, 5) conducting preliminary item tryouts, 6) conducting field-test for psychometric property testing for the final form of the test, and 7) developing scoring and interpretation of the test score (Crocker & Algina, 1986; Devellis, 2003). The details were as follows:

1. Clarifying and determining the concept

Thinking clearly about the content of a scale requires thinking clearly about the construct being measured. Although there are many technical aspects involved in developing and validating a scale, one should not overlook the important of being well grounded in the substantive theories related to the phenomenon to be measured. Theory is a great aid to clarity. Even if there is no available theory to guide the investigators, they much lay out their own conceptual formulations prior to trying to operationalize them (Devellis, 2003).

2. Generating an item pool

Generating item pool should be covering all aspect of the operational definitions. For the first draft, a large number of items helps to ensure that we will eventually have a final scale with good internal consistency, according to Devellis (2003) recommends starting with 3 to 4 times as many items as many items as the final scale (e.g. 30 to 40 items for a 10-item scale), but at a minimum there should be 50% more (e.g., 15 items for a 10-item scale).

3. Determining the format for measurement

Determining the format for measurement or response categories should occur simultaneous with the generation of items. The researcher should consider early on what the format will be (Devellis, 2003). In general, there are numerous types of response format, however in this study only summative scales including a set of items, the respondents answer each item, and then a numerical score of each item is

added to indicate the respondent's total score on the measured phenomenon or concept. With equally weighted items, there is a variety of response option formats from which the researchers can select which offers them a good deal of latitude in constructing a suitable scale. However, the rating scale is the most common scaling methods for summative scale. The Likert-scale is the most frequently used rating scales, especially in measuring opinion, belief, and attitudes. These scales are easy to work with and are easily understood by respondents. With this type of scale, an item is presented as declarative sentence, followed by response option that indicate varying the degree of frequency from never to always.

4. The initial item pool reviewed by expert

This process is asking a group of people who are knowledgeable in the content area to review the item pool. This review serves multiple purposes related to maximizing the content validity. First, having experts review the item pool can confirm or invalidate the definition of the phenomenon. Second, reviewers also can evaluate the items clarity and conciseness. Expert reviewers can provide is pointing out ways of tapping the phenomenon that have failed to include. Content validity will be obtained by computing content validity index (CVI) for both item level and scale level. For item-level CVI (I-CVI), a panel of experts will be asked to rate each scale item in terms of its relevance to the concept of interest. Four-point scale will be used as recommended in literature to avoid having a neutral and ambivalent midpoint: 1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, and 4 = high

relevant (Polit, Beck, & Owen, 2007). For each item, the I-CVI will be computed as the number of experts giving the rating of either 3 or 4, divided by the total number of experts. I-CVI less than .80 will be considered for exclusion or revision. Scale-level CVI (S-CVI) means the average proportion of items rated as 3 or 4 across the various judge of experts. Average S-CVI will be calculated by summing of I-CVI and dividing by the number of items. The first draft of the scale will be emerged after content validity testing.

5. Conducting preliminary item tryouts

Before the researcher has a printed item in final form for a field test. The preliminary item tryouts will be conducted to test the items on small samples. It might be necessary to use as few as 15 to 30 subjects for preliminary item tryouts. Preliminary item tryouts are fairly informal, and the researcher should use this opportunity to observe examinees' reactions during testing, nothing such behaviors as long pauses, scribing, or answer-changing, which may indicate confusion about particular items. After the testing session, a debriefing should take place in which examinees are invited to comment on each item and offer suggestions for possible improvements. It is important to recognize that although the final decisions about which items to retain and which to eliminate are made on the basis of the large-scale field test, item are often revised extensively after reviewing the results of preliminary tryouts (Crocker & Algina, 1986).

6. Conducting field-test for psychometric properties testing

Field testing typically involves the administration of the items in their final draft form to a large sample of examinees representative of those for whom the test is designed. Designing item field-test studies and conducting appropriate analyses, once a final form of the test is assembled, it is incumbent on the test developer to undertake studies of the test scores reliability and validity (Crocker & Algina, 1986)

Item analysis is employed to select the appropriate items that were representative of the sample domain of the item universe in order to construct the final draft scale. Therefore, the descriptive statistics of each item, item-total correlation, item-item correlation, and Cronbach's alpha coefficient is examined. The details of each analysis are explained as follows:

The descriptive statistics including mean, standard deviation, skewness, and kurtosis was examined. The criterions for selecting the appropriate items were considering skewness values which range from -1 to +1 (Hair, Anderson, Tatham, & Black, 1998), and kurtosis values which is less than 2 (Wagner, Schnoll, & Gipson, 1998).

Item-total correlation is proposed in terms of the precision of the item indicating how strongly an individual item reflected the total scale. The item-total correlation was calculated by using the Pearson product-moment correlation. The acceptable range of item-total correlation was .20 to .70. Those less than .20 did not contribute much to the measurement of the concept, while those greater than .70 were probably redundant (Idvall, Hamrin, & Unosson, 2002). Therefore, items with an

item total correlation of less than .20 will be deleted, and the paired items with an item-item correlation greater than .70 are considered the best for each paired item.

Psychometric properties testing

Evidence of validity and reliability is of crucial importance for a new development instrument tool. The psychometric property testing concerns with validity and reliability of instrument as follows:

Validity

Validity is "a determination of the extent to which the instrument actually reflects the abstract construct being examined" (Burn & Grove, 2005) or "a degree to which an instrument measures what it is intended to measure" (Polit & Beck, 2014). Therefore when an instrument is valid, it truly reflects the concept it is supposed to measure (LoBiondo-Wood & Haber, 2006). There are four type of validity as follows:

1) Content validity is the extent to which the instrument represents the phenomena under study (Dempsey & Dempsey, 2000). This type of validity addresses how well the items developed to operationalize a construct provide an adequate and representative sample of all the items that might measure the construct of interest (Kimberlin & Winterstein, 2008). Validity of content is usually establish by having experts in the field, and subjects or patients from the population for whom the instrument would be appropriate, review the instrument and provide critical evaluations of content (Switzer, Wisniewski, Belle, Dew, & Schultz, 1999).

The processes of content validity consist of identification of domain or concept analysis and generation of an instrument. Content validity assesses semantic clarity, domain sampling adequacy, and coherence of items. The methods for evaluating consist of: 1) literature review about historical and current concept/instrument, 2) personal reflection, and 3) analytical critique; (a) by experts (clinicians and researchers), and (b) by potential subjects (focus groups) (Higgins & Staub, 2006). Content validity index (CVI) is the mostly used for reflecting the level of content validity. The experts were asked to rate 4-point rating scale (1=not relevant to 4=very relevant) on each item by considering the content relevance. Items rated as either 3 or 4 were scored. A CVI score of .80 or better indicates good content validity (Polit & Beck, 2004).

2) Face validity is "determined by inspecting the items to determine whether "on the face of it" the instrument contains important items that measure the phenomena under study" (Dempsey & Dempsey, 2000) or "concerns the extent to which items in a measure accurately reflect the full breadth of the construct of interest" (Switzer et al., 1999).

3) Construct validity is the most important and highest level of validity (Polit & Beck, 2004). Construct validity is "directly concerned with the theoretical relationship of a variable to other variables" (Devellis, 2003). It focuses on what really want to measure. It shows that how the instrument is valid. There are three processes to test construct validity. Firstly, the domain of relevant variables

was specified. Secondly, the extent to which observables measure the same or different things was determined. Finally, relevant research to determine the properties of measure consistent with the substantive theory was done (Nunnally & Bernstein, 1994). Assessing the instrument's worth should be described. There are three ways to examine the construct validity as follows:

a) Factor analysis which is "a method for identifying unitary clusters of related items or measures on a scale" (Polit, Beck, & Hungler, 2001). It refers to the instrument's ability for operationalizing theoretical construct. It was determined the relationships of variables set (Higgins & Staub, 2006). There are five processes of factor analysis: 1) the variables are grouped or clustered, 2) the variables belong to which group, and how strongly they belong are identified, 3) the relationship among variables and how many dimensions are explained, 4) a reference frame of relationships among variables are described, and 5) score of individuals on such groupings (Nunnally & Bernstein, 1994). Confirmatory factor analysis is used to validate the instrument equivalence and the number of constructs among comparison groups. Items which loading on the same factor, it was designed to measure the same dimension. Therefore, the items will be deleted if its fall into a factor (Burn & Grove, 2005). The related items will be clustered, if the theory is truly reflected.

b) Contrasted or known group validity refers to ability of instrument identifies two groups of individuals who are suspected to score

extremely high or low in the characteristics being measured by the instrument (LoBiondo-Wood & Haber, 2006). Least two groups of sample who had opposing response to the items of the scale are selected. In case of sensitive instrument, these two groups should differ significantly. It revealed that evidence of construct validity would be supported.

c) Multitrait-multimethod validity refers to involves examining the relationship between instrument that should measure the same construct and between those that should measure different constructs (LoBiondo-Wood & Haber, 2006). The procedure involves measuring more than one construct by means of more than one method so that one obtains a fully crossed method-by-measure matrix (Devellis, 2003). The results of one of those measures should then be correlated with the results of each of the others in a multitrait-multimethod matrix.

4) Criterion-related validity is concerned with the statistical testing of theoretical relationships within an instrument, between 2 instruments, and/or an instrument and an event that occurs before, during, or after an instrument is used to measure the concept of interest (Higgins & Staub, 2006). The instrument is said to be valid if its scores correlate highly with score on the criterion (Polit & Beck, 2004). There are two ways to examine the criterion-related validity as follows:

a) Predictive validity refers to “the adequacy of an instrument in differentiating between people’s performance on some future

criterion" (Polit & Beck, 2004). Therefore the criterion of instrument must be administered sometime after the predictor instrument (Talbot, 1995).

b) Concurrent validity refers to "ability to detect a positive or negative statistical relationship between two instruments simultaneously measuring the same concept at the same time or how well an instrument correlates with another instrument that is known to be valid" (Dempsey & Dempsey, 2000). It was reported as a correlation coefficient (*r*) (Higgins & Staub, 2006).

Reliability

Reliability of instrument denotes the consistency of measures and indication of the extent of random error in the measurement method (Burn & Grove, 2005). If the same individuals are measured under the same conditions, a reliable measurement procedure will produce identical or nearly identical measurements (Gravetter & Forzano, 2003). Coefficient is usually expressed reliability of instrument (Dempsey & Dempsey, 2000). It ranges from 0 to 1. The more reliable is the closer to 1. The reliable coefficient of instrument is 1 indicate a perfect reliability; while coefficient is 0 indicate no reliability. The lowest acceptable coefficient value is .80 (Burn & Grove, 2005; Dempsey & Dempsey, 2000). There are three ways for reliability testing: internal consistency, stability, and equivalence.

1) Internal consistency or homogeneity is instrument's attribution which reflects that items measure the same concept (LoBiondo-Wood & Haber, 2006). The most widely used for reliability aspect is internal consistency which

is economical and the best means for assessing measurement error in psychosocial instruments (Polit & Beck, 2004).

2) Stability is “the same results will be obtained over repeated administration of instrument” (De Muth, 2014). The sets of data are statistically compared. Understanding the concept of interest, the time between measurement, and intervening factors are required for assessing stability of measurement (Higgins & Staub, 2006). It is usually referred to as test-retest reliability. Test-retest reliability is the administration of the same instrument to the same subjects under similar conditions on two or more occasions. It was reported as a correlation coefficient (*r*) (Higgins & Staub, 2006; LoBiondo-Wood & Haber, 2006).

3) Equivalence is focused on the comparison of two versions of the same paper and pencil instrument or of two observers measuring the same event (Burn & Grove, 2005). The resulting data can then be used to calculate an index of equivalence or agreement. That is, a reliability coefficient can be computed to demonstrate the strength of the relation between the observes’ rating (Polit et al., 2001).

The important approaches of instrument development are validity and reliability. If an instrument is unreliable, it lacks adequate validity or cannot possibly be valid (Polit & Beck, 2004; Polit et al., 2001). An instrument cannot validly be measuring the attribute of interest if it is erratic or inaccurate and an instrument can be reliable, however, without being valid (Polit et al., 2001). Therefore,

establishing validity and reliability represent the accuracy and quality of new instrument.

7. Developing scoring and interpretation of the test score

In this step, the level of medication adherence is created on the basis of the MAS total scores. The MAS score should indicate the level of medication adherence; the higher the score, the higher the medication adherence.

CHAPTER III

METHODOLOGY

This chapter explained the research methodology of the study. Describing seven steps of the instrument development procedure include 1) clarifying and determining the concept, 2) generating an item pool, 3) determining the format for measurement, 4) the initial item pool reviewed by experts, 5) conducting preliminary item tryout for item review, 6) conducting field-test for psychometric property testing, and 7) developing scoring and interpretation of the scale score. In addition, providing population, sample, the procedure used for collecting the data, and providing an explanation of the statistics used to analyze the data were presented in each step.

According to the first step of the instrument development, it was clarifying and determining the concept using Delphi technique. The results were used in the next step of generating an item pool; therefore, the results of Delphi technique were presented in this chapter.

Research design

Quantitative methodologic research design (Polit & Beck, 2014) was used for this study.

Instrument Development Procedure

This study aimed to develop instrument to measure medication adherence for persons with CAD. The instrument development procedure composed of seven steps including 1) clarifying and determining the concept, 2) generating an item pool, 3) determining the format for measurement, 4) the initial item pool reviewed by experts, 5) conducting preliminary item tryouts for item review, 6) conducting field-test for psychometric property testing, and 7) developing scoring and interpretation of the test score.

Step 1: Clarifying and determining the concept

Even though there are varieties of medication adherence definitions. However, medication adherence in the context of persons with CAD has not been described previously, and has been limited scientific evidence supported regarding nursing perspective. Characteristic or attributes of medication adherence concept that specific for persons with CAD is still unclear. Describing, explaining, and predicting about medication adherence has been limited by the inability to capture this concept in a way that is easily communicated, or documented. Therefore, the aim of this phase was to clarify and determine medication adherence for persons with CAD in nursing perspective through concept synthesis including classifying, clustering and verifying the characteristic of medication adherence by using Delphi technique.

Population and sample

In this phase, the population was nurses who expert in cardiovascular nursing and medication adherence for persons with CAD. The sample was divided into three groups as inclusion criteria as follows:

1) Advance practice nurse

a) Having certification of advance practice nurse

b) Having experience in medication adherence among persons with CAD more than three years

c) Must be currently practiced in clinical setting

d) Willingness to participate in this study

e) Having sufficient time to participate in Delphi process

2) Nurse educator

a) Graduate of Ph.D. program

b) Teaching about medication adherence in persons with CAD

c) Having publications in medication adherence for persons with cardiovascular disease

d) Willingness to participate in this study

e) Having sufficient time to participate in Delphi process

3) Registered nurse

a) Having experience in medication adherence among persons with CAD more than 10 years

b) Must be currently practiced in clinical setting

c) Willingness to participate in this study

d) Having sufficient time to participate in Delphi process

Sample size

Regarding the appropriate number of subjects to involve in a Delphi process, there is a recommendation that if the sample is quite similar, then required minimum sample size 10-15 samples. Therefore, in this study, 17 expert nurses include 14 advance practice nurses, two nurse educators, and one registered nurse were participated.

Sampling technique

Purposive and snowball sampling procedure was used to select the sample of 17 expert nurses. Snowball sampling was designed to identify sample with particular knowledge, skills or characteristics. Snowball sampling was done by asking nurse expert to nominate another person with the same trait for the next subject, and continue in the same way until obtaining sufficient number of subjects.

Instrument

There are three instruments used in Delphi study including:

1) The Round 1 Interview guide.

According to literature reviewed, it found that there was no existing characteristics or attributes of medication adherence for persons with CAD. Therefore, two questions were used to interview the experts including "Would you tell me the meaning of medication adherence from your perspective?" and "Please tell me about characteristics of medication adherence for persons with CAD".

1) The Round 2 Questionnaire

The researcher established this questionnaire from reviewed literature, and analyzed the data in the first round. The data from interviewing was verbatim recorded, then, analyzed by using content analysis. The statements that reflected characteristic of medication adherence for persons with CAD were identified. Then, the statements from literature reviewed and interviewing that either the same or so similar were classified. After that, looking for and combining classified statements that seem to relate closely or overlap. Finally, a name for the cluster that accurately represents characteristics of medication adherence was chosen. Four names of cluster including 1) knowing about medication properly, 2) storing medication appropriately, 3) self-regulating in taking medication adherence correctly and continuously, and 4) participating in medication treatment plan were chosen. Then, the researcher generated item pool by using the analyzed statements.

The scale consists of 47 items covering 4 domains including knowing about medication properly (10 items), storing medication appropriately (6 items), self-regulating in taking medication adherence correctly and continuously (22 items), and participating in medication treatment plan (6 items). Each item was five rating scale Likert type (1 = strongly disagree, 2 =disagree, 3 = neutral, 4 = agree, and 5 = strongly agree).

3) The Round 3 Questionnaire

This questionnaire was established based on the results of Delphi round 2. The data from the second round was analyzed using median (Mdn), and inter-quartile range (IR). Comment and suggestion of experts were used to revise or add in the scale. The round 3 questionnaire consists of 47 items covering four domains including knowing about medication properly (10 items), storing medication appropriately (6 items), self-regulating in taking medication adherence correctly and continuously (22 items), and participating in medication treatment plan (6 items). Each item was five rating scale Likert type (1 = strongly disagree, 2 =disagree, 3 = neutral, 4 = agree, and 5 = strongly agree), and added an indication of the overall group response to that item and the individual's own response.

The questionnaire was stemmed from group opinion; therefore, they are more valid than a decision made by a single person. The process is based on expert opinion from the real clinical situation providing confirmative judgments. In addition, the process of the Delphi combining an open first qualitative

round, allows experts to generate scale items and the continual succession of rounds allows the opportunity to review and judge the appropriateness. Based on these assumptions, numerous writers claim that the Delphi provides evidence of content (Huang, Lin, & Lin, 2008; Keeney et al., 2011; Morgan, Lam-McCulloch, Herold-McIlroy, & Tarshis, 2007).

Data collection

Data was collected after getting permission from the director of each hospital, the dean of each faculty, and expert nurses. If the participants do not want to answer the questionnaires, or do not have sufficient time to participate in Delphi process, they have the right to withdraw themselves from the study at any time without a penalty.

Delphi Round 1: Face-to-face interviews

The aim of the first round was to identify and classify the characteristics of medication adherence from nursing perspective. Experts were one-to-one interviewed to respond specific questions on definition, and characteristics of medication adherence for persons with CAD from their perspective by using the Round 1 Interview Guideline. The data from interviewing were verbatim recorded, then, analyzed by using content analysis. The statements that reflected characteristic of medication adherence were identified. Then, the statements that very similar were classified. After that, looking for and combining classified statements that seem to relate closely or overlap. Lastly, choosing a name for the cluster that accurately

represents characteristics of medication adherence. In this process, the researcher conducted under supervised of advisors. The time for collecting data in the first round was 48 days (November 6, 2013 to December 23, 2013).

Delphi Round 2: Postal round

The aim of this round was to cluster the characteristics of medication adherence. The same expert panels who had participated in the first round were asked to complete Round 2 Delphi questionnaire which was posed to them and included a stamped addressed envelope for ease of return. The expert panels were asked to rate each statement on a five-point scale from strongly disagree to strongly agree, asked to optionally comment on each statement, and asked to return the completed questionnaire within two weeks using the enclosed stamped addressed envelope or E-mail. In this round, the time for collecting data was 19 days (January 20, 2014 to February 7, 2014).

Delphi Round 3: Postal round

The purpose of the third round was aimed to verify the medication adherence concept. The experts were asked to re-rate the items in the light of the overall group response using the Round 3 Delphi questionnaire. The experts were asked to return the completed questionnaire within two weeks using the enclosed stamped addressed envelope or E-mail. The researcher analyzed the data from the third round to get consensus in the selection statement that represent

characteristics of medication adherence for persons with CAD. In this round, the time for collecting data was 18 days (March 4, 2014 to March 21, 2014).

Sample motivation

In this study, the researcher kept the expert panel motivated and interested enough to complete and return all the Delphi rounds questionnaires which were sent to them by keeping the panel up to date with the progress of the Delphi.

Data analysis

The data were analyzed by using content analysis and descriptive statistic include percentage, median (Mdn), interquartile range (IR), and consensus level of agreement. Criteria for gaining consensus in the selection statement that represents characteristics of medication adherence was median equal to or greater than 3.50, interquartile range equal to or less than 1.50, and consensus level of agreement more than 70% (Keeney et al., 2011).

Results

Definition of medication adherence from nurse expert

Nurse experts defined medication adherence as “taking medication as prescribed by their doctor”, “taking medication as prescribed by their doctor correctly”, “not only taking medication, but also storing medication, and participation in medication treatment”.

Characteristics of medication adherence

After the first round, 47 statements that reflected characteristic of medication adherence were identified. Three statements that very similar were deleted. Therefore, of 47 statements were reduced to 44 statements. After that, looking for and combining classified statements that seem to relate closely or overlap. Lastly, choosing a name for the cluster that accurately represents characteristics of medication adherence including knowing about medication properly (10 statements), storing medications appropriately (6 statements), self-regulating in taking medication as prescribes correctly and continuously (22 statements), and participating in medication treatment plan (6 statements).

The second round aimed to cluster the characteristics of medication adherence using consensus of the expert panel. A total of 17 questionnaires were returned in this round, representing a response rate of 100%. In second round, 42 statements were gained consensus to be medication adherence for persons with CAD covering four clusters. As shown in table 2, knowing about medication properly consist of eight statements (Mdn = 4.52-4.64, IR = 0.80-1.47). Storing medications appropriately consist of six statements (Mdn = 4.64-4.69, IR = 0.61-1.02). Self-regulating in taking medication as prescribes correctly and continuously consist of 22 statements (Mdn = 4.52-4.71, IR = 0.57-1.40). Lastly, participating in medication treatment plan consist of six statements (Mdn = 4.64-4.69, IR = 0.60-0.90).

The third round aimed to verify the medication adherence concept using consensus of the expert panel. A total of 17 questionnaires were returned in this round, representing a response rate of 100%. In the third round, 42 statements were verified and gained consensus to be medication adherence for persons with CAD covering four clusters. As shown in table 2, knowing about medication properly consists of eight statements (Mdn = 4.52-4.64, IR = 0.80-1.06, and consensus level of agreement = 94.1-100%). Storing medications appropriately consists of six statements (Mdn = 4.69-4.75, IR = 0.50-0.61, and consensus level of agreement = 94.2-100%). Self-regulating in taking medication as prescribes correctly and continuously consists of 22 statements (Mdn = 4.57-4.80, IR = 0.50-0.91, and consensus level of agreement = 88.2-100 %). Lastly, participating in medication treatment plan consist of six statements (Mdn = 4.67-4.75, IR = 0.50-0.65, and consensus level of agreement = 100%).

Based on the results in the third round, 15.14% of the experts changed their answers. Therefore, the researcher stopped for collecting the data at Round 3.

Table 2 Consensus of expert panel reached on characteristics of medication adherence

Dimension/Statement	Round 2		Round 3		
	Mdn	IR	Mdn	IR	consensus level of agreement (%)
Knowing about medication properly					
1. Knowing how to take medicines correctly	4.64	0.80	4.64	0.80	100
2. Knowing the disadvantage if they don't take the medicine	4.61	0.91	4.64	0.80	100
3. Knowing the benefit of each medicine they use	4.61	0.96	4.61	0.91	100
4. Knowing how to evaluate drugs usage	4.57	1.26	4.57	0.97	100
5. Knowing how to perform when side effect occurred	4.57	1.26	4.57	0.97	100
6. Knowing how to store medicines	4.52	1.47	4.57	1.03	100
7. Knowing how to prepare medicine	4.52	1.00	4.52	1.00	100
8. Knowing the side effects of each medicine they use	4.52	1.28	4.52	1.06	94.1
Storing medication appropriately					
9. Never leave pills out of foil before time to take	4.69	0.61	4.75	0.50	100
10. Storing sublingual drugs into the brown container, bottle, or bag that protected from light	4.69	0.61	4.75	0.50	100

Table 2 Consensus of expert panel reached on characteristics of medication adherence (Continued)

Dimension/Statement	Round 2		Round 3		
	Mdn	IR	Mdn	IR	consensus level of agreement (%)
11. Discard drug expired	4.67	0.65	4.73	0.53	100
12. Keeping medicines in sealed container	4.64	0.80	4.69	0.61	100
13. Keeping medicines in right place	4.64	1.02	4.69	0.61	94.2
14. Never keep all drugs in the one container	4.64	0.83	4.69	0.61	94.2
Self-regulating in taking medications correctly and continuously					
15. Taking medicine with right dose	4.69	0.61	4.80	0.50	100
16. Taking medicine regularly	4.69	0.61	4.75	0.50	100
17. Taking medication as prescribed continuously throughout the duration of the treatment	4.71	0.57	4.75	0.50	100
18. Refill medication continuously	4.71	0.57	4.75	0.50	100
19. Ask for help from relatives or caregivers in case of having problem about drug usage at home	4.71	0.57	4.75	0.50	100
20. Taking right medicine	4.69	0.61	4.73	0.53	100
21. Taking medication with right method	4.67	0.65	4.73	0.53	100
22. Taking medicine with right time of drug schedule	4.69	0.61	4.73	0.53	100

Table 2 Consensus of expert panel reached on characteristics of medication adherence (Continued)

Dimension/Statement	Round 2		Round 3		
	Mdn	IR	Mdn	IR	consensus level of agreement (%)
23. Taking medicine as prescribed by their doctor	4.69	0.61	4.73	0.53	100
24. Never stop to take medication even feel better	4.69	0.61	4.73	0.53	100
25. Never use drugs of the other even same medicine or symptom	4.67	0.65	4.71	0.57	94.1
26. Never adjust dose without doctor order	4.67	0.65	4.71	0.57	88.2
27. Bring medicine when go out home	4.64	1.40	4.71	0.57	94.1
28. Self-directing to take medicine as prescribed continuously	4.67	0.65	4.71	0.57	100
29. Ask health care team in case of having problem about drug usage during living at home	4.64	0.83	4.69	0.61	100
30. Seek for other caregiver if having limitation to take care of themselves for drug usage	4.61	0.96	4.69	0.61	100
31. Taking medication completely	4.64	0.90	4.67	0.65	94.1
32. Ask their relatives for drug preparation	4.64	0.83	4.67	0.65	94.1
33. Use appropriate devices for drug usage such as pill box, pill splitter, diary, or alarm clock	4.57	1.13	4.64	0.80	100

Table 2 Consensus of expert panel reached on characteristics of medication adherence (Continued)

Dimension/Statement	Round 2		Round 3		
	Mdn	IR	Mdn	IR	consensus level of agreement (%)
34. Ask for their relatives' help for drug regulation	4.61	0.91	4.64	0.80	100
35. Never use supplementary food, herb, fruit juice that interfere drug effectiveness	4.61	1.20	4.61	0.91	100
36. Ask pharmacists for instructions on how to use drugs correctly in case of receiving unfamiliar drug	4.52	1.15	4.57	0.87	94.1
Participating in medication treatment plan					
37. Sharing information with a doctor for adjusting the medication treatment harmonize with daily life pattern	4.69	0.60	4.75	0.50	100

In nursing point of view, the characteristics of medication adherence differed from existing definition in previous studied. Most of the studied defined medication adherence based on WHO's definition which was defined as the extent to which patient' taking medication with agreed recommendations from a healthcare provider (World Health Organization, 2003). The meaning of medication adherence focused on physical action--take medication as prescribed (Anderson et al., 2010; Dunbar-Jacob

et al., 2003; Hauptman, 2008; Klein et al., 2006; Osterberg & Blaschke, 2005; Wu, Moser, Lennie, & Burkhart, 2008).

From this finding, it was clear that medication adherence was described not only taking medication as prescribed, but also doing something that related to taking medication was required. Persons with CAD need a long term medication therapy to prevent disease progression and recurrent cardiovascular events (Pflieger et al., 2011). Medication treatment for persons with CAD is a complex. Therefore, persons with CAD have to know about medications that they used including how to take medicines correctly, the disadvantage if they don't take them, the benefit of each medicine they use, how to evaluate drugs usage, the side effects of each medicine, how to perform when side effect occurred, how to prepare medicine, and how to storage medicines. Moreover, medicines are an important part of treatment, using medicines correctly can lower the risk of having a heart attack or dying from coronary artery disease. Thus, they have to regulate themselves correctly and continuously in taking prescribed medication.

In addition, medication adherence is depended on the collaborative relationship between patient and healthcare provider (Cohen, 2009). The participation in a medication treatment plan is one attribute of medication adherence for persons with CAD. Likewise, one studied found that communicating and negotiating the regimen is an attribute of medication adherence among persons with chronic disease (Huang & Chen, 2014). When patients involve in decision making

regarding their medications taking so that they have a sense of ownership and they are partners in the treatment plan (Jimmy & Jose, 2011). To participate in medication treatment plan, persons with CAD have to observe common side effects of the drugs, evaluate their symptoms after medication taking, share information with a doctor for adjusting the medication treatment with daily life pattern, inform the doctor in case of having possible side effects or complications to adjust drug prescription, inform the doctor if they have any question about drug usage, and set agreement with their doctors to select appropriate medication treatment.

Lastly, storing medications appropriately is the one attribute of medication adherence among persons with CAD. Medicines should always be kept in the right way. Improper storage can affect the effectiveness and shelf life of the medicines. Therefore, storing medications appropriately is necessary for persons with CAD.

The findings of this study contribute to the concept of medication adherence for persons with CAD. It was an initial attempt clarifying nursing perspective on medication adherence. Defining medication adherence appropriately is crucial for instrument development to measure this concept.

Based on concepts synthesis results, medication adherence composed of four constructs include knowing about medication properly, storing medication composed of four constructs include knowing about medication properly, storing medication appropriately, self-regulating in taking medication correctly and

continuously, and participating in medication treatment plan. The conceptual framework in this study showed in figure 1.

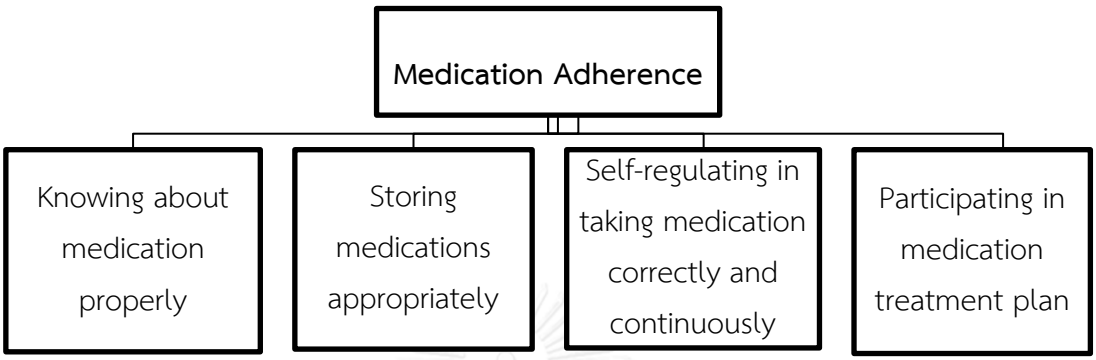

Figure 1 Conceptual framework of the present study

The operational definition of medication adherence for persons with CAD was written based on this conceptual framework.

Step 2: Generating an item pool

Generating item pool was developed in Thai language. The strategies for creating the initial pool of items were based on the operational definition of the medication adherence, and Thai context. Each item was constructed by writing a short declarative statement reflecting all characteristic of medication adherence for persons with CAD. Generating item pool of the first draft of the MAS was covered all aspect of the operational definitions. Forty-two items in Dephi were used as items of the questionnaire, and three items were added in the scale. The first draft of the MAS consist of 47 items covering four attributes of the medication adherence

concept, knowing about medication (8 items), storing medication appropriately (9 items), self-regulating in taking medication correctly and continuously (23 items), and participation in medication treatment plan (7 items) (see Appendix F).

Step 3: Determining the format for measurement

Determining the manifest of measurement was considered early and occurred simultaneous with the generation of items. In this study, medication adherence was designed to be assessed by five categorical ratings item format, and the item analysis was summated ratings procedure called Likert scaling, as illustrated in appendix G.

Step 4: The initial item pool reviewed by expert

Logical judgment by a group of experts who were knowledgeable in the content area was used to review the 47 items of the pool of the first draft. A panel of seven professional experts including five nurse instructors in cardiovascular nursing and had experienced in medication adherence, and two researchers in instrument development were asked to rate each scale item in terms of its relevance to medication adherence of persons with CAD. Four-point scale was used as recommended in literature to avoid having a neutral and ambivalent midpoint: 1 = not relevant, 2 = somewhat relevant, 3 = quite relevant and, 4 = high relevant. Content validity was obtained by computing content validity index (CVI) for each item and scale. Then, the pool of the first draft were revised, or deleted following

comments and suggestions of the experts. The second draft of the scale was emerged after content validity testing.

Step 5: Conducting preliminary item tryouts for item review

Before the researcher has a printed item in final form for a field test. The second draft of the scale was preliminary item tryout in a small group of persons with CAD for testing readability, difficulty, and relevancy for persons with CAD's conditions. Preliminary item tryout is fairly informal.

Population and sample

In this phase, the population was persons with CAD who attended at out-patient heart clinics of tertiary hospitals in Thailand. The sample was persons with CAD who attended at out-patient heart clinics of two tertiary hospitals including Police hospital, and Chonburi hospital. The samples were asked to participate in the study if they met with the inclusion criteria as follows:

1) Diagnosed with CAD by the physician and reported in their medical record at least three months preceding entry to the study.

2) Receiving medication treatment at least 3 month preceding entry to the study.

3) Age equal to or more than 18 years old

4) Able to communicate in Thai language

An exclusion criterion was as follows:

1) Having unstable condition or a life threatening of CAD such as severe chest pain, acute MI.

Sample size

The preliminary study was conducted to try out item on a small sample of examinees. It is necessary to use as few as 15 to 30 subjects for the pretest item tryouts (Crocker & Algina, 1986). In this study, 30 persons with CAD were recruited.

Sampling technique

Convenience sampling was used to select the participants into the study.

Data collection procedure

1) After got the permission from the Institutional Review Board (IRB), the researcher made appointments with head nurse of outpatient heart clinics in each hospital, informed them about the objectives, process of the study, and asked them for cooperation.

2) The researcher reviewed of patient's medical records and made a list of the participants who met the inclusion criteria of the study.

3) Each patient was invited to participate the study. Those who agree to participate, explained the objective of the study, process of the study, and the right to participate in this study.

4) The researcher gave the participant information sheet and informed consent form to them, explained the details of both forms, and asked to sign the informed consent form before data collection.

5) The researcher gave all the questionnaires to the patients.

6) The participants were asked to complete the questionnaires by themselves. Then, the researcher /or research assistants proved the questionnaires for completeness of the data. Participants were asked to answer any missing items.

The researcher used this opportunity to observe participant' reactions during testing, nothing such behaviors as long pauses, scribing, or answer-changing, which may indicate confusion about particular items. After the testing session, the participants were invited to comment and suggestion on each item. Comment and suggestion of the samples was considered to add in original item contents. The final draft of the scale was emerged after deleted and revised.

Step 6: Conducting field test for psychometric property testing

Field testing was conducted for psychometric property testing of the final form of the MAS. The expected outcome of this step is a valid and reliable scale instrument of measuring medication adherence for persons with CAD. This step typically involves the administration of the final draft of the MAS to a large group of persons with CAD for psychometric property testing including validity and reliability testing. Two types of validity were tested including content validity using I-CVI and S-

CVI/Ave, and construct validity using confirmatory factor analysis. Two types of reliability were tested including internal consistency index by Cronbach's alpha, and stability using test-retest correlation.

Population and sample

In this phase, the population was persons with CAD who attended at out-patient heart clinics of tertiary hospitals from five geographic areas of Thailand including Bangkok, Central, North, Northeast, and South. The sample were persons with CAD who attended at out-patient heart clinics of seven tertiary hospitals including Ramathibodi hospital, Police hospital, Chonburi hospital, Thammasat hospital, Songkhlanakarin hospital, Sappasitthiprasong hospital, and Buddhachinaraj Phitsanulok Hospital. The samples were asked to participate in the study if they met with the inclusion criteria as follows:

1) Diagnosed with CAD by the physician and reported in their medical record at least three months preceding entry to the study.

2) Receiving medication treatment at least 3 month preceding entry to the study.

3) Age equal to or more than 18 years old

4) Able to communicate in Thai language

An exclusion criterion was persons with CAD have unstable condition or a life threatening of CAD such as severe chest pain, acute MI.

Sample size

The field test typically involves the administration of the MAS to a large sample of examinees representative of those for whom the test is designed. According to the purpose of field-testing was item analysis, reliability testing, and validity testing. Criteria for set the sample size was 5 to 10 subjects per item (Crocker & Algina, 1986; Devellis, 2003). The researcher calculated the sample size since the second draft of the MAS which comprised of 43 items. Thus, the actual sample comprises of 430 participants. The number of participants in this study was 457.

Sampling technique

A multi-stage random sampling procedure was used to select participants into the study. The details were as follows:

1) According to Bureau of policy and strategy, there are five geographic areas of Thailand including Bangkok, Central, North, Northeast, and South. There are 47 tertiary hospitals in Thailand: eight hospitals in the Northern, eight hospitals in the Northeastern, 12 hospitals in the Central region, eight hospitals in the Southern, and 12 hospitals in Bangkok.

2) Using simple random sampling without replacement to select the tertiary hospital in each region of Thailand. One hospital in the Northern (Buddhachinaraj Phitsanulok), one hospital in the Northeastern (Sappasitthiprasong),

two hospitals in the Central region (Chonburi and Thammasat), one hospital in the Southern (Songkhlanakarin), and two hospitals in Bangkok (Ramathibodi and Police).

3) Using simple random sampling without replacement to select the sample from each hospital. The researcher screened persons with CAD who had appointments with physicians at outpatient heart clinics in each day. The participants were recruited into the study if they met with inclusion criteria, and were excluded if the met the exclusion criteria. Sampling technique shows as figure 2.

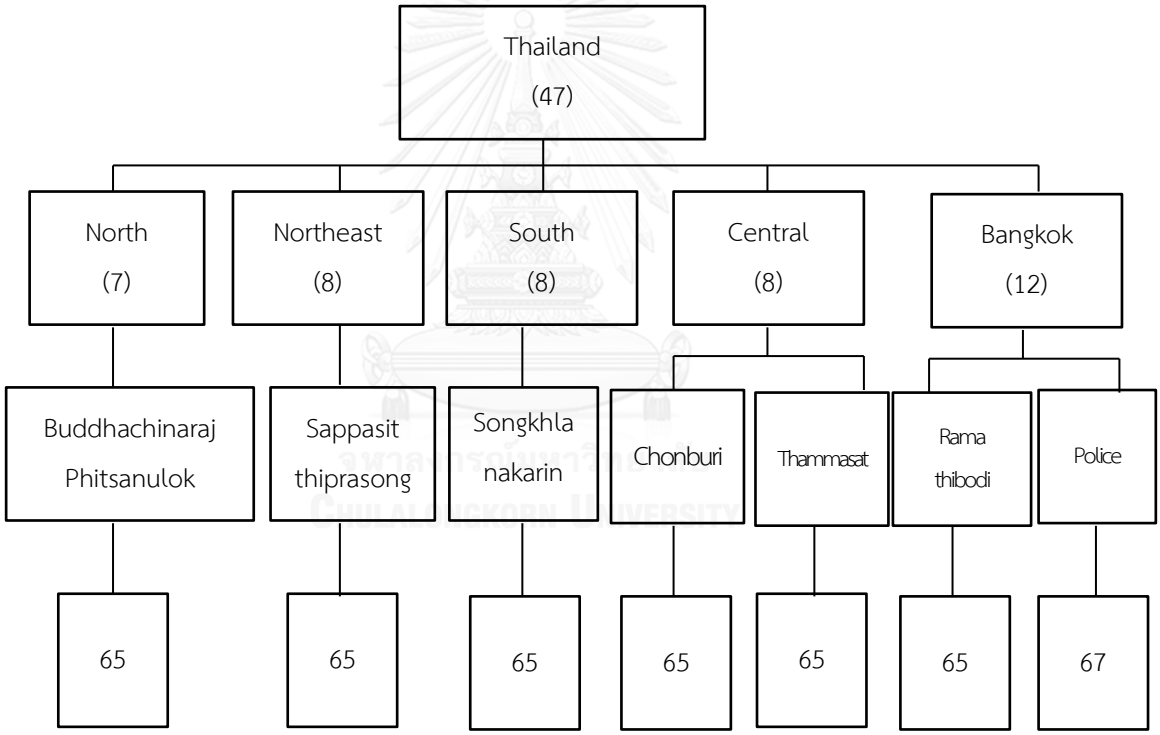

Figure 2 Multi-stage random sampling

Data collection procedure

In this phase, the data was collected by the researcher or research assistants. The research assistant must be a nurse who graduated in master degree (Nursing science). Before collecting the data, the researcher trained research assistants of each hospital. The researcher explained regarding the objective, process of the study, every item in the questionnaire, and given a guideline questionnaire in order to clear the questions. Training them regarding the selecting participants, and collecting the data. After research assistant training, it ready for data collection. The details of data collection were as follows:

1) A letter asking for the permission to collect the data from the Institutional Review Board (IRB) of each hospital.

2) After the permission, the researcher made appointments with head nurse of outpatient heart clinics in each hospital, informed them about the objectives, process of the study, and asked them for cooperation.

3) The researcher reviewed of patient's medical records and made a list of the participants who met the inclusion criteria of the study.

4) Each patient was invited to participate the study. Those who agree to participate, explained the objective of the study, process of the study, and the right to participate in this study.

5) The researcher gave the participant information sheet and informed consent form to them, explained the details of both forms, and asked to sign the informed consent form before data collection.

6) The researcher gave all the questionnaires to the patients.

7) The participants were asked to complete the questionnaires by themselves. Then, the researcher /or research assistants proved the questionnaires for completeness of the data. Participants were asked to answer any missing items.

8) For the sample who willing to participate in stability testing, after past two weeks, the researcher sent the same questionnaire and stamped addressed envelope to the patients, and asked them to complete the questionnaires by themselves, and then send to the researcher.

Step 7: Developing scoring and interpretation of the test score

In this step, the level of medication adherence was created on the basis of the MAS mean scores. The MAS score should indicate the level of medication adherence; the high score reflected the high medication adherence.

The procedures for developing the MAS can be summarized as shown in figure 3.

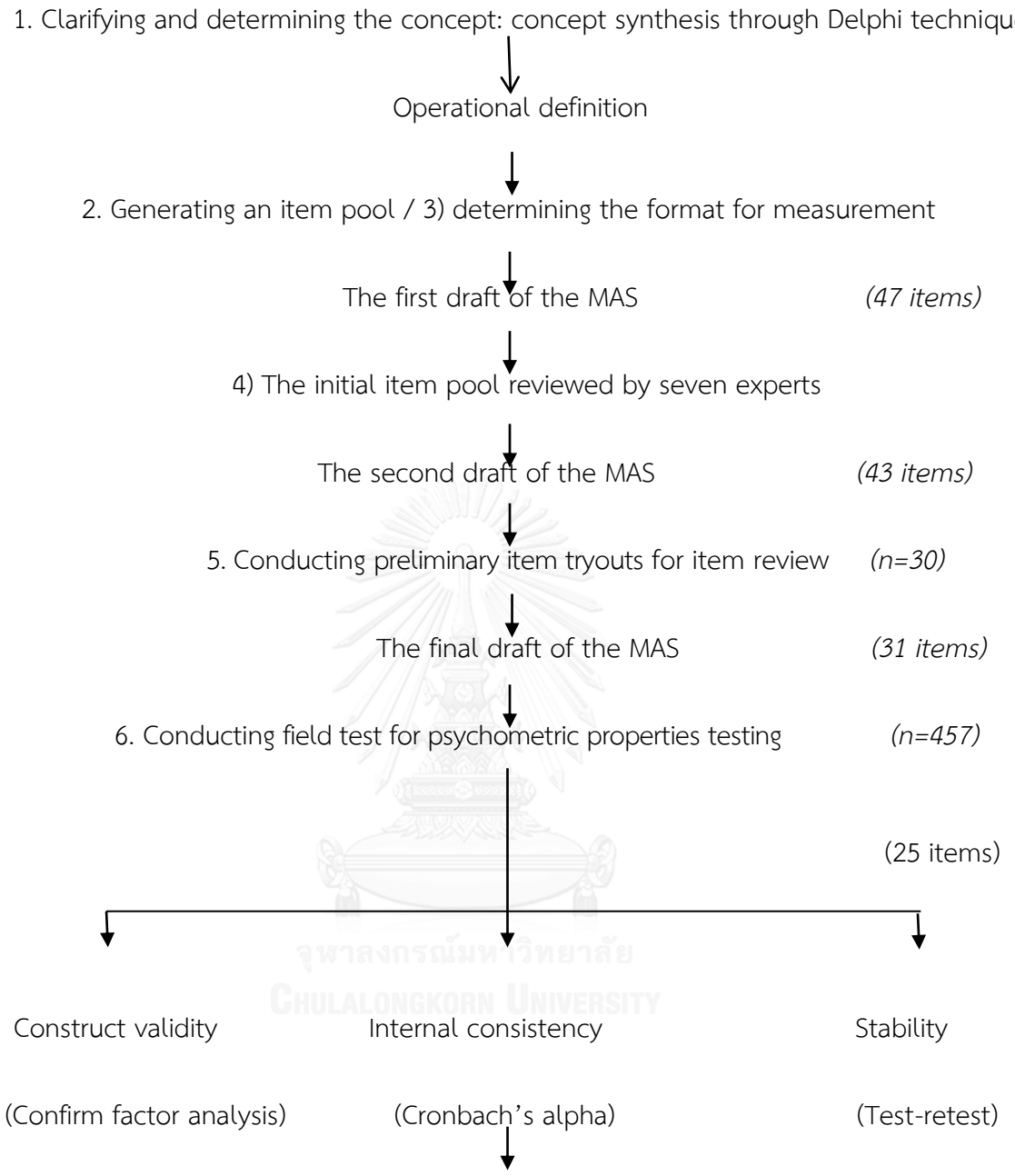

Figure 3 The MAS development procedures

Protection of the right of human subject

This study was conducted with the approval of the Institutional Review Board (IRB) of Faculty of Medicine Ramathibodi Hospital, Mahidol University (ID 11-57-92), Police hospital (จว 75/57), Chonburi hospital (54/2557), Thammasat University (153/2557), Faculty of Medicine, Songkhlanakarin University (57-344-19-9), Sappasitthiprasong hospital (005/2558), and Buddhachinaraj Phitsanulok Hospital (111/57). Both written and verbal informed consents were obtained in Thai on the same date as the data collection. The informed consent form was explain the purpose of the study, benefits, risks, types of questionnaires, time, and tasks to be completed. Permission was obtained from participants before the start of data collection. If the participants do not want to answer the questionnaires, they have right to withdraw themselves from the study at any time without penalty. Their names were not use in the data; rather a code number was used to ensure confidentiality. There was no harm to the participants in this study.

Data Analysis

The Statistic Package of the Social Science for Personal Computer (SPSS/PC) version 22 and LISREL 8.53 were used for data analysis in this study. Before conducting the data analysis, all data were screened through descriptive analysis in order to detect missing data. The processes for data analysis were as follows:

1. Demographic characteristics of samples were analyzed by descriptive statistics including frequency, percentage, mean, and standard deviation.

2. Descriptive characteristics of the MAS were examined by using mean, standard deviation, min, max, skewness, and kurtosis. Skewness measures the symmetry of the distribution. Kurtosis measures the degree to which distribution is peaked or flat relative to a normal distribution. The criterions for selecting the appropriate items were considering skewness values which range from -1 to +1 (Hair et al., 1998), and kurtosis values which is less than 2 (Wagner et al., 1998).

3. Item-total correlation was proposed in terms of the precision of the item indicating how strongly an individual item reflected the total scale. Psychometrically strong items would have moderate to high correlations with the scale total and individual items. Item-total correlation was calculated by using the Pearson product-moment correlation. Regarding a common rule of thumb, the item-total correlation should be between 0.20 and 0.70 (Idvall et al., 2002). Those less than 0.20 did not contribute much to the measurement of the concept, while those greater than 0.70 were probably redundant. Therefore, items with an item total correlation of less than 0.20 will be deleted.

4. Content validity concerns the degree to which the items in an instrument adequately represent the universe of content for the concept being measured (Polit & Beck, 2014). Content validity index ranges from 0 to 1, and value of .90 or higher is the standard for establishing excellence in a scale's content validity (Polit & Beck, 2014).

5. Confirmatory factor analysis was used to test construct validity. The factor loading greater than .3 was accepted (Shore, Newton, & Thornton, 1990). Moreover, the criteria for supporting the model good fit to empirical data are as follows:

Chi-square (χ^2) values resulting in a non-significant difference level of .05. However, there is a limitation to the chi-square test. The Chi-square is highly sensitive to sample size especially if the observations are more than 200. According to the sample in this study were 457. There for an alternative evaluation of the Chi-square statistic is to examine the ratio of Chi-square to the degrees of freedom (*df*) for the model (Siu, 2008). The χ^2/df ratio fell within the recommended level less than 3.

Root mean square error of approximation (RMSEA) is an extremely informative criterion in evaluating model fit. The RMSEA index measures the discrepancy between the observed and estimated covariance matrices per degree of freedom (Steiger, 1990). RMSEA run on a continuum from 0 to 1. Values less than 0.05 indicate good fit, values up to 0.08 reasonable fit and values between 0.08 and 0.10 indicate mediocre fit (Siu, 2008).

Goodness- of- fit statistic (GFI) as an alternative to the Chi-square test and calculates the proportion of variance that is accounted for by the estimated population covariance (Tabachnick & Fidell, 2007). GFI values greater than 0.95 is acceptable for model fit.

The adjusted goodness-of-fit statistic (AGFI) also range between 0 and 1 and it is generally accepted that values of 0.90 or greater indicate well-fitting models (Hooper, Coughlan, & Mullen, 2008).

6. Internal consistency reliability was used to examine the extent to which all of the instrument's items or subscale invoked the same attribute. Internal consistency would be used Cronbach's alpha coefficient to evaluate the MAS. A value above .70 was considered satisfactory for the new scale (Nunnally & Bernstein, 1994).

7. Test-retest reliability interested in how consistently examinees respond to this form at different times. Pearson product moment correlation was used to test stability of the MAS. The value of relationships was determined by the following criteria: $r > .51$ = moderate relationship, and $r > .70$ =strong or high relationship.

CHAPTER IV

RESULTS

This study aimed to develop the MAS for persons with CAD, and to test psychometric properties of the scale. The results were presented into three parts. Firstly, describing the medication adherence scale for persons with CAD. Secondly, explaining the psychometric properties of the scale. Lastly, explaining how to scoring and interpretation of the MAS score.

The Medication adherence scale for persons with CAD

The MAS was developed to measure medication adherence for persons with CAD. The details of the MAS development presented as following:

The first draft of the MAS

The first draft of the MAS was developed in Thai language based on the operational definition of the medication adherence, and Thai context. The first draft consist of 47 items covering four attributes of the medication adherence concept including knowing about medication (8 items), storing medication appropriately (9 items), self-regulating in taking medication correctly and continuously (23 items), and participation in medication treatment plan (7 items).

Medication adherence was designed to be assessed by five categorical ratings item format, and the item analysis was summated ratings procedure called Likert scaling, as illustrated in appendix G.

The first draft was reviewed by seven professional experts in terms of its relevance to medication adherence of persons with CAD. Content validity was obtained by computing content validity index (CVI) for both item level (I-CVI) and scale level (S-CVI/Ave). The result showed that the first draft had I-CVI score ranged from 0.71-1.00, and S-CVI/Ave score = .96 (see Appendix H). Regarding I-CVI greater than 0.80 indicates of good content validity (Polit & Beck, 2004). Therefore, four items which had I-CVI 0.71 were deleted. For the rest items were revised based on comment and suggestion of the experts.

The second draft of the MAS

The second draft of the scale was emerged after content validity testing. It composed of 43 items: knowing about medication (7 items), storing medication appropriately (8 items), self-regulating in taking medication correctly and continuously (21 items), and participation in medication treatment plan (7 items).

The second draft of the MAS was tried out in 30 persons with CAD for testing readability, difficulty, and relevancy for persons with CAD's conditions.

Demographic Characteristics of the Sample for item tryout

Participants had age ranged from 44-81 years, a mean age of 63.17 years (SD =10.29), with most frequency between 61-70 years (36.7%). Most of them were male (73.3%) and married (76.7%). Most of them had completed elementary school (33.3%) and unemployed (36.7%). Income ranged from 0-60,000 baht/month ($\overline{X}$ = 16,090.00, SD=14,600.24). Length of illness ranged from 3-240 months ($\overline{X}$ =53.23, SD=69.06). Number of medicine ranged from 2-15 ($\overline{X}$ =6.30, SD=2.51). Demographic characteristics of the sample were presented in Table 3.

Table 3 Demographic characteristics of the sample for item tryout (N = 30)

Demographic characteristics	Number	Percentage
Gender		
Male	22	73.3
Female	8	26.7
Age 44-81 years, $\overline{X}$ =63.17, SD=10.29		
41-50 years	5	16.7
51-60 years	7	23.3
61-70 years	11	36.7
71-80 years	6	20.0
81-90 years	1	3.3
Marital Status		
Single	4	13.3
Married	23	76.7
Widowed	3	10.0

Table 3 Demographic characteristics of the sample (N=30) (Continued)

Demographic characteristics	Number	Percentage
Education level		
No education	2	6.7
Elementary school	10	33.3
Secondary school	2	6.7
High school	4	13.3
Diploma	4	13.3
Bachelor's degree	7	23.3
Higher than Bachelor's degree	1	3.3
Occupation		
Unemployed	11	36.7
Employee	1	3.3
Company officer	1	3.3
Merchant	4	13.3
Government official	4	13.3
Self-employed	1	3.3
State enterprise employee	1	3.3
Others	7	23.3
Income 0-60,000 baht/month, $\overline{X}$ =16,090.00, SD=14,600.24		
No income	3	10.0
Less than 5,000 baht/month	6	20.0
5,001-10,000 baht/month	5	16.7
10,001-15,000 baht/month	3	10.0
15,001-20,000 baht/month	2	6.7
20,001-25,000 baht/month	6	20.0

Table 3 Demographic characteristic of the sample (N=30) (Continued)

Demographic characteristics	Number	Percentage
25,001-30,000 baht/month	2	6.7
More than 30,001 baht/month	3	10.0
Length of illness 3-240 months, $\overline{X}$ =53.23, SD=69.06		
3-60 months	22	73.3
61-120 months	3	10
121-180 months	3	10
181-240 months	2	6.7
Number of medicine 2-15, $\overline{X}$ =6.30, SD=2.51		
1-3	2	6.7
4-6	18	60
7-9	7	23.3
10-12	2	6.7
13-15	1	3.3

In this step, the time used for answering the questionnaire varied, ranging from 10 to 20 minutes. Between answering the questionnaire, they asked in some items. The results of item tryout were presented as follows:

Item 12 “I keep sublingual drug in brown container”. Most of participants suggested that they do not use sublingual drug prescribed by their doctor. Therefore, they cannot answer this question. Moreover, consideration on item 11 “I keep medicines in their original packs that I receive from a hospital”, the participants suggested that it’s the same meaning. In addition, based on expert ‘suggestion in Delphi process, keeping sublingual in brown container, may not occur in persons with

CAD who don't have angina pectoris. Thus, the researcher kept item 11, and deleted item 12.

Item 14 "I dispose all medicines that expire or deteriorate"

Item 15 "I dispose all medicines that do not have any or clear labels"

Most of participants suggested that doctor orders cardiac medication for them around 1-2 months. Moreover, pharmacist will check drug expire or deteriorate, and clear the labels of drug information, and confirm them with the participant. Therefore, the action in item 14 and item 15 may not occur in persons with CAD who continued to meet appointment with their doctor on time. Thus, the researcher considered to delete item 14, and item 15.

Item 18 "I check the name of the medicines before taking" According to the name of medicines was written in English. Most of them (33.3%) completed elementary school. They suggested that they cannot read English. Moreover, consideration on item 16 "I read carefully all information leaflets and all the labels on containers before taking medicines", the participants suggested that it's the same meaning. Thus, the researcher considered to delete this item.

Item 26 "I apply other tools; for example, a medical container, alarm clock, or note book, to warn me about taking medicines". Most of participants suggested that they can take medication by themselves. They do not use any tools to warn them. In addition, based on expert 'suggestion in Delphi process, applying other tools to warn the participants about taking medicines may occur in persons with CAD

who always forget to take medicine frequently. Thus, the researcher considered to delete this item.

Item 28 "I ask my relatives, who take care of me, for help when I have a problem regarding the use of medicines at home" Most of participants suggested that they can take medication by themselves. They do not ask for help from the others. In addition, based on expert 'suggestion in Delphi process, asking for help may not occur in persons with CAD who had ability to self-care. Thus, the researcher considered to delete this item.

Item 30 "I ask the pharmacist giving me medicines about how to use them when I have new or unfamiliar medicines"

Item 31 "I ask the pharmacist giving me medicines when I do not understand a word appears on the medical labels or face with an unclear medical instruction"

Most of participants suggested that they were CAD for a long time, and the doctor ordered the same medication. Even if the doctor changed the order, the pharmacist already gave them about how to use the new or unfamiliar medicines. Thus, the researcher considered to delete item 30, and item 31.

Item 33 "If I have a problem regarding the use of medicines, I will wait to ask the doctor, pharmacist, and nurse on the day of appointment.

Item 39 "I inform the doctor when I have uncommon symptoms or serious reactions caused by medicines"

Most of participants suggested that they were CAD for a long time, and the doctor ordered the same medication. They don't have any problem regarding the use of medicines, or don't have uncommon symptoms or serious reactions caused by medicines. Thus, the researcher considered to deleted item 33, and item 39.

Item 40 "I inform the doctor when I use other medicines that are not prescribed by the doctor"

Item 41 "I inform the doctor when I use other Vitamin, mineral and herbal supplements that are not prescribed by the doctor"

Most of participants suggested that they were CAD for a long time, and the doctor, pharmacist, and nurse teach them that they have to use only medication that doctor orders. Therefore, they don't use other medicines, vitamin, mineral, or herbal supplements that are not prescribed by the doctor. Thus, the researcher considered to deleted item 40, and item 41.

In summary, 12 items were deleted in this phase. For the rest items were revised based on comment and suggestion of the participants.

The final draft of MAS

The final draft of MAS consist of 31 items covering four constructs; knowing about medication properly (7 items), storing medication appropriately (5 items), self-regulating in taking medication correctly and continuously (15 items), and participating in medication treatment plan (4 items).

The final draft of MAS was field tested in 457 persons with CAD for item analysis, and psychometric property testing. The results were presented as follows:

Demographic Characteristics of the Sample for field testing

Participants had age ranged from 32-89 years, a mean age of 64.94 years (SD =11.23), with most frequency between 61-70 years (31.5%). Most of them were male (67.4%) and married (74%). Most of them had completed elementary school (46.6%) and unemployed (33.3%). Income ranged from 0-150,000 baht/month ($\overline{X}$ = 14,154.19, SD=17472.90). Length of illness ranged from 3-480 months ($\overline{X}$ = 66.46, SD=71.39). Number of medicine ranged from 1-15 ($\overline{X}$ =6.37, SD=2.44). Demographic characteristics of the sample were presented in Table 4.

Table 4 Demographic characteristics of the sample for field testing (N = 457)

Demographic characteristics	Number	Percentage
Gender		
Male	308	67.4
Female	149	32.6
Age 32-89 years, $\overline{X}$ =64.94, SD=11.23		
31-40 years	7	1.5
41-50 years	38	8.3
51-60 years	115	25.2
61-70 years	144	31.5
71-80 years	114	25.0
81-90 years	39	8.5
Marital Status		
Single	33	7.2
Married	338	74.0
Widowed	72	15.8
Divorced	14	3.1
Education level		
No education	35	7.7
Elementary school	213	46.6
Secondary school	52	11.4
High school	54	11.8
Diploma	28	6.1
Bachelor's degree	59	12.9
Higher than Bachelor's degree	16	3.5

Table 4 Demographic characteristics of the sample for field testing (N=457) (Continued)

Demographic characteristics	Number	Percentage
Occupation		
Unemployed	152	33.3
Employee	46	10.1
Company officer	10	2.2
Merchant	44	9.6
Government official	59	12.9
Self-employed	41	9.0
State enterprise employee	6	1.3
Others	99	21.7
Retired government official	51	11.2
Agriculture	48	10.5
Income 0-150,000 baht/month, $\overline{X}$ =14,154.19, SD=17472.90		
No income	34	7.0
Less than 5,000 baht/month	149	32.6
5,001-10,000 baht/month	88	19.3
10,001-15,000 baht/month	33	7.2
15,001-20,000 baht/month	59	12.9
20,001-25,000 baht/month	19	4.2
25,001-30,000 baht/month	31	6.8
More than 30,001 baht/month	44	9.6

Table 4 Demographic characteristics of the sample for field testing (N=457) (Continued)

Demographic characteristics	Number	Percentage
Length of illness 3-480 months, $\overline{X}$ =66.46, SD=71.39		
3-60 months	302	66.1
61-120 months	96	21.0
121-180 months	35	7.6
181-240 months	13	2.9
More than 240 months	11	2.4
Number of medicine 1-15, $\overline{X}$ =6.37, S.D.=2.44		
1-3	47	10.3
4-6	216	47.2
7-9	144	31.6
10-12	42	9.1
13-15	8	1.8

Demographic characteristics of the 31 items MAS

As shown in Table 5, the mean scores of the 31 items MAS was 4.46 (SD = 0.38). The skewness of the overall MAS was -0.93, and kurtosis was 1.10. These indicated that skewness values falling inside the range of -1 to +1 (Hair et al., 1998), 1998), and the magnitude of the kurtosis is less than 2 (Wagner et al., 1998) that represented the scale characteristics of normal distribution.

When considered in each dimension, the results showed that mean scores ranging from 3.97 to 4.73, with standard deviation ranging from 0.35 to 0.85. There

were two dimensions which had characteristics of normal distribution including knowing about medication properly, and participation in medication treatment plan, which had skewness values were -1.08, and -0.71, respectively, and kurtosis values were -0.39, and 1.673, respectively. On the other hand, there were two dimensions which had characteristics of non-normal distribution including storing medication appropriately, and self-regulating in taking medication correctly and continuously, which had skewness values were -2.21, and –1.58, respectively, and kurtosis values were 4.77, and 5.30, respectively.

Table 5 Demographic characteristics of the 31 items MAS (N = 457)

The overall MAS/Dimension	Number of items	Mean	SD	Skewness	Kurtosis
The overall MAS	**31**	**4.46**	**0.38**	**-0.93**	**1.10**
1. Knowing about medication properly	7	3.97	0.85	-0.71	-0.39
2. Storing medication appropriately	5	4.73	0.48	-2.21	5.30
3. Self-regulating in taking medication correctly and continuously	15	4.63	0.35	-1.58	4.77
4. Participating in medication treatment plan	4	4.37	0.66	-1.08	1.67

Inter-Item Correlations of the 31 items MAS

As shown in Table 6, the results showed that inter-item correlation of the 31 items MAS ranging from 0.001 to 0.655. There are 40 paired-items from 465 paired-items (8.60%) which had inter-item correlations in acceptable criteria (0.30-0.70). There is 425 paired-items (91.40%) which had inter-item correlations less than 0.30. There is no paired-item which had inter-item correlation greater than 0.70.

Table 6 Inter-Item Correlations of the 31 item MAS

	know1	know2	know3	know4	know5	know6	know7	storage1	storage2	storage3	storage4	storage5	self1	self2
know1	1													
know2	.407**	1												
know3	.388**	.538**	1											
know4	.395**	.300**	.394**	1										
know5	.349**	.456**	.509**	.457**	1									
know6	.347**	.489**	.471**	.313**	.619**	1								
know7	.270**	.134**	.179**	.327**	.310**	.330**	1							
storage1	.083	-.022	.023	.107*	.035	.051	.216**	1						
storage2	.135**	.033	-.005	.095*	.093*	.049	.313**	.328**	1					
storage3	.067	.005	-.063	.123**	.021	.046	.045	.017	.037	1				
storage4	.058	.020	-.062	.216**	.132**	.054	.177**	.141**	.078	.453**	1			
storage5	.194**	.122**	.032	.131**	.110*	.122**	.190**	.090	.067	.359**	.217**	1		
self1	.255**	.376**	.341**	.199**	.285**	.283**	.188**	-.014	.004	.063	.094*	.124**	1	
self2	.098*	.065	.070	.219**	.109*	.110*	.171**	.088	.112*	.168**	.158**	.174**	.269**	1
self3	.208**	.140**	.032	.228**	.107*	.077	.213**	.108*	.101*	.223**	.204**	.165**	.107*	.374**
self4	.139**	.155**	.086	.184**	.128**	.127**	.040	.061	.098*	.009	.042	.019	.170**	.152**
self5	.135**	.122**	.055	.124**	.129**	.078	.064	.153**	.155**	.056	.130**	.109*	.076	.076
self6	.109*	.084	.057	.164**	.128**	.068	.087	.175**	.276**	.085	.168**	.094*	.001	.087
self7	.097*	.035	.089	.054	.144**	.037	.045	.107*	.165**	.118*	.093*	.060	.079	.070
self8	.099*	-.008	.053	.089	.025	.031	.110*	.174**	.096*	-.005	.129**	.125**	-.006	.102*
self9	.127**	.003	.011	.060	-.015	.009	.082	.166**	.143**	.007	.093*	-.007	-.050	.031
self10	-.013	-.036	-.058	-.004	-.019	.025	.103*	.114*	.111*	.035	.130**	.023	-.011	.071
self11	.103*	.055	.013	.128**	.076	-.005	.022	.163**	.161**	.046	.122**	.050	.036	.145**
self12	.166**	.301**	.364**	.253**	.288**	.264**	.100*	.008	.070	.069	.063	.091	.301**	.133**
self13	.122**	.052	.039	.124**	.118*	.096*	.054	.110*	.107*	-.011	.157**	-.060	-.047	.087
self14	.141**	.075	.052	.100*	.201**	.172**	.079	.141**	.136**	.002	.058	-.020	.066	.047
self15	.118*	-.060	-.010	.096*	.021	.066	.043	.065	.092*	.144**	.178**	.102*	.063	.114*
par1	.161**	.198**	.169**	.274**	.311**	.246**	.183**	.142**	.104*	.054	.085	.081	.092*	.267**
par2	.114*	.193**	.109*	.195**	.272**	.240**	.115*	.058	.032	.053	.102*	.107*	.074	.274**
par3	-.001	.050	.104*	.103*	.051	.013	.066	.092*	.093*	.038	.082	-.055	.076	.179**
par4	.164**	.290**	.206**	.125**	.298**	.275**	.134**	-.007	-.029	.048	-.015	.121**	.241**	.175**

*p<.05, **p<.01

Table 6 Inter-Item Correlations of the 31 item MAS (Continued)

	self3	self4	self5	self6	self7	self8	self9	self10	self11	self12	self13	self14	self15	par1	par2	par3	par4
self3	1																
self4	.289**	1															
self5	.300**	.391**	1														
self6	.297**	.325**	.655**	1													
self7	.218**	.108*	.288**	.356**	1												
self8	.223**	.081	.167**	.184**	.131**	1											
self9	.004	.005	.110*	.135**	.195**	.151**	1										
self10	.213**	.090	.132**	.207**	.046	.146**	.025	1									
self11	.280**	.281**	.398**	.326**	.307**	.139**	.138**	.100*	1								
self12	.082	.195**	.055	.110*	-.010	.064	-.059	-.051	.015	1							
self13	.178**	.107*	.150**	.163**	.098*	.061	.220**	.012	.242**	.097*	1						
self14	.153**	.211**	.275**	.181**	.162**	.063	.091	.078	.201**	.190**	.126**	1					
self15	.070	.194**	.150**	.264**	.076	.043	.175**	.018	.106*	.117*	.145**	.032	1				
par1	.320**	.299**	.260**	.224**	.117*	.038	.046	.165**	.328**	.112*	.292**	.184**	.106*	1			
par2	.267**	.169**	.163**	.109*	.112*	.066	.089	.118*	.192**	.077	.154**	.114*	.088	.589**	1		
par3	.217**	.142**	.103*	.182**	.086	.060	.105*	.134**	.144**	.116*	.214**	.145**	.123**	.345**	.297**	1	
par4	.091	.095*	.043	.048	.021	-.070	-.086	-.016	.017	.265**	.020	.085	.019	.214**	.198**	.139**	1

*p<.05, **p<.01

Item-Total Correlations of the 31 items MAS

Item-total correlations were proposed in terms of the precision of the item indicating how strongly an individual item reflected the total scale. Psychometrically strong items would have moderate to high correlations with the scale total and individual items. This study used the corrected item-total correlation that correlates the item being evaluated with all the scale items, excluding itself (Devellis, 2003).

As shown in Table 7, corrected item-total correlation of overall scale ranged from 0.09 to 0.58. Item-total correlation of each dimension; knowing about medication properly ranged from 0.38 to 0.58, storing medication appropriately ranged from 0.17 to 0.24, self-regulating in taking medication correctly and continuously ranged from 0.09 to 0.40, and participating in medication treatment plan ranged from 0.24 to 0.47.

Twenty-five items which had an item-total correlation in acceptable criteria (0.20-0.70), whereas, six items which had item-total correlation less than 0.20. There was no item which had item-total correlation greater than .70. There for, this can summarize that the scale was not redundancy.

Table 7 Item-Total Correlation of the 31 item MAS (N=457)

The MAS	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Knowing about medication properly				
Item 1 (Know1)	134.48	123.64	.47	.80
Item 2 (Know2)	135.20	120.02	.50	.79
Item 3 (Know3)	134.57	122.24	.46	.80
Item 4 (Know4)	133.82	129.65	.50	.80
Item 5 (Know5)	134.34	121.63	.58	.79
Item 6 (Know6)	134.74	121.13	.53	.79
Item 7 (Know7)	133.75	131.53	.38	.80
Storing medication appropriately				
Item 8 (Store1)	133.51	136.67	.17	.81
Item 9 (Store2)	133.47	136.71	.20	.81
Item 10 (Store3)	133.65	134.85	.18	.81
Item 11 (Store4)	133.63	134.48	.24	.81
Item 12 (Store5)	134.00	130.08	.24	.81

Table 7 Item-Total Correlation of the 31 item MAS (N=457) (Continued)

The MAS	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Self-regulating in taking medication correctly and continuously				
Item 13 (Self1)	134.92	120.45	.40	.80
Item 14 (Self2)	133.88	129.39	.33	.80
Item 15 (Self3)	133.64	132.52	.39	.80
Item 16 (Self4)	133.78	133.29	.32	.80
Item 17 (Self5)	133.58	135.10	.33	.81
Item 18 (Self6)	133.49	136.00	.33	.81
Item 19 (Self7)	133.56	135.19	.22	.81
Item 20 (Self8)	133.50	137.21	.16	.81
Item 21 (Self9)	133.58	136.96	.09	.81
Item 22 (Self10)	133.68	136.59	.09	.81
Item 23 (Self11)	133.53	135.55	.26	.81
Item 24 (Self12)	134.50	123.02	.38	.80
Item 25 (Self13)	133.55	135.68	.20	.81
Item 26 (Self14)	133.68	133.33	.26	.81
Item 27 (Self15)	133.47	137.18	.18	.81
Participating in medication treatment plan				
Item 28 (Par1)	133.68	131.89	.47	.80
Item 29 (Par2)	133.89	130.48	.37	.80
Item 30 (Par3)	133.55	135.59	.24	.81
Item 31 (Par4)	134.93	123.72	.33	.81

Regarding a common rule of thumb, the item-total correlation should be between 0.20 and 0.70. Those less than .20 did not contribute much to the measurement of the concept (Idvall et al., 2002). Therefore, six items which had item-total correlation less than 0.20 (item 8, 10, 20, 21, 22, and 27) were considered to delete.

Finally, the MAS consisted of 25 items covering four constructs including knowing about medication properly (7 items), storing medication appropriately (3 items), self-regulating in taking medication correctly and continuously (11 items), and participation in medication treatment plan (4 items).

Psychometric properties of the MAS for persons with CAD

Testing psychometric properties of the MAS include validity and reliability. Validity was investigated by content validity and construct validity. Reliability of the MAS was tested by internal consistency reliability and test-retest reliability. The results were presented as following:

Validity of the MAS

Both content and construct validity were tested to examine validity of the MAS.

Content validity of the MAS

The MAS was reviewed by a panel of seven experts. Content validity was obtained by computing content validity index (CVI) for both item level (I-CVI) and scale level (S-CVI/Ave). The result showed that the overall MAS had I-CVI score ranged from 0.86-1.00, and S-CVI/Ave score = .99. In knowing about medication properly, self-regulating in taking medication correctly and continuously, and storing medication appropriately dimension had I-CVI score =1. Participating in medication treatment plan dimension had I-CVI score ranged from 0.86-1.00 (Table 8).

Table 8 Content validity of the MAS

The overall MAS/Dimension	**Number of items**	**ICV-I**
The overall MAS (S-CVI/Ave score = .99.)	25	0.86-1.00
1. Knowing about medication properly	7	1.00
2. Storing medication appropriately	3	1.00
3. Self-regulating in taking medication correctly and continuously	11	1.00
4. Participating in medication treatment plan	4	0.86-1.00

Construct Validity of the MAS

Confirmatory factor analysis was used to test construct validity of the MAS. Before testing construct validity, testing assumption for the CFA include normality, multicollinearity, Bartlett's test of sphericity, and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy were examined (see Appendix I).

As shown in Appendix I, the data were sufficient for testing construct validity by using CFA.

The Initial measurement model of the MAS

The initial measurement model of the MAS was indicated that medication adherence consist of 25 items covering four constructs including knowing about medication properly (7 items), storing medication appropriately (3 items), self-regulating in taking medication correctly and continuously (11 items), and participation in medication treatment plan (4 items) as shown in Figure 4.

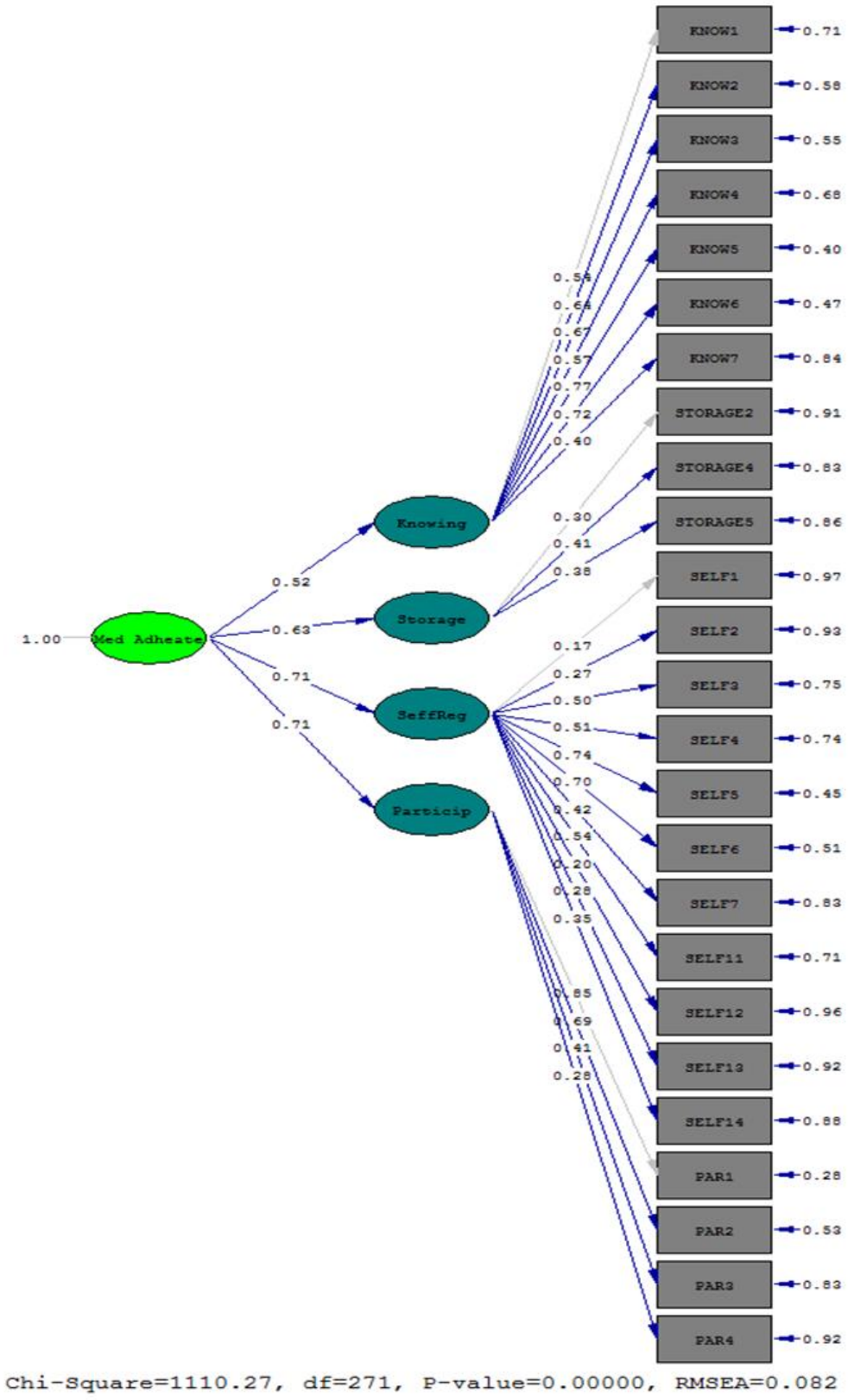

Figure 4 The initial measurement model of the MAS

Assessment of overall model fit

The initial measurement model of the MAS was assessed the overall model fit. The results showed inacceptable model fit with the data with chi-square (χ^2) = 1110.27, p-value (*p*) =0.00, degree of freedom (*df*) =271, chi-square/df (χ^2 /df) = 4.10, goodness of fit statistic (GFI) = 0.84, comparative fit index (CFI) = 0.85, adjusted goodness of fit statistic (AGFI) = 0.80, root mean square error of approximation (RMSEA) = 0.08. It was indicated that the initial model did not fit with empirical data. Therefore, the hypothesized model was modified and retested.

Model modification

Regarding model modification, the researcher added an error covariance between 27 paired item under rationale consideration. To reduce the residual values of each indicator, modification indices were modified.

After modifying the model, the results of the second-order CFA showed that all indices of the overall model fit of the modified model met the criteria for supporting good fit including low Chi-square values resulting in a non-significant difference level of .05. The χ^2/df ratio fell within the recommended level less than 3, GFI value equal to or greater than 0.90, AGFI values greater than 0.90, and RMSEA value less than 0.08. The results indicated that the modified model had

χ^2=533.78, *df*=244, *p*=0.00, χ^2/df=2.19, GFI=0.91, AGFI=0.89, CFI=0.94, and RMSEA=0.051 (Table 9).

Table 9 Comparison of the Goodness of Fit Measures between Initial model and modified model of the MAS (N=457)

Goodness of Fit Index	Criteria of Goodness of fit	Initial model	Modified model
Chi-Square (χ^2)	Significant (p<.05)	1110.27 (*p*=0.00)	533.78 (*p*=0.00)
(χ^2/df)	< 3.00	4.10	2.19
Goodness of Fit Index (GFI)	≥ 0.90	0.84	0.91
Root Mean Square Error of Approximation (RMSEA)	< 0.08	0.08	0.051
Comparative Fit Index (CFI)	>0.90	0.85	0.94
Adjusted Goodness of Fit Index (AGFI)	>0.90	0.80	0.89

These results indicated that the modified factor structure model was congruent with the empirical data, and under investigation the factor structure in the modified model was possible to be the factor structure of the MAS construct (Figure 5).

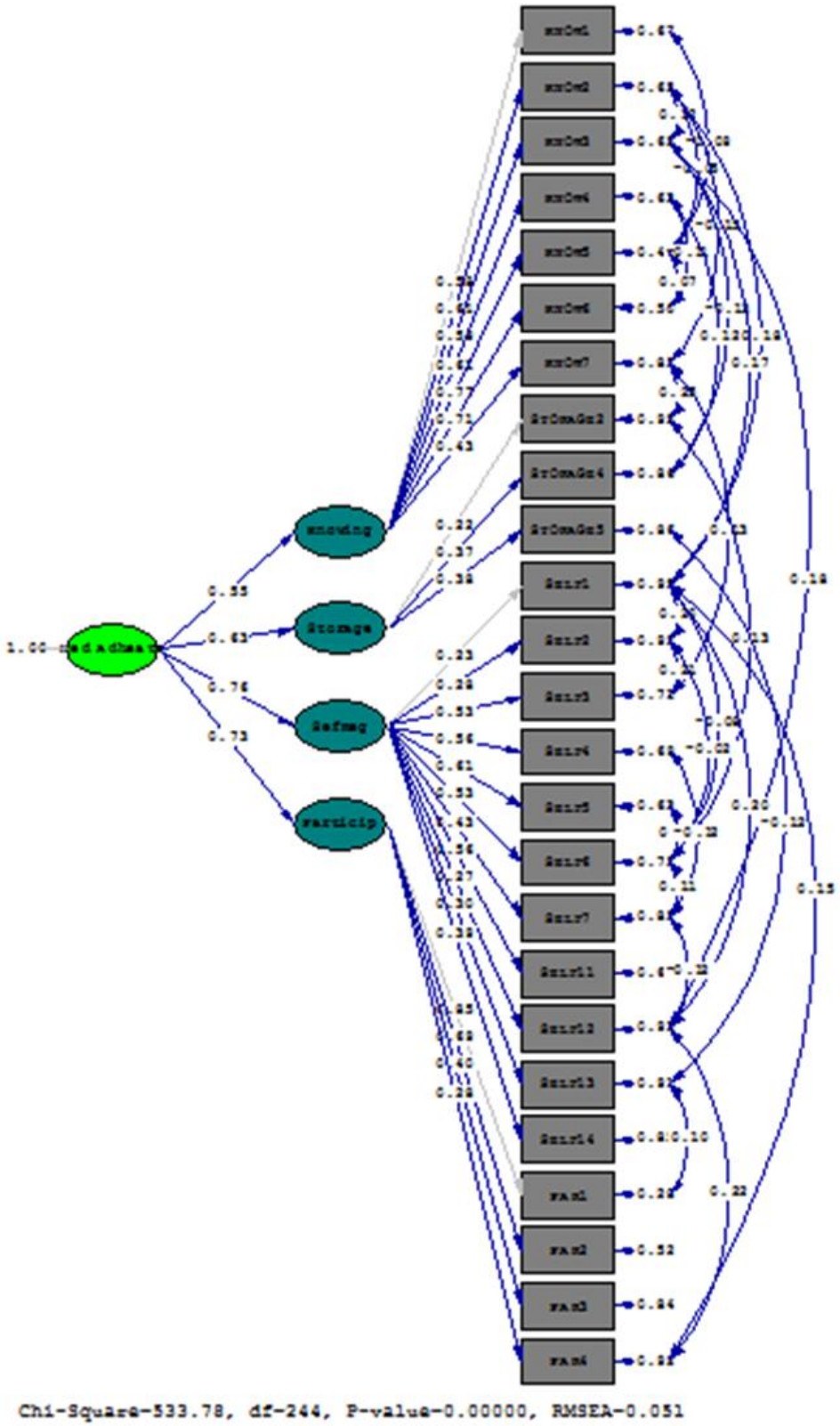

Figure 5 The modified measurement model of the MAS

As shown in Table 10, regarding factor loading of overall scale, the result showed that all of items were statically significant at 0.01 which standardized factor loading ranged from 0.22-0.85. Participating in medication treatment plan, self-regulating in taking medication correctly and continuously, storing medication appropriately, and knowing about medication properly dimension had standardized factor loading 0.76, 0.73, 0.63, and 0.55, respectively. Square multiple correlations (R^2) of dimension ranged from 0.31-0.58.

Consideration on factor loading of items in knowing about medication properly dimension, the result showed that most of items were statically significant at 0.01 which square multiple correlations (R^2) ranged from 0.18-0.60. Standardized factor loading ranged from 0.43-0.77.

Regarding factor loading of items in storing medication appropriately dimension, the result showed that most of items were statically significant at 0.01 which square multiple correlations (R2) ranged from 0.05-0.14. Standardized factor loading ranged from 0.22-0.38. There was one item (item 8) which had standardized factor loading less than 0.3. It indicated that this item should be considered for revision or deletion from the model.

Regarding factor loading of items in self-regulating in taking medication correctly and continuously dimension, the result showed that most of items were statically significant at 0.01 which square multiple correlations (R^2) ranged from 0.05-0.37. Standardized factor loading ranged from 0.23-0.61. There was three

items (Item 11, 12, and 19) which had standardized factor loading less than 0.3. It indicated that these items should be considered for revision or deletion from the model.

Regarding factor loading of items in participation in medication treatment plan dimension, the result showed that all of items were statically significant at 0.01 which square multiple correlations (R^2) ranged from 0.08-0.72. Standardized factor loading ranged from 0.28-0.85. There was one item (item 25) which had standardized factor loading less than 0.3. It indicated that these items should be considered for revision or deletion from the model.

Table 10 Standardized factor loading, estimated factor loading, and item reliability of the MAS (N=457)

Dimension/Item	Standardized factor loading	Estimated factor loading	SE	t-value	R^2
Knowing about medication properly	**0.55**	**0.59**	**0.08**	**7.58**	**0.31**
1) I know the benefit of the medicines as prescribed by the doctor for me to take (Know1)	0.58	0.71	-	-	0.33
2) I know unpleasant symptoms that might be caused by medicines prescribed by the doctor (Know2)	0.61	0.86	0.09	9.51	0.38

Table 10 Standardized factor loading, estimated factor loading, and item reliability of the MAS (N=457) (Continued)

Dimension/Item	Standardized factor loading	Estimated factor loading	SE	t-value	R^2
3) I know the disadvantage if I do not take the medicines prescribed by the doctor (Know3)	0.59	0.77	0.08	9.63	0.35
4) I know the right way to take medicines (Know4)	0.61	0.44	0.04	9.57	0.37
5) I know the right way to observe my symptoms after taking a medicine (Know5)	0.77	0.90	0.09	10.27	0.60
6) I know the right way to do if I have an unpleasant symptom caused by taking a medicine (Know6)	0.71	0.91	0.09	10.09	0.50
7) I know the right way to store medicines (Know7)	0.43	0.32	0.04	7.61	0.18
Storing medication appropriately	**0.63**	**0.48**	**0.17**	**2.88**	**0.39**
8) I store medicines in a dry Place (Storage2)	0.22	0.13	-	-	0.05
9) I keep medicines in the completely closed containers (Storage4)	0.37	0.34	0.13	2.60	0.14

Table 10 Standardized factor loading, estimated factor loading, and item reliability of the MAS (N=457) (Continued)

Factor	Standardized factor loading	Estimated factor loading	SE	t-value	R^2
10) I take medicines out of their foil packs just when I want to take them (Storage5)	0.38	0.65	0.25	2.61	0.14
Self -regulating in taking medication correctly and continuously	**0.76**	**1.00**	**0.24**	**4.20**	**0.58**
11) I check an expiry date of medicines before taking (Self1)	0.23	0.31	-	-	0.05
12) I read carefully all the labels on containers before taking medicines (Self2)	0.28	0.24	0.06	3.88	0.08
13) I follow closely to all instructions written all the the labels on containers (Self3)	0.53	0.27	0.06	4.21	0.29
14) I take medicines at the right time prescribed by the doctor (Self4)	0.56	0.30	0.07	4.22	0.31
15) I take all types of medicines prescribed by the doctor (Self5)	0.61	0.23	0.05	4.29	0.37

Table 10 Standardized factor loading, estimated factor loading, and item reliability of the MAS (N=457) (Continued)

Factor	Standardized factor loading	Estimated factor loading	SE	t-value	R^2
16) I take medicines the right dose prescribed by the doctor (Self6)	0.53	0.15	0.04	4.06	0.28
17) I do not either reduce or increase a dose without consultation with the doctor (Self7)	0.43	0.22	0.05	3.97	0.18
18) I continue to take medicines prescribed by the doctor without self-determination (Self11)	0.56	0.23	0.05	4.24	0.31
19) I ask the doctor, pharmacist, and nurse about the way to take medicines before starting to take those medicines (Self12)	0.27	0.33	0.09	3.80	0.07
20) I continue to take medicines as prescribed by the doctor even though I feel better (Self13)	0.30	0.14	0.04	3.57	0.09

Table 10 Standardized factor loading, estimated factor loading, and item reliability of the MAS (N=457) (Continued)

Factor	Standardized factor loading	Estimated factor loading	SE	t-value	R^2
21) I carry medicines with myself when I have to go out (Self14)	0.39	0.25	0.06	3.91	0.15
Participation in medication treatment plan	**0.73**	**0.72**	**0.07**	**10.61**	**0.54**
22) I observe myself whether I am better or not after taking medicines (Par1)	0.85	0.54	-	-	0.72
23) I observe unpleasant symptoms that might occur after taking medicines (Par2)	0.69	0.64	0.06	11.36	0.48
24) I correctly inform the doctor about my symptoms in order to adjust the way to take medicines to suit my way of life (Par3)	0.40	0.23	0.03	7.54	0.16
25) I make a decision with the doctor on the selection of medicine to suit myself (Par4)	0.28	0.49	0.09	5.47	0.08

χ^2=533.78, *df*=244, *p*=0.00, χ^2/df=2.19, GFI=0.91, AGFI=0.89, CFI=0.94, RMSEA=0.051

Reliability of the MAS

In this study, reliability was tested by using internal consistency, and test-retest reliability. Internal consistency reliability was used to examine the extent to which all of the instrument's items measured the same attribute by using Cronbach's alpha coefficient method. Test-retest reliability was used to examine stability of the scale.

1) Internal consistency reliability of the MAS

The results showed that Cronbach's alpha of 25 items MAS was .81. This result indicated the internal consistency of the overall scale higher than acceptable value for the newly developed scale which usually set at 0.70 (Nunnally & Bernstein, 1994). Consideration on internal consistency of each dimension, the results showed that Cronbach's alpha of dimension knowing about medication properly, self-regulating in taking medication correctly and continuously, participation in medication treatment plan, and storing medication appropriately were .81, .60, 49, and .27 respectively. Only one dimension (knowing about medication properly) had the internal consistency higher than acceptable value, the others were slightly lower than acceptable value (Table 11).

Table 11 Internal consistency reliability of the 25 items MAS (N=457)

The overall MAS/ Dimension	Number of Item	Cronbach's alpha reliability
The overall MAS	**25**	**.81**
1. Knowing about medication properly	7	.81
2. Storing medication appropriately	3	.27
3. Self-regulating in taking medication correctly and continuously	11	.60
4. Participating in medication treatment plan	4	.49

2) Stability of the MAS

Test-retest reliability was used to examine stability of the scale. Two weeks interval test-retest reliability was evaluated to determine the extent to which the two sets of score are correlated.

Demographic characteristics of the sample for stability testing

Of 457 samples, 160 samples were participated to test stability of the MAS. Participants had age ranged from 32-89 years, a mean age of 64.66 years (SD =10.79), with most frequency between 61-70 years (33.8%). Most of them were male (66.9%) and married (74.4%). Most of them had completed elementary school (42.5%) and unemployed (26.9%). Income ranged from 0-100,000 baht/month ($\overline{X}$ =14,240.28, SD=15671.96). Length of illness ranged from 3-360 months ($\overline{X}$ =68.24, SD=71.80). Number of medicine ranged from 1-15 ($\overline{X}$ =6.55, S.D.=2.51), with most

frequency between 4-6 tabs (44.4%). Demographic characteristics of the sample were presented in Table 12.

Table 12 Demographic characteristics of the sample for stability testing (N=160)

Demographic characteristics	Number	Percentage
Gender		
Male	107	66.9
Female	53	33.1
Age 32-89 years, $\overline{X}$ =64.66, SD=10.79		
31-40 years	3	1.9
41-50 years	11	6.9
51-60 years	43	26.8
61-70 years	54	33.8
71-80 years	38	23.7
81-90 years	11	6.9
Marital Status		
Single	12	7.5
Married	119	74.4
Widowed	22	13.7
Divorced	7	4.4
Education level		
No education	8	5.0
Elementary school	68	42.5
Secondary school	18	11.2
High school	24	15.0
Diploma	10	6.3
Bachelor's degree	24	15.0
Higher than Bachelor's degree	8	5.0

Table 12 Demographic characteristics of the sample for stability testing (N=160)

(Continued)

Demographic characteristics	Number	Percentage
Occupation		
Unemployed	43	26.9
Employee	16	10.0
Company officer	3	1.9
Merchant	11	6.9
Government official	24	15.0
Self-employed	18	11.2
State enterprise employee	4	2.5
Others	41	25.6
Retired government official	51	11.2
Agriculture	48	10.5
Income 0-100,000 baht/month, $\overline{X}$ =14,240.28, SD=15671.96		
No income	11	6.9
≤ 5,000 baht/month	49	30.6
5,001-10,000 baht/month	24	15.0
10,001-15,000 baht/month	18	11.3
15,001-20,000 baht/month	27	16.8
20,001-25,000 baht/month	8	5.0
25,001-30,000 baht/month	12	7.5
More than 30,001 baht/month	11	6.9

Table 12 Demographic characteristics of the sample for stability testing (N=160) (Continued)

Demographic characteristics	Number	Percentage
Length of illness 3-360 months, $\overline{X}$ =68.24, SD=71.80		
3-60 months	104	65.0
61-120 months	30	18.8
121-180 months	15	9.3
181-240 months	8	5.0
More than 240 months	3	1.9
Number of medicine 1-15, $\overline{X}$ =6.55, S.D.=2.51		
1-3	15	9.4
4-6	71	44.4
7-9	51	31.8
10-12	20	12.5
13-15	3	1.9

Test-retest reliability of the MAS

Test-retest reliability was used to examine stability of the scale. Two weeks interval test-retest reliability was evaluated to determine the extent to which the two sets of score are correlated. As shown in Table 13, the results showed that Pearson product moment correlation of the MAS was .62 ($p<.01$). It was revealed that the scale had moderate relationship.

Table 13 Test-retest reliability of the 25 items MAS (N=160)

	Test	**Re-Test**
Test	1	
Re -test	.62**	1

***p*<.01 (2-tailed)

Scoring and interpretation of the MAS score

Medication adherence was designed to be assessed by five categorical ratings item format, and the item analysis was summated ratings procedure called Likert scaling. The total score is usually treated as interval, as when the arithmetic mean score, which assumes equality of interval, is computed (Nunnally & Bernstein, 1994). Thus, the MAS was the interval scale which psychological measures are commonly described as deviations from the mean.

Scoring the scale

Scoring of each item from 1 to 5 (untrue = 1, quite untrue = 2, neutral = 3 quite true = 4, and true = 5). Mean score was calculated for the scale.

Interpretation of the scale score

The scale score was interpreted as following:

>3.67	means person with CAD had the high level of medication adherence.
2.34-3.67	means person with CAD had the moderate level of medication adherence.
<2.34	means person with CAD had the low level of medication adherence.

CHAPTER V

DISCUSSION

This chapter presents discussion of the results follows the objectives of the study. The objectives of this study were to develop the medication adherence scale for persons with CAD, and to test psychometric properties of the scale. In addition, presents the conclusion of the study. Explaining the implications of the study for nursing knowledge, nursing practice, and recommendations for future research. Lastly, describing limitation of the study.

Discussion

This discussion of the results was written based on the objectives of the study as following:

Objective 1. To develop the medication adherence scale for persons with CAD.

The MAS was developed to measure medication adherence for persons with CAD. The MAS composed of 25 items covering four constructs include knowing about medication properly (7 items), storing medication appropriately (3 items), self-regulating in taking medication correctly and continuously (11 items), and participation in medication treatment plan (4 items). The scale format was a five-

choice Likert-scale format (1= untrue, 2= quite untrue, 3= neutral, 4= quite true, and 5 = true.

The MAS differed from existing instrument to measure medication adherence. Based on the existing instrument, medication adherence deal with symptoms and doctor prescribed. Whereas, the MAS was developed from nursing perspective. According to nursing practice dealing with human experience. Nurses are guided to recognize the complexity and uniqueness of each person's relating and experiencing (Mitchell & Cody, 1999).

In nursing point of view, medication adherence was described not only taking medication as prescribed, but also doing something that related to taking medication was required. According to persons with CAD need a long term medication therapy to prevent disease progression and recurrent cardiovascular events (Pflieger et al., 2011). Regarding medication treatment for persons with CAD is a complex. Therefore, persons with CAD have to know about medications that they used including how to take medicines correctly, the disadvantage if they don't take them, the benefit of each medicine they use, how to evaluate drugs usage, the side effects of each medicine, how to perform when side effect occurred, how to prepare medicine, and how to storage medicines. Moreover, medicines are an important part of treatment, using medicines correctly can lower the risk of having a heart attack or dying from coronary artery disease. Thus, they have to regulate themselves in taking medication as prescribes correctly and continuously.

In addition, medication adherence is depended on the collaborative relationship between patient and healthcare provider (Cohen, Maillardet, & Yavin, 2009). Participation in medication treatment plan is one attribute of medication adherence for persons with CAD. Likewise, one studied found that communicating and negotiating the regimen is an attribute of medication adherence among persons with chronic disease (Huang & Chen, 2014). When patients involve in decision making regarding their medications taking so that they have a sense of ownership and they are partners in the treatment plan (Jimmy & Jose, 2011). To participate in medication treatment plan, persons with CAD have to observe common side effects of the drugs, evaluate their symptoms after medication taking, share information with a doctor for adjusting the medication treatment with daily life pattern, inform the doctor in case of having possible side effects or complications to adjust drug prescription, inform the doctor if they have any question about drug usage, and set agreement with their doctors to select appropriate medication treatment.

Lastly, storing medications appropriately is the one attribute of medication adherence among persons with CAD. Medicines should always be kept in the right way. Improper storage can affect the effectiveness and shelf life of the medicines. Therefore, storing medications appropriately is necessary for persons with CAD.

Thus, the data that gained from the MAS is the holistic assessment reflected cognitive and physical action of persons with CAD. Nurse can use this data to find the appropriate intervention to improve medication adherence.

Objective 2 To test psychometric properties of the medication adherence scale for persons with CAD

The MAS was developed and tested psychometric properties including validity and reliability. Validity of the MAS was investigated by content validity and construct validity. Reliability of the MAS was investigated by internal consistency reliability and test-retest reliability.

Content validity

Content validity is the extent to which an instrument has an appropriate sample of items for the construct being measured (Polit & Beck, 2014). In this study, the MAS was reviewed by a panel of seven experts. Content validity was obtained by computing content validity index (CVI) for both item level (I-CVI) and scale level (S-CVI/Ave). The I-CVI of the MAS ranged from 0.86-1.00, and S-CVI/Ave score = .99. Polit and Beck (2014) stated that S-CVI value of .90 or higher is the standard for establishing excellence in a scale's content validity. Because of the first step of the scale development the MAS, the researcher clarified medication adherence by using concept synthesis. Walker and Avant (2005) stated that this concept synthesis very much like establishing content validity in research. In addition, procedure for concept synthesis was done by using consensus of panel experts in medication adherence for persons with CAD. Therefore, these procedures supported content validity of the MAS. It revealed that the Mas have appropriate items for the construct being measured.

Construct validity

Construct validity is the most important and highest level of validity (Polit & Beck, 2014). Construct validity is directly concerned with the theoretical relationship of a variable to other variables (Devellis, 2003). It emphasizes on the instrument really measuring, adequately measure the abstract concept of interest. In this study, confirmatory factor analysis was used to test construct validity of the MAS.

The initial model of the MAS was indicated that medication adherence composed of four construct include knowing about medication properly (7 items), storing medication appropriately (3 items), self-regulating in taking medication correctly and continuously (11 items), and participation in medication treatment plan (4 items). The initial model of the MAS was assessed the overall model fit. The results showed inacceptable model fit with the empirical data. After modifying the model, the results of the second-order CFA showed that the modified factor structure model was congruent with the empirical data, and under investigation the factor structure in the modified model was possible to be the factor structure of the MAS construct.

Regarding factor loading of overall scale, the result showed that all of items were statically significant at 0.01 which standardized factor loading ranged from 0.22-0.85. Participating in medication treatment plan, self-regulating in taking medication correctly and continuously, storing medication appropriately, and knowing about

medication properly dimension had standardized factor loading 0.76, 0.73, 0.63, and 0.55, respectively. Square multiple correlations (R^2) of dimension ranged from 0.31-0.58.

Of 25 items, five items (item 8, 11, 12, 19, and 25) which had standardized factor loading less than 0.3. It indicated that these items should be considered for revision or deletion from the model.

Item 8 “I store medicines in a dry Place”, regarding most of participants were chronic CAD for a long time, the length of illness ranged from 3 to 480 months ($\overline{X}$ =66.46, SD=71.39). Most of them knew how to store medicines appropriately in the good level ($\overline{X}$ =4.64, SD=0.79). Therefore, the mean of this item was high ($\overline{X}$ =4.91, SD=0.44), skewness = -6.82, and kurtosis 52.83. These result revealed that this item had skewed left, and leptokurtic kurtosis. Therefore, it should be revised.

Items 11 “I check an expiry date of medicines before taking”, regarding the doctor made appointment to meet the CAD patients every one or two month. Moreover, in hospital system, pharmacist double checked medicine before distributed to the patients, especially expire date, and some hospital did not provide the date expire on the medicine package. Based on these situations, the patients make sure that the medicines will not expire in this period of time. Therefore, this item should be revised.

Item 12 “I read carefully all the labels on containers before taking medicines”, and item 19 “I ask the doctor, pharmacist, and nurse about the way to

take medicines before starting to take those medicines". According to most of participants were chronic CAD, the length of illness ranged from 3 to 480 months ($\overline{X}$ =66.46, SD=71.39). They already knew the way to take medicines. Moreover, in hospital system, pharmacist has to explain about drug usage for all patients. Based on these situations, these items should be revised.

Item 25 "I make a decision with the doctor on the selection of medicine to suit myself. It should be considered for revision.

Based on the confirmatory factor analysis results, these revealed that the MAS were acceptable for construct validity. However, some items need to be revised. Dempsey and Dempsey (2000) suggested that the establishing construct validity is a complicated and time consuming process because it requires that the measuring instrument be used in a succession of different studies. Therefore, construct validity of the MAS need the further study to confirm.

Reliability

In this study, reliability was tested by using internal consistency, and test-retest reliability. Internal consistency reliability was used to examine the extent to which all of the instrument's items measured the same attribute by using Cronbach's alpha coefficient method. Test-retest reliability was used to examine stability of the scale.

Internal consistency

Internal consistency or homogeneity is another attribute of an instrument relates to reliability with which the items within the scale reflect or measure the same concept (LoBiondo-Wood & Haber, 2006). The results showed that Cronbach's alpha of 25 items MAS was .81. This result indicated the internal consistency of the overall scale higher than acceptable value for the newly developed scale which usually set at 0.70 (Nunnally & Bernstein, 1994). Consideration on internal consistency of each dimension, the results showed that Cronbach's alpha of dimension knowing about medication properly, self-regulating in taking medication correctly and continuously, participation in medication treatment plan, and storing medication appropriately were .81, .60, 49, and .27 respectively. Only one dimension (knowing about medication properly) had the internal consistency higher than acceptable value, the others were slightly lower than acceptable value. According to there are some factors affecting the reliability of the result taking from the scale. The measurement errors are smaller in the measurement values obtained from the long scales than the short scales (O'Connor, 1993). The overall MAS composed of 25 items, the reliability was high. On the other hand, the participation in medication treatment plan, and storing medication appropriately dimension composed of 4 items, and 3 items, respectively, reliability were 49, and .27 respectively. In this case, the number of the items must be increased to increase the reliability (Oncu, 1994).

Stability

Stability is concerned with "the same results will be obtained over repeated administration of instrument" (De Muth, 2014). The two sets of data are statistically compared. In this study, two weeks interval test-retest reliability was evaluated among 160 participants to determine the extent to which the two sets of score are correlated. The results showed that Pearson product correlation of the MAS was .62 ($p<.01$). Regarding to criteria of $r > .50$ indicated that the instrument had moderate relationship between two tests. According to Most of participants had mean age of 64.66 years (SD =10.79), and completed elementary school (46.6%). When they completed the first test, if they had some question, they can ask the researcher directly. For the second test, all of them complete the questionnaire by themselves, if they have some question, they don't ask. These characteristics of participant can be related with the stability of the scale.

Conclusion

Medication adherence is important for persons with CAD. Medication adherence is important for them because it associates with improving quality of life and well-being and reducing morbidity, mortality, re-hospitalization, and costs. The correct medication adherence data is necessary for nurses to develop such intervention. The MAS was a new instrument developed to measure medication

adherence for person with CAD who attended at out-patient heart clinics of tertiary hospitals.

The instrument development procedures composed seven steps including 1) clarifying and determining the concept, 2) generating an item pool, 3) determining the format for measurement, 4) the initial item pool reviewed by experts, 5) conducting preliminary item tryouts for item review, 6) conducting field-test for psychometric property testing, and 7) developing scoring and interpretation of the test score.

The MAS is a self-report composed of 25 items covering four constructs; knowing about medication properly (7 items), storing medication appropriately (3 items), self-regulating in taking medication correctly and continuously (11 items), and participating in medication treatment plan (4 items). The scale format was a five-choice Likert-scale format (1= untrue, 2= quite untrue, 3= neutral, 4= quite true, and 5 = true.

In summary, the MAS had acceptable content validity, construct validity, and reliability.

Implication for Nursing Knowledge

The MAS was developed to measure medication adherence for person with CAD. This scale was a new instrument which was developed by nurses, and designed for use by professional nurses. According to nurses take an active role in assessment

medication adherence. Assessment is the first and most critical phase of the nursing process. The data was used to identify nursing diagnoses, collaborative problems, make referrals, make judgments about the effectiveness of nursing interventions, and evaluate client care outcomes.

The scale construction starting with concept synthesis of medication adherence concept through Delphi technique based on nursing perspective. Medication adherence was assessed compatible with nursing practice to recognize the complexity and uniqueness of each person's relating and experiencing. Therefore, the MAS was the new knowledge for assessing medication adherence in nursing perspective.

Implication for nursing practice

1. The MAS was designed for use by professional nurses. This instrument will be a benefit instrument for nurses to assess medication adherence of persons with CAD. At out-patient heart clinics, nurses can be used this scale when persons with CAD come for follow-up visit. At community area, home health care nurses can be used this scale when they undertake home visit. The correct data of specific medication adherence will be benefit for nurse to find the appropriate intervention to improve medication adherence for persons with CAD.

2. The MAS can be used as a valid and reliable instrument to measure medication adherence for persons with CAD for future research.

Recommendation for future research

The MAS is a new research instrument. There are many recommendations for further studies.

1. Even though it could be conclude that the overall MAS was the validity and reliability instrument to measure medication adherence for person with CAD. The modified factor structure model was congruent with the empirical data, and under investigation the factor structure in the modified model was possible to be the factor structure of the MAS construct. However, there was five items had factor loading lower than acceptable level. For further study, these items should be revised, and tested to improve construct validity.

2. Testing psychometric properties of the MAS in this study composed of content validity, construct validity, and reliability. In the future research needs the descriptive study to test the scale in the others aspect. For example, testing concurrent validity with other objective instrument to measure medication adherence for person with CAD.

3. According to this study was conducted in persons with CAD who attended at out-patient heart clinic of tertiary hospital. Future research should be tested the MAS in others setting such as in community, and in-patient unit.

4. The level of medication adherence was created on the basis of the MAS mean scores. The MAS score indicate the level of medication adherence; the high score reflected the high medication adherence. The future research needed to identify how the various score on the MAS can predict the outcome of medication adherence. Moreover, a cutoff score between high, moderate, or low levels of medication adherence in persons with CAD need to be studied.

Limitation of the Study

1. The MAS was developed from nursing perspective on medication adherence for persons with CAD. Therefore, this instrument cannot generalize to assess medication adherence in other groups of illness.

2. According to the limited time, the most of the sample in this study was older adult. Thus, the instrument using for measuring medication adherence should be concerned about this point.

REFERENCES

Adams, C. D., Dreyer, M. L., Dinakar, C., & Portnoy, J. M. (2004). Pediatric asthma: a look at adherence from the patient and family perspective. *Curr Allergy Asthma Rep, 4*(6), 425-432.

American Heart Association. (2014). *Drug Therapy for Cholesterol*. Retrieved from http://www.heart.org.

Anderson, Deepak, B. V., Amoateng-Adjepong, Y., & Zarich, S. (2005). Benefits of comprehensive inpatient education and discharge planning combined with outpatient support in elderly patients with congestive heart failure. *Congest Heart Fail, 11*(6), 315–321.

Anderson, K. H., Ford, S., Robson, D., Cassis, J., Rodrigues, C., & Gray, R. (2010). An exploratory, randomized controlled trial of adherence therapy for people with schizophrenia. *Int J Ment Health Nurs, 19*(5), 340-349. doi: 10.1111/j.1447-0349.2010.00681.x

Andrade, S. E., Kahler, K. H., Frech, F., & Chan, K. A. (2006). Methods for evaluation of medication adherence and persistence using automated databases. *Pharmacoepidemiol Drug Saf, 15*(8), 565-574; discussion 575-567. doi: 10.1002/pds.1230

Berger, J. S., Brown, D. L., & Becker, R. C. (2008). Low-dose aspirin in patients with stable cardiovascular disease: a meta-analysis. *Am J Med, 121*(1), 43-49. doi: 10.1016/j.amjmed.2007.10.002

Bitton, A., Choudhry, N. K., Matlin, O. S., Swanton, K., & Shrank, W. H. (2013). The impact of medication adherence on coronary artery disease costs and outcomes: a systematic review. *Am J Med, 126*(4), 357 e357-357 e327. doi: 10.1016/j.amjmed.2012.09.004

Bouvy, M. L., Heerdink, E. R., Leufkens, H. G., & Hoes, A. W. (2003). Predicting mortality in patients with heart failure: a pragmatic approach. *Heart, 89*(6), 605-609.

Brunzell, J. D., Davidson, M., Furberg, C. D., Goldberg, R. B., Howard, B. V., Stein, J. H., & Witztum, J. L. (2008). Lipoprotein management in patients with cardiometabolic risk: consensus conference report from the American Diabetes Association and the American College of Cardiology Foundation. *J Am Coll Cardiol, 51*(15), 1512-1524. doi: 10.1016/j.jacc.2008.02.034

Burn, N., & Grove, S. K. (2005). *The practice of nursing research: Conducts, critique and utilization* (5th ed.): Philadelphia: W. B. Saunders Company.

Burn, N., & Grove, S. K. (2009). *The Practice of Nursing Research : Appraisal, Synthesis, and Generation of Evedence* (6th ed.): St Louis, MO: Saunders.

Chui, M. A., Deer, M., Bennett, S. J., Tu, W., Oury, S., Brater, D. C., & Murray, M. D. (2003). Association between adherence to diuretic therapy and health care utilization in patients with heart failure. *Pharmacotherapy, 23*(3), 326-332.

Cohen, A. T., Maillardet, L., & Yavin, Y. (2009). Will a once-weekly anticoagulant for the treatment and secondary prevention of thromboembolism improve adherence? *Thromb Haemost, 101*(3), 422-427.

Cohen, S. M. (2009). Concept analysis of adherence in the context of cardiovascular risk reduction. *Nurs Forum, 44*(1), 25-36. doi: 10.1111/j.1744-6198.2009.00124.x

Cox, K. R., & Taylor, S. G. (2005). Orem's self-care deficit nursing theory: pediatric asthma as exemplar. *Nurs Sci Q, 18*(3), 249-257.

Cramer, J. A., Roy, A., Burrell, A., Fairchild, C. J., Fuldeore, M. J., Ollendorf, D. A., & Wong, P. K. (2008). Medication compliance and persistence: terminology and definitions. *Value Health, 11*(1), 44-47. doi: 10.1111/j.1524-4733.2007.00213.x

Crocker, L., & Algina, J. (1986). *Introduction to classical and modern test theory*. The United States of America: Harcourt Brace Jovanovich College Publishers.

Custer, R. L., Scarcella, J. A., & Stewart, B. R. (1999). Ttionhe modified Delphi technique: A rotational modifica. *Journal of Vocation and Technical Education, 15*(2), 1-10.

Dalkey, N. C., & Rourke, D. L. (1972). *Experimental assessment of Delphi procedures with group value judgment* (N. C. Dalkey, D. L. Rourke, R. Lewis & D. Snyder Eds.): Lexington, MA: Lexington Books.

De Muth, J. E. (2014). *Basic Statistics and Pharmaceutical Statistical Applications* (3rd ed.). NW: Taylor & Francis Group, LLC.

Delbecq, A. L., Van de Ven, A. H., & Gustafson, D. H. (1975). *Group techniques for program planning*. Glenview,IL: Scott, Foresman, and Co.

Dempsey, P. A., & Dempsey, A. P. (2000). *Using nursing research: Process, critical evaluation and utilization* (5th ed. ed.). New York: Lippincott Williams and Wilkins.

Devellis, R. F. (2003). *Scale development: theory and applications*. California: United States of America: Sage Publications, Inc.

Dunbar-Jacob, J., Bohachick, P., Mortimer, M. K., Sereika, S. M., & Foley, S. M. (2003). Medication adherence in persons with cardiovascular disease. *J Cardiovasc Nurs, 18*(3), 209-218.

Evangelista, L. S., & Shinnick, M. A. (2008). What do we know about adherence and self-care? *J Cardiovasc Nurs, 23*(3), 250-257.

Fialko, L., Garety, P. A., Kuipers, E., Dunn, G., Bebbington, P. E., Fowler, D., & Freeman, D. (2008). A large-scale validation study of the Medication Adherence Rating Scale (MARS). *Schizophr Res, 100*(1-3), 53-59. doi: 10.1016/j.schres.2007.10.029

Fraker, T. D., Jr., Fihn, S. D., Gibbons, R. J., Abrams, J., Chatterjee, K., Daley, J., . . . Yancy, C. W. (2007). 2007 chronic angina focused update of the ACC/AHA 2002 guidelines for the management of patients with chronic stable angina: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines Writing Group to develop the focused update of the 2002 guidelines for the management of patients with chronic stable angina. *J Am Coll Cardiol, 50*(23), 2264-2274. doi: 10.1016/j.jacc.2007.08.002

Goodman, C. M. (1987). The Delphi technique: a critique. *Journal of Advanced Nursing, 12*, 729-734.

Gravetter, F. J., & Forzano, L. A. B. (2003). *Research methods: For the behavioral sciences*: CA: Thomson and Wadsworth.

Green, B., Jones, M., Hughes, D., & William, A. (1999). Applying the Delphi technique in a study of GPs information requirement. *Health and Social Care in the Community, 7*(3), 198-205.

Green, L. W., Levine, D. M., & Deed. (1975). Clinical trials of health education for hypertensive outpatients: design and baseline data. *Preventive Medicine, 4*, 417-425.

Green, P. J. (1982). *The content of a college-level outdoor leadership course.* Paper presented at the The Conference of the Northwest District Association for the American Alliance for Health, Physical Education, Recreation, and Dance.

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis* (5th Ed.). New Jersey: Prentice-Hall International.

Halpern, M. T., Khan, Z. M., Schmier, J. K., Burnier, M., Caro, J. J., Cramer, J., . . . Hollenberg, N. K. (2006). Recommendations for evaluating compliance and persistence with hypertension therapy using retrospective data. *Hypertension, 47*(6), 1039-1048. doi: 10.1161/01.HYP.0000222373.59104.3d

Hasson, F., Keeney, S., & McKenna, H. (2000). Research guidelines for the Delphi survey technique. *Journal of Advanced Nursing, 32*(4), 1008-1015.

Hauptman, P. J. (2008). Medication adherence in heart failure. *Heart Fail Rev, 13*(1), 99-106. doi: 10.1007/s10741-007-9020-7

Haynes, R. B., McDonald, H. P., & Garg, A. X. (2002). Helping patients follow prescribed treatment: clinical applications. *JAMA, 288*, 2880–2883.

Higgins, P. A., & Staub, J. A. (2006). Understanding the error of our ways: Mapping the concepts of validity and reliability. *Nursing Outlook, 54*(1), 23-29.

Hill, K. Q., & Fowles, J. (1975). The methodological worth of the Delphi forecasting technique. *Technological Forecasting and Social Change, 7*, 179-192.

Ho, P. M., Bryson, C. L., & Rumsfeld, J. S. (2009). Medication adherence: its importance in cardiovascular outcomes. *Circulation, 119*(23), 3028-3035. doi: 10.1161/circulationaha.108.768986

Hooper, D., Coughlan, J., & Mullen, M. R. (2008). Structural Equation Modelling: Guidelines for Determining Model Fit. *Journal of Business Research Methods, 6*(1), 53-60.

Hsu, C.-C., & Sandford, B. A. (2007). The Delphi Technique: Making Sense Of Consensus. *Practical Assessment, Research & Evaluation, 12*(10), 1-7.

Huang, H. C., Lin, W. C., & Lin, J. D. (2008). Development of a fall-risk checklist using the Delphi technique. *J Clin Nurs, 17*(17), 2275-2283. doi: 10.1111/j.1365-2702.2008.02337.x

Huang, J. Y., & Chen, H. M. (2014). [Concept analysis of medication adherence in patients with chronic disease]. *Hu Li Za Zhi, 61*(3), 112-118. doi: 10.6224/jn.61.3.112

Hui, C. L., Chen, E. Y., Kan, C. S., Yip, K. C., Law, C. W., & Chiu, C. P. (2006). Detection of non-adherent behaviour in early psychosis. *Aust N Z J Psychiatry, 40*(5), 446-451. doi: 10.1111/j.1440-1614.2006.01821.x

Idvall, E., Hamrin, E., & Unosson, M. (2002). Development of an instrument to measure strategic and clinical quality indicators in postoperative pain management. *J Adv Nurs, 37*(6), 532-540.

Jacobs, J. M. (1996). *Essential assessment criteria for physical education teacher education programs: A Delphistudy*. (Doctoral), West Virginia University, Morgantown.

Jimmy, B., & Jose, J. (2011). Patient Medication Adherence: Measures in Dailly Practice. *Oman Medical Journal, 26*(3), 155-159. doi: 10.5001/omj.2011.38

Josan, K., Majumdar, S. R., & McAlister, F. A. (2008). The efficacy and safety of intensive statin therapy: a meta-analysis of randomized trials. *Cmaj, 178*(5), 576-584. doi: 10.1503/cmaj.070675

Kalichman, S. C., Pope, H., White, D., Cherry, C., Amaral, C. M., Swetzes, C., . . . Kalichman, M. O. (2008). Association between health literacy and HIV treatment adherence: further evidence from objectively measured medication adherence. *J Int Assoc Physicians AIDS Care (Chic), 7*(6), 317-323. doi: 10.1177/1545109708328130

Keeney, S., Hass, F., & McKenna, H. (2011). *The Delphi Technique in Nursing and Health Research*. A John Wiley & Sons, Ltd.

Kiatchoosakun, S., Sutra, S., & Thepsuthammarat, K. (2012). Coronary artery disease in the Thai population: data from health situation analysis 2010. *J Med Assoc Thai, 95 Suppl 7*, S149-155.

Kim, M. T., Hill, M. N., Bone, L. R., & Levine, D. M. (2000). Development and testing of the Hill-Bone Compliance to High Blood Pressure Therapy Scale. *Prog Cardiovasc Nurs, 15*(3), 90-96.

Kimberlin, C. L., & Winterstein, A. G. (2008). Vality and reliability of measurement instruments used in research. *Am J Health Syst Pharm, 65*.

Klein, C. E., Kastrissios, H., Miller, A. A., Hollis, D., Yu, D., Rosner, G. L., . . . Ratain, M. J. (2006). Pharmacokinetics, pharmacodynamics and adherence to oral topotecan in myelodysplastic syndromes: a Cancer and Leukemia Group B study. *Cancer Chemother Pharmacol, 57*(2), 199-206. doi: 10.1007/s00280-005-0023-6

Kramer, J. M., Hammill, B., Anstrom, K. J., & al., e. (2006). National evaluation of adherence to β-blocker therapy for 1 year after acute myocardial infarction in patients with commercial health insurance. *Am Heart J, 152*, 454.e451–454.e458.

Kravitz, R. L., Hays, R. D., Sherbourne, C. D., DiMatteo, M. R., Rogers, W. H., Ordway, L., & Greenfield, S. (1993). Recall of recommendations and adherence to advice among patients with chronic medical conditions. *Arch Intern Med, 153*(16), 1869-1878.

Krousel-Wood, M., Muntner, P., Jannu, A., Desalvo, K., & Re, R. N. (2005). Reliability of a medication adherence measure in an outpatient setting. *Am J Med Sci, 330*(3), 128-133.

Lavsa, S. M., Holzworth, A., & Ansani, N. T. (2011). Selection of a validated scale for measuring medication adherence. *J Am Pharm Assoc (2003), 51*(1), 90-94. doi: 10.1331/JAPhA.2011.09154

LoBiondo-Wood, G., & Haber, J. (2006). *Nursing research: Methods and critical appraisal for evidence-based practice*. Missouri: Mosby Elsevier.

Ludwig, B. G. (1994). *Internationalizing Extension: An exploration of the characteristics evident in a state university Extension system that achieves internationalization.* (doctoral), The Ohio State University, Columbus.

McKenna, H. P. (1994a). The Delphi technique: a worthwhile approach for nursing? *Journal of Advanced Nursing, 19*, 1221-1225.

Mitchell, G. J., & Cody, W. K. (1999). Nursing Knowledge and Human Science: Ontological and Epistemological Considerations. In E. C. Polifroni & W. Marelouise (Eds.), *Perspectives on Philosophy of Science in Nursing: An Historical and Contemporary Anthology*. Philadelphia: Lippincott Print.

Morgan, P. J., Lam-McCulloch, J., Herold-McIlroy, J., & Tarshis, J. (2007). Simulation performance checklist generation using the Delphi technique. *Can J Anaesth, 54*(12), 992-997. doi: 10.1007/bf03016633

Morisky, D. E., Ang, A., Krousel-Wood, M., & Ward, H. J. (2008). Predictive validity of a medication adherence measure in an outpatient setting. *J Clin Hypertens (Greenwich), 10*(5), 348-354.

Morisky, D. E., Green, L. W., & Levine, D. M. (1986). Concurrent and predictive validity of a self-reported measure of medication adherence. *Med Care, 24*(1), 67-74.

Murray, M. D., Morrow, D. G., Weiner, M., Clark, D. O., Tu, W., Deer, M. M., . . . Weinberger, M. (2004). A conceptual framework to study medication adherence in older adults. *Am J Geriatr Pharmacother, 2*(1), 36-43.

Nguyen, G. C., LaVeist, T. A., Harris, M. L., Datta, L. W., Bayless, T. M., & Brant, S. R. (2009). Patient trust-in-physician and race are predictors of adherence to medical management in inflammatory bowel disease. *Inflamm Bowel Dis, 15*(8), 1233-1239. doi: 10.1002/ibd.20883

Nissen, S. E., Tuzcu, E. M., Libby, P., Thompson, P. D., Ghali, M., Garza, D., . . . Topol, E. J. (2004). Effect of antihypertensive agents on cardiovascular events in patients with coronary disease and normal blood pressure: the CAMELOT study: a randomized controlled trial. *Jama, 292*(18), 2217-2225. doi: 10.1001/jama.292.18.2217

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric Theory* (3rd ed.). New York : McGRAW-HILL, INC..

O'Connor, R. (1993). *Issue in the measurement of health-related quality of life*: Elsevier/ Churchill Livingstone

Oncu, H. (1994). *Egitimde olcme ve degerlendirme (Measurement and evaluation in education)*: Ankara: Matser Basim.

Orem, D. E., Taylor, S. G., & Renpenning, K. M. (2001). *Nursing: concepts of practice* (Y. Alexopoulos Ed. 6th edition ed.): Mosby, Inc. A Harcourt Health Sciences Company.

Osterberg, L., & Blaschke, T. (2005). Adherence to medication. *N Engl J Med, 353*(5), 487-497. doi: 10.1056/NEJMra050100

Petrilla, A. A., Benner, J. S., Battleman, D. S., Tierce, J. C., & Hazard, E. H. (2005). Evidence-based interventions to improve patient compliance with antihypertensive and lipid-lowering medications. *Int J Clin Pract, 59*, 1441-1451.

Pflieger, M., Winslow, B. T., Mills, K., & Dauber, I. M. (2011). Medical Management of Stable Coronary Artery Disease. *American Family Physician, 83* (7), 819-826.

Polit, D. F., & Beck, C. T. (2004). *Nursing research: Principles and Methods* (7th ed.). Philadelphia: Lippincott Williams and Wilkins.

Polit, D. F., & Beck, C. T. (2014). *Essentials of nursing research : appraising evidence for nursing practice* (8th ed.): Wolters Kluwer Health.

Polit, D. F., Beck, C. T., & Hungler, B. P. (2001). *Essentials of nursing research: Method appraisal, and utilization* (5th ed.): Philadelphia: Lippincott Williams and Wilkins.

Polit, D. F., Beck, C. T., & Owen, S. V. (2007). Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. *Res Nurs Health, 30*(4), 459-467. doi: 10.1002/nur.20199

Pope, M., & Scott, J. (2003). Do clinicians understand why individuals stop taking lithium? *J Affect Disord, 74*(3), 287-291.

Powell, C. (2003). The Delphi technique: myths and realities. *Journal of Advanced Nursing, 41*(4), 376-382.

Rapoff, M. A. (2010). *Adherence to pediatric medical regimens* (2nd ed.). New York: Springer.

Rich, M. W., Beckham, V., Wittenberg, C., Leven, C. L., Freedland, K. E., & Carney, R. M. (1995). A multidisciplinary intervention to prevent the readmission of elderly patients with congestive heart failure. *N Engl J Med, 333*, 1190-1195.

Rosa, A. R., Marco, M., Fachel, J. M., Kapczinski, F., Stein, A. T., & Barros, H. M. (2007). Correlation between drug treatment adherence and lithium treatment attitudes and knowledge by bipolar patients. *Prog Neuropsychopharmacol Biol Psychiatry, 31*(1), 217-224. doi: 10.1016/j.pnpbp.2006.08.007

Rosendorff, C., Black, H. R., Cannon, C. P., Gersh, B. J., Gore, J., Izzo, J. L., Jr., . . . Oparil, S. (2007). Treatment of hypertension in the prevention and management of ischemic heart disease: a scientific statement from the American Heart Association Council for High Blood Pressure Research and the Councils on Clinical Cardiology and Epidemiology and Prevention. *Circulation, 115*(21), 2761-2788. doi: 10.1161/circulationaha.107.183885

Roter, D. L., Hall, J. A., Merisca, R., Nordstrom, B., Cretin, D., & Svarstad, B. (1998). Effectiveness of interventions to improve patient compliance: a meta-analysis. *Med Care, 36*, 1138–1161.

Roumie, C. L., Elasy, T. A., & Greevy, R., et al. . (2006). Improving blood pressure control through provider education, provider alerts, and patient education: a cluster randomized trial. *Ann Intern Med, 145*, 165-175.

Sandrey, M., & Bulger, S. (2008). The Delphi method: an approach for facilitation evidence based practice in athletic training. *Althetic Training Education Journal, 3*(4), 135-142.

Shore, L. M., Newton, L. A., & Thornton, G. C. (1990). Job and organizational attitudes in relation to employee behavioral intention. *Journal of Organizational Behavior, 11*(1), 57-67. doi: 10.1002/job.4030110108

Siu, L. H. (2008). Issues and Procedures in Adoping Structural Equation Modeling Technique. *Journal of Applied Quantitative Methods, 3*(1), 76-83.

Skulmoski, G. J., Hartman, F. T., & Krahn, J. (2007). The Delphi method for graduate research. *Journal of Information Technology Education, 6*, 1-21.

Steiger, J. H. (1990). Structural Model Evaluation and Modification: An Interval Estimation Approach. *Multivariate Behavioral Research, 25*, 173-180.

Switzer, G. E., Wisniewski, S. R., Belle, S. H., Dew, M. A., & Schultz, R. (1999). Selecting, developing, and evaluating research instruments. *Soc Psychiatry Psychiatr Epidemiol, 34*(8), 399-409.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using Multivariate Statistics* (5th ed.). New York: Allyn and Bacon.

Talbot, L. A. (1995). *Principles and practice of nursing research*: St. Louis, Baltimore: Mosby.

Tarn, D. M., Heritage, J., Paterniti, D. A., Hays, R. D., Kravitz, R. L., & Wenger, N. S. (2006). Physician communication when prescribing new medications. *Arch Intern Med, 166*, 1855-1862.

Thompson, K., Kulkarni, J., & Sergejew, A. A. (2000). Reliability and validity of a new Medication Adherence Rating Scale (MARS) for the psychoses. *Schizophr Res, 42*(3), 241-247.

Ulschak, F. L. (1983). *Human resource development: The theory and practice of need assessment*: Reston, VA: Reston Publishing Company, Inc.

Wagner, J. A., Schnoll, R. A., & Gipson, M. T. (1998). Development of a scale to measure adherence to self-monitoring of blood glucose with latent variable measurement. *Diabetes Care, 21*(7), 1046-1051.

Walker, L. O., & Avant, K. C. (2005). *Strategies for Theory Construction in Nursing*. Pearson Education, Inc., Upper Saddle River, New Jersey: Julie Levin Alexander.

Weaver, W. T. (1971). The Delphi forecasting method. *Phi Delta Kappan, 52*(5), 267-273.

Weber, J. R., Kelley, J. H., & Sprengel, A. D. (2014). *Lab manual for health assessment in nursing*: Wolters Kluwer.

White, B., & Truax, D. (2007). *The nurse practitioner in long-term care: guidelines for clinical practice.* . Massachusetts: Jones and Bartlett

World Health Organization. (2003). *Adherence to long-term therapies: evidence for action*. World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland.

World Health Organization. (2008). *Report on cardiovascular disease 2005*. Retrieved from http://www.who.int/cardiovascular_diseases.

Wu, J. R., Chung, M., Lennie, T. A., Hall, L. A., & Moser, D. K. (2008). Testing the psychometric properties of the Medication Adherence Scale in patients with heart failure. *Heart Lung, 37*(5), 334-343. doi: 10.1016/j.hrtlng.2007.10.001

Wu, J. R., Moser, D. K., Chung, M. L., & Lennie, T. A. (2008). Objectively measured, but not self-reported, medication adherence independently predicts event-free survival in patients with heart failure. *J Card Fail, 14*(3), 203-210. doi: 10.1016/j.cardfail.2007.11.005

Wu, J. R., Moser, D. K., De Jong, M. J., Rayens, M. K., Chung, M. L., Riegel, B., & Lennie, T. A. (2009). Defining an evidence-based cutpoint for medication adherence in heart failure. *Am Heart J, 157*(2), 285-291. doi: 10.1016/j.ahj.2008.10.001

Wu, J. R., Moser, D. K., Lennie, T. A., & Burkhart, P. V. (2008). Medication adherence in patients who have heart failure: a review of the literature. *Nurs Clin North Am, 43*(1), 133-153; vii-viii. doi: 10.1016/j.cnur.2007.10.006

APPENDICES

Appendix A Approval of dissertation proposal

ประกาศ

คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

เรื่อง การอนุมัติหัวข้อดุษฎีนิพนธ์นิพนธ์ ครั้งที่ 3/2555 ประจำปีการศึกษา 2555

นิสิตผู้ทำวิจัยและอาจารย์ที่ปรึกษาดุษฎีนิพนธ์

รหัสนิสิต	5377971836
ชื่อ-นามสกุล	นาวาโทหญิง กนกเลขา สุ่วรรณฟอง
สาขาวิชา	พยาบาลศาสตร์ (นานาชาติ)
อาจารย์ที่ปรึกษา	รองศาสตราจารย์ ดร. สุรีพร ธนศิลป์
อาจารย์ที่ปรึกษาร่วม	รองศาสตราจารย์ ดร. วราภรณ์ ชัยวัฒน์
ประธานกรรมการสอบฯ	รองศาสตราจารย์ ดร. จินตนา ยูนิพันธุ์
กรรมการสอบฯ	รองศาสตราจารย์ ดร. อรสา พันธ์ภักดี
กรรมการสอบฯ	ศาสตราจารย์ ดร. ศิริชัย กาญจนวาสี
กรรมการสอบฯ	รองศาสตราจารย์ ร.ต.อ.หญิง ดร. ยุพิน อังสุโรจน์
ชื่อหัวข้อดุษฎีนิพนธ์	การพัฒนาเครื่องมือประเมินพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ THE DEVELOPMENT OF MEDICATION ADHERENCE SCALE FOR PERSONS WITH CORONARY ARTERY DISEASE
ครั้งที่อนุมัติ	3/2555
ระดับ	ปริญญาเอก

นิสิตผู้ทำวิจัยและอาจารย์ที่ปรึกษาดุษฎีนิพนธ์

รหัสนิสิต	5377975336
ชื่อ-นามสกุล	นางสาวภัทรา เผือกพันธ์
สาขาวิชา	พยาบาลศาสตร์ (นานาชาติ)
อาจารย์ที่ปรึกษา	รองศาสตราจารย์ ร.ต.อ.หญิง ดร. ยุพิน อังสุโรจน์
อาจารย์ที่ปรึกษาร่วม	รองศาสตราจารย์ ดร. จินตนา ยูนิพันธุ์
ประธานกรรมการสอบฯ	รองศาสตราจารย์ ดร. วราภรณ์ ชัยวัฒน์
กรรมการสอบฯ	ดร. กฤษดา แสวงดี
กรรมการสอบฯ	รองศาสตราจารย์ ดร. ศิริเดช สุชีวะ
กรรมการสอบฯ	ผู้ช่วยศาสตราจารย์ ดร. สุวิณี วิวัฒน์วานิช
ชื่อหัวข้อดุษฎีนิพนธ์	ปัจจัยที่มีอิทธิพลต่อความตั้งใจในการลาออกจากวิชาชีพของพยาบาลในโรงพยาบาลรัฐ FACTORS INFLUENCING INTENTION TO LEAVE NURSING PROFESSION AMONG REGISTERED NURSES, GOVERNMENTAL HOSPITALS
ครั้งที่อนุมัติ	3/2555
ระดับ	ปริญญาเอก

นิสิตผู้ทำวิจัยและอาจารย์ที่ปรึกษาดุษฎีนิพนธ์

รหัสนิสิต	5377977636
ชื่อ-นามสกุล	นาวาตรีหญิง อรวรรณ ฆ้องต้อ
สาขาวิชา	พยาบาลศาสตร์ (นานาชาติ)
อาจารย์ที่ปรึกษา	รองศาสตราจารย์ ดร. จินตนา ยูนิพันธุ์
อาจารย์ที่ปรึกษาร่วม	ผู้ช่วยศาสตราจารย์ ดร. สุนิดา ปริชาวงษ์
ประธานกรรมการสอบฯ	รองศาสตราจารย์ ร.ต.อ.หญิง ดร. ยุพิน อังสุโรจน์
กรรมการสอบฯ	พันเอก นายแพทย์ พิชัย แสงชาญชัย
กรรมการสอบฯ	ดร. กฤษดา แสวงดี
กรรมการสอบฯ	รองศาสตราจารย์ ดร. สิริพรรณ สุวรรณมรรคา
กรรมการสอบฯ	รองศาสตราจารย์ ดร. วราภรณ์ ชัยวัฒน์
ชื่อหัวข้อดุษฎีนิพนธ์	ปัจจัยทำนายความพยายามเลิกบุหรี่และสถานภาพการสูบบุหรี่ของผู้ป่วยโรคจิตเภทที่สูบบุหรี่ PREDICTING FACTORS OF QUIT ATTEMPT AND SMOKING STATUS IN SCHIZOPHRENIC SMOKERS
ครั้งที่อนุมัติ	3/2555
ระดับ	ปริญญาเอก

จากมติคณะกรรมการบริหารคณะพยาบาลศาสตร์ ครั้งที่ 9/2556 วันที่ 14 พฤษภาคม 2556

ประกาศ ณ วันที่ 17 พฤษภาคม พ.ศ. 2556

(รองศาสตราจารย์ ร.ต.อ.หญิง ดร. ยุพิน อังสุโรจน์)

คณบดีคณะพยาบาลศาสตร์

Appendix B Approval of committee

หนังสือรับรองการพิจารณาด้านจริยธรรมการวิจัยในคน
คณะอนุกรรมการจริยธรรมการวิจัยในคน มหาวิทยาลัยธรรมศาสตร์ ชุดที่ 2
99 หมู่ที่ 18 ถ.พหลโยธิน ต.คลองหนึ่ง อ.คลองหลวง จ.ปทุมธานี 12121
โทร. 0-2564-4440-79 ต่อ 1804, โทรสาร 0-2564-3151

หนังสือรับรองเลขที่ 153 /2557

รหัสโครงการ 186/2557

ชื่อโครงการวิจัย การพัฒนาเครื่องมือประเมินพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

ชื่อผู้วิจัยหลัก นาวาโทหญิง กนกเลขา สุวรรณพงษ์

หน่วยงานที่รับผิดชอบ คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

เอกสารที่รับรอง

1. โครงร่างการวิจัย ฉบับแก้ไข ครั้งที่ 1 (วันที่ 6 มกราคม 2558)
2. เอกสารชี้แจงข้อมูลแก่ผู้เข้าร่วมโครงการวิจัย (Information Sheet)
3. หนังสือแสดงเจตนายินยอม เข้าร่วมการวิจัย (Consent Form)

คณะอนุกรรมการจริยธรรมการวิจัยในคน มหาวิทยาลัยธรรมศาสตร์ ชุดที่ 2 ได้พิจารณาอนุมัติด้านจริยธรรมการทำวิจัยในคนให้ดำเนินการวิจัยข้างต้นได้ ตามมติการพิจารณาแบบ Expedited Review

ระยะเวลาที่อนุมัติ 1 ปี (เอกสารอนุมัติฉบับนี้มีผลตั้งแต่วันที่ 15 มกราคม 2558 ถึง วันที่ 15 มกราคม 2559)

ถ้าหากผู้วิจัยไม่สามารถดำเนินการทันตามกำหนดของอายุใบรับรอง โครงการวิจัย (1 ปี) ให้ผู้วิจัยดำเนินการยื่นเรื่องขอต่ออายุขยายเวลา ก่อนครบกำหนดอย่างน้อย 30 วัน

ลงชื่อ.....
(รองศาสตราจารย์ ดร. พันเอก ถวัลย์ ฤกษ์งาม)
ประธานคณะอนุกรรมการ

ลงชื่อ.....
(อาจารย์ ดร. วิมลพักตร์ ศรีไวย์)
อนุกรรมการและเลขานุการ

อนุมัติ ณ วันที่ 15 มกราคม 2558
หมดอายุ วันที่ 15 มกราคม 2559

AF/17-03/01.1

คณะแพทยศาสตร์ มหาวิทยาลัยสงขลานครินทร์

หนังสือฉบับนี้ให้ไว้เพื่อแสดงว่า

รหัสโครงการ: REC: 57-344-19-9

ชื่อโครงการ (ภาษาไทย): การพัฒนาเครื่องมือประเมินพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสาหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

ชื่อโครงการ (ภาษาอังกฤษ): THE DEVELOPMENT OF MEDICATION ADHERENCE SCALE FOR PERSONS WITH CORONARY ARTERY DISEASE

ผู้วิจัยหลัก: นาวาโทหญิง กนกเลขา สุวรรณพงษ์ **สังกัด:** คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

ผู้ร่วมวิจัย: รองศาสตราจารย์ ดร.สุรีพร ธนศิลป์ **สังกัด:** คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

ผู้ร่วมวิจัย: รองศาสตราจารย์ ดร.วราภรณ์ ชัยวัฒน์ **สังกัด:** คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

เอกสารที่รับรอง:

1. แบบเสนอเพื่อขอรับการพิจารณาจริยธรรมการวิจัยในมนุษย์ เวอร์ชั่น 2.0 ฉบับลงวันที่ 29 ธันวาคม 2557
2. โครงการวิจัยฉบับสมบูรณ์ เวอร์ชั่น 2.0 ฉบับลงวันที่ 29 ธันวาคม 2557
3. เอกสารชี้แจงอาสาสมัคร เวอร์ชั่น 2.0 ฉบับลงวันที่ 29 ธันวาคม 2557
4. เอกสารแสดงเจตนายินยอมของอาสาสมัคร เวอร์ชั่น 2.0 ฉบับลงวันที่ 29 ธันวาคม 2557
5. แบบบันทึกข้อมูล
6. ประวัติผู้วิจัย

ได้ผ่านการรับรองจากคณะกรรมการจริยธรรมการวิจัยในมนุษย์คณะแพทยศาสตร์ มหาวิทยาลัยสงขลานครินทร์ โดยยึดหลักเกณฑ์ตามประกาศ เฮลซิงกิ (Declaration of Helsinki) และแนวทางการปฏิบัติการวิจัยทางคลินิกที่ดี (The International Conference on Harmonization in Good Clinical Practice หรือ ICH-GCP) โดยขอให้รายงานความก้าวหน้าของโครงการวิจัยทุก 12 เดือน

ลงชื่อ.....

(รองศาสตราจารย์นายแพทย์บุญสิน ตั้งตระกูลวนิช)

ประธานคณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์

วันที่รับรอง: 9 มกราคม 2558

วันหมดอายุ: 8 มกราคม 2559

สำนักงานจริยธรรมการวิจัยในมนุษย์
คณะแพทยศาสตร์ มหาวิทยาลัยสงขลานครินทร์
15 ถ.กาญจนวานิช อ.หาดใหญ่ จ.สงขลา 90110
โทรศัพท์ 0-7445-1149, 0-7445-1157

รหัสเอกสารรับรอง 005/2558

เอกสารรับรองจริยธรรมโครงการวิจัยในมนุษย์

คณะกรรมการจริยธรรมการวิจัยในมนุษย์ โรงพยาบาลสรรพสิทธิประสงค์ อุบลราชธานี

ชื่อโครงการ การพัฒนาเครื่องมือประเมินพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

The Development of Medication Adherence Scale for Persons with Coronary Artery Disease

ผู้วิจัยหลัก นาวาโทหญิง กนกเลขา สุวรรณเพงษ์ และคณะ

หน่วยงาน/สถาบัน คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

คณะกรรมการจริยธรรมการวิจัยในมนุษย์ โรงพยาบาลสรรพสิทธิประสงค์ อุบลราชธานี ได้พิจารณารายละเอียดของโครงร่างการวิจัย เอกสารข้อมูลสำหรับอาสาสมัคร เอกสารแสดงความยินยอมเข้าร่วมการวิจัยภาษาไทยแล้ว มีมติสมควรให้ดำเนินการวิจัยในขอบเขตของโครงการที่เสนอได้

.....
(นายแพทย์จิรวัฒน์ มูลศาสตร์)
ประธานคณะกรรมการการวิจัยในมนุษย์

.....
(นายแพทย์ชลิต ทองประยูร)
ผู้อำนวยการโรงพยาบาลสรรพสิทธิประสงค์

วันที่รับรอง : 26 S.A. 2558 **วันหมดอายุของการรับรอง:** 25 S.A. 2559

เอกสารที่รับรองรวมถึง
1. โครงร่างการวิจัย
2. ใบยินยอมและเอกสารชี้แจงอาสาสมัคร
3. ผู้วิจัย/คณะผู้วิจัย
4. แบบสอบถาม/แบบบันทึกข้อมูล

ผู้วิจัยที่ได้รับการรับรองต้องยอมตามเงื่อนไขดังต่อไปนี้

1.ผู้วิจัยรับทราบว่าเป็นการผิดจริยธรรมที่จะรวบรวมข้อมูลที่ศึกษาก่อนโครงการได้รับการรับรองโดยคณะกรรมการจริยธรรมการวิจัยในมนุษย์ โรงพยาบาลสรรพสิทธิประสงค์ อุบลราชธานี

2.กิจกรรมของโครงการวิจัยต้องจบลงภายในวันหมดอายุของการรับรอง ถ้าต้องการขยายเวลา ต้องยื่นแสดงความจำนงก่อนวันหมดอายุ 30 วัน

3.ผู้วิจัยต้องทำการศึกษาตรงตามที่ระบุไว้ในโครงร่างงานวิจัยอย่างเคร่งครัด

4.ใช้เพียงแบบฟอร์มที่คณะกรรมการจริยธรรมฯได้รับรอง (ใบยินยอมและเอกสารชี้แจงอาสาสมัคร, แผ่นประชาสัมพันธ์ เป็นต้น) และ คณะกรรมการจริยธรรมฯมีสิทธิตรวจสอบเอกสารดังกล่าวได้ทุกครั้งเมื่อต้องการ

5.ในกรณีที่เกิดเหตุการณ์ข้างเคียงร้ายแรง ต้องรายงานคณะกรรมการจริยธรรมฯภายใน 5 วันทำการ

6.ในกรณีที่มีการเปลี่ยนแปลงกิจกรรมไปจากเดิมที่รับรองไว้ ต้องรายงานคณะกรรมการจริยธรรมฯ ก่อนที่จะเริ่มทำกิจกรรมนั้นๆ

7.ส่งรายงานการวิจัยฉบับสมบูรณ์หลังโครงการวิจัยเสร็จสิ้นลงแล้ว จำนวน 1 ฉบับ

สถานที่ติดต่อ: ศูนย์วิจัย รพ.สรรพสิทธิประสงค์ ถ.สรรพสิทธิ์ ต.ในเมือง อ.เมือง จ.อุบลราชธานี 34000 โทรศัพท์ 045-244973

คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี มหาวิทยาลัยมหิดล
๒๗๐ ถนนพระราม ๖ แขวงทุ่งพญาไท เขตราชเทวี กทม. ๑๐๔๐๐
โทร. (๐๒) ๒๐๑-๑๐๐๐

Faculty of Medicine Ramathibodi Hospital, Mahidol University.
270 Rama VI Road, Ratchathewi, Bangkok 10400, Thailand
Tel. (662) 201-1000

Documentary Proof of Ethical Clearance
Committee on Human Rights Related to Research Involving Human Subjects
Faculty of Medicine Ramathibodi Hospital, Mahidol University

MURA2014/694

Title of Project	The Development of Medication Adherence Scale for Persons with Coronary Artery Disease
Protocol Number	ID 11-57-92
Principal Investigator	Cdr. Kanoklekha Suwannapong
Education Address	Faculty of Nursing Chulalongkorn University

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

Signature of Secretary Committee on Human Rights Related to Research Involving Human Subjects	..... Prof. Duangrurdee Wattanasirichaigoon, M.D.
Signature of Chairman Committee on Human Rights Related to Research Involving Human Subjects	Pratak Oprasertsawat Prof. Pratak O-Prasertsawat, M.D.
Date of Approval	December 8, 2014
Duration of Study	6 Months

โรงพยาบาลตำรวจ สำนักงานตำรวจแห่งชาติ
๔๙๒/๑ ถนนพระรามที่ ๑ เขตปทุมวัน
กรุงเทพมหานคร ๑๐๓๓๐

เอกสารรับรองโครงการวิจัย โดย คณะกรรมการจริยธรรมและวิจัยในมนุษย์ โรงพยาบาลตำรวจ

เลขที่หนังสือรับรอง ๒๐. ๒๒๕/๕๖

ชื่อโครงการ/ภาษาไทย	การพัฒนาเครื่องมือประเมินพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ
ชื่อโครงการ/ภาษาอังกฤษ	THE DEVELOPMENT OF MEDICATION ADHERENCE SCALE FOR PERSONS WITH CORONARY ARTERY DISEASE
ชื่อหัวหน้าโครงการ/หน่วยงานที่สังกัด	นาวาโทหญิง กนกเลขา สุวรรณพงษ์ คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
รหัสโครงการ	-
สถานที่ทำการวิจัย	โรงพยาบาลตำรวจ
เอกสารรับรอง	๑. รายละเอียดโครงร่างการวิจัย ฉบับที่ ๑.๐ ลงวันที่ ๙ ธันวาคม ๒๕๕๗ (Version 1.0 Date 9 December 2014) (ฉบับภาษาไทย) ๒. แบบฟอร์มการให้ข้อมูลแก่ผู้เข้าร่วมวิจัย ฉบับที่ ๑.๐ ลงวันที่ ๙ ธันวาคม ๒๕๕๗ (Version 1.0 Date 9 December 2014) (ฉบับภาษาไทย) ๓. เอกสารชี้แจงข้อมูลและเอกสารลงนามยินยอม ฉบับที่ ๑.๐ ลงวันที่ ๙ ธันวาคม ๒๕๕๗ (Version 1.0 Date 9 December 2014) (ฉบับภาษาไทย) ๔. แบบฟอร์มการเก็บข้อมูลและการวิเคราะห์ข้อมูล ฉบับที่ ๑.๐ ลงวันที่ ๙ ธันวาคม ๒๕๕๗ (Version 1.0 Date 9 December 2014) (ฉบับภาษาไทย) ๕. อัตตประวัติผู้วิจัย
รับรองโดย	คณะกรรมการจริยธรรมและวิจัยในมนุษย์ โรงพยาบาลตำรวจ
วันที่รับรอง	๙ ธันวาคม ๒๕๕๗
วันหมดอายุ	๘ ธันวาคม ๒๕๕๘

หนังสือรับรองฉบับนี้ออกโดยความเห็นชอบในการพิจารณาจากคณะกรรมการจริยธรรมและวิจัยของโรงพยาบาลตำรวจ ตามกฎเกณฑ์สากล ผู้วิจัยสามารถเข้าเก็บข้อมูลเพื่อทำการวิจัยได้ตั้งแต่วันที่ออกเอกสารรับรองโครงการวิจัย

พันตำรวจเอก.....
(เสรี ธีรพงษ์)
เลขานุการคณะกรรมการจริยธรรมและวิจัย
ของโรงพยาบาลตำรวจ

พลตำรวจตรี .....
(ธนา ธุระเจน)
ประธานคณะกรรมการจริยธรรมและวิจัย
ของโรงพยาบาลตำรวจ

เอกสารรับรองโครงการวิจัยในมนุษย์ 111/57

คณะกรรมการจริยธรรมเกี่ยวกับการวิจัยในมนุษย์

โรงพยาบาลพุทธชินราช พิษณุโลก

ชื่อโครงการ การพัฒนาเครื่องมือประเมินพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

ชื่อหัวหน้าโครงการ นาวาโทหญิงกนกเลขา สุวรรณพงษ์

เลขที่โครงการ/รหัส -

หน่วยงานที่รับผิดชอบ คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

การรับรอง ขอรับรองโครงการวิจัยดังกล่าวข้างบนนี้ได้ผ่านการพิจารณาและรับรองจากคณะกรรมการจริยธรรมเกี่ยวกับการวิจัยในมนุษย์โรงพยาบาลพุทธชินราช พิษณุโลก เมื่อวันที่ 1 S.A. 2557

ลงนาม

(แพทย์หญิงศิริลักษณ์ กล้าณรงค์)

ประธานคณะกรรมการจริยธรรมเกี่ยวกับการวิจัยในมนุษย์

เอกสารเลขที่ ๕๔ /๒๕๕๗

เอกสารรับรองโครงการวิจัย

โดย คณะกรรมการวิจัย โรงพยาบาลชลบุรี

.....

โครงการวิจัย : การพัฒนาเครื่องมือประเมินพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ
The Development of Medication Adherence Scale for Persons with Coronary Artery Disease.

ผู้ดำเนินการวิจัยหลัก : นาวาโทหญิงกนกเลขา สุวรรณพงษ์

หน่วยงานที่รับผิดชอบ : คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

คณะกรรมการวิจัยโรงพยาบาลชลบุรีได้พิจารณาแล้วเห็นว่าสมควรให้ดำเนินการวิจัยในขอบข่ายของโครงการวิจัยที่เสนอได้ ตั้งแต่วันที่ ๑ พฤษภาคม ๒๕๕๖ จนถึงวันที่ ๓๑ พฤษภาคม ๒๕๕๘

ออกหนังสือ ณ วันที่ ๒๙ ธันวาคม ๒๕๕๗

ลงนาม
(นายแพทย์พงษ์เทพ ไชยประสิทธิ์)
ประธานคณะกรรมการวิจัยและจริยธรรมการวิจัย

ลงนาม
(นายแพทย์อัษฎา ตียพันธ์)
นายแพทย์ทรงคุณวุฒิ
รักษาการในตำแหน่ง ผู้อำนวยการโรงพยาบาลชลบุรี

Appendix C List of the panel expert of Delphi technique

1. Assistant Professor Dr. Kusuma Khuwatsamrit, Ph.D., RN.

   Faculty of medicine, Ramathibodi Hospital, Mahidol University

2. Ms. Sineenart Likitratcharean, MSN., APN.

   Faculty of medicine, Ramathibodi Hospital, Mahidol University

3. Ms. Sunantha Sakuldee, MSN., APN.

   Songkhlanagarin Hospital

4. Mrs. Thidarat Chaiyamat, MSN., APN

   Siriraj Piyamaharajkarun Hospital

5. Mrs. Daranee Inthajak, MSN., APN.

   Siriraj Hospital

6. CAPT Patchanok Jitsuwan, MSN., APN.

   Somdejprapinklao Hospital

7, CDR. Udomporn Pamonpipat, RN.

   Somdejprapinklao Hospital

8. Ms. Pinthong Rattanapuchong, MSN., APN.

   Khon Khan Hospital

9. Major. Jiraporn Chaopothong, MSN., APN.

   Head Nurse of Semi Coronary Care Unit, Phramongkutklao Hospital

10. Ms. Sunisa Khanacharean, MSN., APN.

    Rajavithi Hospital

11. Miss Tassanee chollanakijkul, MSN., APN.

    Central Chest Institute of Thailand

12. Miss Patchanee Romtan, MSN., APN.

    Central Chest Institute of Thailand

13. Police Captain Dr. Rapin Polsook, Ph.D., RN.

    Nurse instructor, Faculty of Nursing, Chulalongkorn University

14. LCDR. Jirawan Panayingphisan, MSN, APN.

    Queen Sirikit Hospital

15. LCDR. Pitak Thongsuk, MSN, APN.

    Queen Sirikit Hospital

16. Dr. Aem-orn Sangsiri, Ph.D., APN.

    Chulalongkorn Hospital

17. Miss Arunsri Rattanaphrom, MSN, APN.

    Surat Thani Hospital

Appendix D List of the content expert

1. Assistant Professor Dr. Jaruwan Manasurakarn

   Faculty of Nursing, Prince of Songkla University

2. Assistant Professor Dr. Wasana Ruisungnoen

   Faculty of Nursing, Khon Kaen University

3. Lt.Col. Dr. Wanarat Srikanok

   The Royal Thai Army Nursing College

4. Assistant Professor Dr. Phuangphaka Kreethong

   Navamindradhiraj University

5. Assistant Professor Dr. Duangkamol Wattradul

   The Thai Red Cross College of Nursing

6. Dr. Sarinrut Sriprasong

   Faculty of Nursing, Mahidol University

7. Associate Professor Dr. Siridej Sujiva

   Faculty of Education, Chulalongkorn University

Appendix E Participants information sheet

แบบ วจ-16

เอกสารแนะนำสำหรับอาสาสมัคร

ชื่อโครงการวิจัย การพัฒนาเครื่องมือประเมินพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสาหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

ชื่อผู้วิจัย นาวาโทหญิง กนกเลขา สุวรรณพงษ์

ตำแหน่ง นิสิตหลักสูตรพยาบาลศาสตรดุษฎีบัณฑิต

สถานที่ปฏิบัติงาน คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย อาคารบรมราชชนนีศรีศตพรรษ ชั้น 11 ถนนพระราม 1 แขวงวังใหม่ เขตปทุมวัน กรุงเทพฯ 10330 หมายเลขโทรศัพท์ 081-899-3660

เหตุผลและความจำเป็นที่ต้องทำการศึกษาวิจัย ผู้ที่เป็นโรคหลอดเลือดหัวใจ จำเป็นต้องได้รับการรักษาด้วยยาอย่างต่อเนื่องและระยะยาว ดังนั้นผู้ป่วยจึงจำเป็นต้องมีพฤติกรรมในการใช้ยาที่ถูกต้องและเหมาะสม หากพยาบาลสามารถประเมินพฤติกรรมการใช้ยาของผู้ป่วยได้อย่างถูกต้อง ก็จะทำให้รู้ถึงสภาพปัญหาการใช้ยาของผู้ป่วยตามสภาพการณ์จริง จากการทบทวนเอกสารงานวิจัยที่เกี่ยวข้องพบว่าแบบประเมินพฤติกรรมการใช้ยาตามเกณฑ์การรักษาที่มีอยู่ในปัจจุบัน ยังไม่มีการประเมินคุณลักษณะหรือองค์ประกอบของพฤติกรรมการใช้ยาตามเกณฑ์การรักษา โดยเฉพาะอย่างยิ่งในบริบทของผู้ที่เป็นโรคหลอดเลือดหัวใจอย่างแท้จริง ดังนั้นจึงมีความจำเป็นอย่างยิ่งที่จะต้องพัฒนาแบบประเมินพฤติกรรมการใช้ยาตามเกณฑ์การรักษาที่สะท้อนถึงโครงสร้างหรือองค์ประกอบของพฤติกรรมดังกล่าว ที่พยาบาลสามารถนำไปใช้เป็นเครื่องมือพื้นฐานในการประเมินพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ป่วยโรคหลอดเลือดหัวใจต่อไป

วัตถุประสงค์ของการศึกษาวิจัย เพื่อพัฒนาและทดสอบคุณภาพของแบบประเมินพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

วิธีการศึกษาวิจัย ผู้วิจัยจะขอให้ท่านตอบแบบสอบถาม 2 ครั้ง ครั้งแรกเมื่อท่านมารับบริการ ณ คลินิกโรคหัวใจ แบบสอบถามมีจำนวน 1 ชุด ประกอบด้วย 2 ส่วนคือ ส่วนที่ 1 จะถามเกี่ยวกับพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ จำนวน 43 ข้อ และส่วนที่ 2 จะถามเกี่ยวกับข้อมูลส่วนบุคคล จำนวน 8 ข้อ ใช้เวลาในการตอบแบบสอบถามประมาณ 20 นาที และครั้งที่ 2 เมื่อครบ 2 สัปดาห์ ผู้วิจัยจะส่งแบบสอบถามจำนวน 1 ชุด พร้อมซองเปล่า ติดแสตมป์ จ่าหน้าซองถึงผู้วิจัย ให้ท่านตามที่อยู่ที่ท่านแจ้งไว้ ขอให้ท่านตอบแบบสอบถามด้วยตนเองอีกครั้ง โดยในครั้งนี้ท่านไม่ต้องตอบข้อมูลส่วนบุคคล หลังจากนั้นขอให้ท่านส่งแบบสอบถามกลับคืนให้ผู้วิจัยทางไปรษณีย์

ระยะเวลาที่อาสาสมัครต้องเกี่ยวข้องในการศึกษาวิจัย ท่านจะใช้เวลาในการตอบแบบสอบถามครั้งละประมาณ 20 นาที

ประโยชน์ที่คาดว่าจะเกิดขึ้น ผลการศึกษาที่ได้จะเป็นประโยชน์ต่อการพัฒนาแบบประเมินพฤติกรรมการใช้ยาสำหรับผู้ป่วยโรคหลอดเลือดหัวใจ ซึ่งพยาบาลและผู้เกี่ยวข้องสามารถนำไปใช้เพื่อประเมินพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจได้อย่างถูกต้อง ผลการประเมินที่ได้จะนำไปสู่การพัฒนาแนวทางการปฏิบัติเพื่อเพิ่มคุณภาพการพยาบาลในด้านการส่งเสริม สนับสนุน และปรับเปลี่ยนพฤติกรรมการใช้ยาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจให้เป็นไปตามเกณฑ์การรักษา อันจะส่งผลให้ผู้ป่วยมีคุณภาพชีวิตที่ดีขึ้น อีกทั้งยังเป็นการลดค่าใช้จ่ายทางด้านการรักษาพยาบาลอีกด้วย

ความเสี่ยงที่คาดว่าจะเกิดขึ้น เนื่องจากการศึกษาครั้งนี้เป็นการตอบแบบสอบถาม จึงไม่มีความเสี่ยงหรือผลข้างเคียงใดๆ ต่อท่าน อย่างไรก็ตามหากท่านรู้สึกอ่อนเพลีย ท่านสามารถพักระหว่างตอบแบบสอบถามได้

การป้องกันความเสี่ยง และการแก้ไขกรณีเกิดปัญหา ในงานวิจัยนี้เป็นการใช้แบบสอบถามในการเก็บข้อมูล ดังนั้นจะไม่เกิดอันตรายใดๆ แก่ท่าน แต่อย่างไรก็ตามหากท่านพบความไม่สะดวกหรือต้องการข้อมูลเพิ่มเติมท่านสามารถติดต่อผู้วิจัยได้ตลอดเวลาที่ นาวาโทหญิง กนกเลขา สุวรรณพงษ์ คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย อาคารบรมราชชนนีศรีศตพรรษ ชั้น 11 ถนนพระราม 1 แขวงวังใหม่ เขตปทุมวัน กรุงเทพฯ 10330 หมายเลขโทรศัพท์ 081-899-3660

ขอบเขตการดูแลรักษาความลับของข้อมูลต่างๆ ของอาสาสมัคร ในงานวิจัยนี้ผู้วิจัยจะใช้รหัสแทนชื่อ-นามสกุลในแบบบันทึกข้อมูล ข้อมูลส่วนตัวของท่านจะถูกเก็บรักษาไว้เป็นความลับและจะไม่เปิดเผยต่อสาธารณะเป็นรายบุคคล แต่จะรายงานผลการวิจัยเป็นข้อมูลส่วนรวมโดยไม่สามารถระบุข้อมูลรายบุคคลได้

การถอนตัวออกจากโครงการวิจัย การเข้าร่วมการวิจัยครั้งนี้เป็นไปโดยความ**สมัครใจ** ท่านมีสิทธิ์ในการ**ปฏิเสธ**หรือสามารถ**ถอนตัว**จากการศึกษาได้ตลอดเวลา ทั้งนี้การปฏิเสธหรือถอนตัวจะไม่มีผลกระทบใดๆต่อตัวท่านทั้งสิ้น

หากท่านไม่ได้รับการปฏิบัติตามข้อมูลดังกล่าว ท่านสามารถร้องเรียนได้ที่ **คณะกรรมการวิจัย โรงพยาบาลชลบุรี** 69 ม.2 ถนนสุขุมวิท ตำบลบ้านสวน อำเภอเมือง จังหวัดชลบุรี 20000 โทรศัพท์ 038-931000 โทรสาร 038-931100 (ในเวลาราชการ)

Appendix F Consent form

หนังสือแสดงความยินยอมการเข้าร่วมโครงการวิจัย

ชื่อโครงการวิจัย การพัฒนาเครื่องมือประเมินพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสาหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

ข้าพเจ้า (นาย, นาง, นางสาว) ..... นามสกุล ..... อายุ ..... ปี
ผู้เข้าร่วมโครงการ

ก่อนที่จะลงนามในใบยินยอมให้ทำการวิจัยนี้ ข้าพเจ้าได้รับการอธิบายจากผู้ให้ข้อมูลถึงวัตถุประสงค์ของการวิจัย ระยะเวลาที่ทำการวิจัย ขั้นตอนและวิธีการปฏิบัติตัวที่ข้าพเจ้าต้องปฏิบัติ ผลประโยชน์ที่ข้าพเจ้าจะได้รับ รวมทั้งผลข้างเคียงหรืออันตรายที่อาจเกิดขึ้นจากการเข้าร่วมโครงการวิจัยอย่างละเอียดและมีความเข้าใจดีแล้ว

ผู้วิจัยรับรองว่าจะตอบคำถามต่างๆ ที่ข้าพเจ้าสงสัยด้วยความเต็มใจ ไม่ปิดบังซ่อนเร้นจนข้าพเจ้าพอใจ และข้าพเจ้าสามารถถอนตัวจากการศึกษานี้เมื่อใดก็ได้ที่ข้าพเจ้าปรารถนา โดยไม่เสียสิทธิ์ใดๆ ในการรับการรักษาพยาบาลที่จะเกิดขึ้นตามมาในโอกาสต่อไปทั้งในปัจจุบันและอนาคต ณ สถานพยาบาลแห่งนี้หรือสถานพยาบาลอื่น

ผู้วิจัยรับรองว่าจะเก็บข้อมูลเฉพาะเกี่ยวกับตัวข้าพเจ้าเป็นความลับและจะเปิดเผยได้เฉพาะสรุปผลการวิจัยหรือการเปิดเผยข้อมูลต่อผู้มีหน้าที่ที่เกี่ยวข้องกับการสนับสนุนและกำกับดูแลการวิจัยเท่านั้น

ข้าพเจ้าสามารถติดต่อผู้วิจัยคือ นาวาโทหญิง กนกเลขา สุวรรณพงษ์ ที่อยู่ คณะพยาบาลศาสตร์ จุฬาลงกรณ์-มหาวิทยาลัย อาคารบรมราชชนนีศรีศตพรรษ ชั้น 11 ถนนพระราม 1 แขวงวังใหม่ เขตปทุมวัน กรุงเทพฯ 10330 หมายเลขโทรศัพท์ 081-899-3660 ได้ตลอดเวลา

ข้าพเจ้าได้อ่านข้อความข้างต้นและมีความเข้าใจดีทุกประการ และได้ลงนามในใบยินยอมนี้ด้วยความเต็มใจ และหลังจากลงนามแล้วข้าพเจ้าจะได้รับสำเนาของเอกสารฉบับนี้เก็บไว้ 1 ชุด

ลงนาม ..... ผู้เข้าร่วมโครงการ
(.....)
วันที่ ..... เดือน ..... พ.ศ. 255.....

ลงนาม ..... ผู้ให้ข้อมูลการวิจัย
(.....)
วันที่ ..... เดือน ..... พ.ศ. 255.....

ลงนาม ..... พยาน
(.....)
วันที่ ..... เดือน ..... พ.ศ. 255.....

Appendix G Research instrument

แบบสอบถามความคิดเห็นเรื่องพฤติกรรมการใช้ยาตามเกณฑ์การรักษา

สำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

(Delphi รอบที่ 2)

คำชี้แจง

พฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจในแบบสอบถามฉบับนี้ ผู้วิจัยได้มาจากการสัมภาษณ์ความคิดเห็นของผู้เชี่ยวชาญ จำนวน 17 คน โดยนำข้อมูลที่ได้มาวิเคราะห์เนื้อหา สรุปประเด็น และจัดกลุ่มพฤติกรรมการใช้ยาที่มีลักษณะใกล้เคียงกัน (Clustering) ได้ทั้งสิ้น 4 กลุ่ม คือ การรู้เรื่องยาอย่างถูกต้อง การเก็บรักษายาอย่างเหมาะสม การกำกับตนเองให้รับประทานยาอย่างถูกต้องและต่อเนื่อง และการมีส่วนร่วมในการวางแผนการรักษา

แบบสอบถามฉบับนี้ มีวัตถุประสงค์เพื่อสอบถามความคิดเห็นของท่าน เกี่ยวกับพฤติกรรมการใช้ยาตามเกณฑ์การรักษาฯ ที่ระบุอยู่ในแบบสอบถาม โปรดทำเครื่องหมาย √ ลงในช่องที่ตรงกับความคิดเห็นของท่านมากที่สุด โดยมีเกณฑ์ในการพิจารณา ดังนี้

5 หมายถึง ท่านเห็นด้วยอย่างยิ่งว่าข้อความนั้นเป็นพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

4 หมายถึง ท่านเห็นด้วยว่าข้อความนั้นเป็นพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

3 หมายถึง ท่านไม่แน่ใจว่าข้อความนั้นเป็นพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

2 หมายถึง ท่านไม่เห็นด้วยว่าข้อความนั้นเป็นพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

1 หมายถึง ท่านไม่เห็นด้วยอย่างยิ่งว่าข้อความนั้นเป็นพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

และขอให้ท่านให้เหตุผลประกอบ (ถ้ามี)

พฤติกรรมการใช้ยาตามเกณฑ์การรักษา	ไม่เห็นด้วยอย่างยิ่ง (1)	ไม่เห็นด้วย (2)	ไม่แน่ใจ (3)	เห็นด้วย (4)	เห็นด้วยอย่างยิ่ง (5)	เหตุผลประกอบ (ถ้ามี)
การรู้เรื่องยาอย่างถูกต้อง						
1. รู้ชื่อยาที่หมอสั่งให้รับประทานทุกตัว						
2. รู้ว่ายาแต่ละชนิดมีประโยชน์อย่างไร						
3. รู้ว่าถ้าไม่กินยาแล้วจะเกิดผลเสียอย่างไร						
4. รู้ว่ายาออกฤทธิ์อย่างไร						
44. ตกลงร่วมกับแพทย์เพื่อเลือกการรักษา ด้วยยาที่เหมาะสม						

คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
อาคารบรมราชชนนีศรีศตพรรษ ชั้น 11
ถนนพระราม1 แขวงวังใหม่ เขตปทุมวัน
กรุงเทพฯ

3 มีนาคม 2557

เรียน

ผู้วิจัยขอขอบพระคุณเป็นอย่างสูง ในความอนุเคราะห์ของท่าน ที่ได้กรุณาให้ความร่วมมืออย่างดียิ่งในการให้สัมภาษณ์เกี่ยวกับพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจในกระบวนการเดลฟายรอบที่ 1 และตอบแบบสอบถามในรอบที่ 2 สำหรับแบบสอบถามรอบที่ 3 นี้ มีจุดมุ่งหมายเพื่อให้ท่านได้ทราบภาพรวมของความคิดเห็นของกลุ่มผู้ตอบแบบสอบถามในรอบที่ผ่านมา และพิจารณาทบทวนคำตอบของท่านเอง ในรอบนี้ท่านอาจเปลี่ยนแปลงคำตอบหรือยืนยันตามคำตอบเดิมได้ โดยผู้วิจัยได้แสดงผลความสอดคล้องของข้อความแต่ละข้อจากการตอบแบบสอบถามรอบที่ 2 ของผู้ตอบแบบสอบถามทุกท่าน ด้วยการระบุค่ามัธยฐาน (Median) และค่าพิสัยระหว่างควอไทล์ (Interquartile Range) ที่คำนวณได้ และแสดงตำแหน่งคำตอบของท่านในรอบที่ผ่านมา เพื่อประกอบการพิจารณาดังกล่าว

ผู้วิจัยหวังเป็นอย่างยิ่งว่าจะได้รับความร่วมมือในการตอบแบบสอบถามจากท่าน และขอความกรุณาจากท่าน โปรดส่งคืนแบบสอบถามให้ผู้วิจัยภายใน 2 สัปดาห์ และขอขอบพระคุณในความอนุเคราะห์ของท่านเป็นอย่างสูงมา ณ โอกาสนี้

ขอแสดงความนับถืออย่างสูง
นาวาโทหญิง กนกเลขา สุวรรณพงษ์
(ผู้วิจัย)

แบบสอบถามความคิดเห็นเรื่องพฤติกรรมการใช้ยาตามเกณฑ์การรักษา
สำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ
(Delphi รอบที่ 3)

คำชี้แจง

แบบสอบถามฉบับนี้มีจุดมุ่งหมายเพื่อให้ท่านได้ทราบภาพรวมของความคิดเห็นเรื่องพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ ของกลุ่มผู้ตอบแบบสอบถามในรอบที่ผ่านมา และพิจารณาทบทวนคำตอบของท่านเอง โดยในรอบนี้ท่านสามารถเปลี่ยนแปลงคำตอบหรือยืนยันตามคำตอบเดิมได้ เพื่อประกอบการพิจารณาดังกล่าว ผู้วิจัยได้แสดงผลความสอดคล้องของข้อความแต่ละข้อ จากการตอบแบบสอบถามรอบที่ 2 ของผู้ตอบแบบสอบถามทุกท่าน ด้วยการระบุค่ามัธยฐาน (Median) และค่าพิสัยระหว่างควอไทล์ (Interquartile Range) ที่คำนวณได้ และแสดงตำแหน่งคำตอบของท่านในรอบที่ผ่านมา ดังนี้

สัญลักษณ์ ♦ หมายถึง ค่ามัธยฐานของระดับความคิดเห็นจากคำตอบของผู้ตอบแบบสอบถามทั้งหมด

สัญลักษณ์ ⌊⌋ หมายถึง ขอบเขตของพิสัยระหว่างควอไทล์ของคำตอบจากผู้ตอบแบบสอบถามทั้งหมด

สัญลักษณ์ * หมายถึง ตำแหน่งคำตอบของท่านในรอบที่ผ่านมา

ระดับคะแนนที่ใช้มีความหมายดังนี้

5 หมายถึง ท่านเห็นด้วยอย่างยิ่งว่าข้อความนั้นเป็นพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

4 หมายถึง ท่านเห็นด้วยว่าข้อความนั้นเป็นพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

3 หมายถึง ท่านไม่แน่ใจว่าข้อความนั้นเป็นพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

2 หมายถึง ท่านไม่เห็นด้วยว่าข้อความนั้นเป็นพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

1 หมายถึง ท่านไม่เห็นด้วยอย่างยิ่งว่าข้อความนั้นเป็นพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

หลังจากการพิจารณาภาพรวมของคำตอบจากกลุ่มผู้ตอบแบบสอบถามทั้งหมดและตำแหน่งคำตอบของท่านในรอบที่ผ่านมาแล้ว ถ้าท่านยังคงยืนยันคำตอบเดิมและคำตอบของท่านอยู่ในขอบเขตพิสัยระหว่าง ควอไทล์ ท่านไม่ต้องทำเครื่องหมายใดๆ แต่ถ้าท่านยืนยันคำตอบเดิม และคำตอบนั้นอยู่นอกขอบเขตพิสัยระหว่างควอไทล์ ขอให้ท่านแสดงเหตุผลด้วย ในกรณีที่ท่านต้องการเปลี่ยนแปลงคำตอบ ขอความกรุณาท่านใส่เครื่องหมาย √ ในช่องที่ท่านเลือกใหม่ ไม่ว่าคำตอบที่ท่านเลือกใหม่นั้นจะอยู่ในหรือนอกขอบเขตพิสัยระหว่างควอไทล์

พฤติกรรมการใช้ยาตามเกณฑ์การรักษา	**ไม่เห็นด้วยอย่างยิ่ง (1)**	**ไม่เห็นด้วย (2)**	**ไม่แน่ใจ (3)**	**เห็นด้วย (4)**	**เห็นด้วยอย่างยิ่ง (5)**	**เหตุผล**
การรู้เรื่องยาอย่างถูกต้อง						
1. รู้ชื่อยาที่หมอสั่งให้รับประทานทุกตัว				◆	*	
2. รู้ว่ายาแต่ละชนิดมีประโยชน์อย่างไร					* ◆	
3. รู้ว่าถ้าไม่รับประทานยาแล้วจะเกิดผลเสียอย่างไร					* ◆	
44. ตกลงร่วมกับแพทย์เพื่อเลือกการรักษาด้วยยาที่เหมาะสม					* ◆	

Frist draft

แบบสอบถามพฤติกรรมการใช้ยาตามแผนการรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

แบบสอบถามนี้ต้องการถามข้อมูลเกี่ยวกับการกินยาของคุณ ขอให้คุณอ่านข้อความต่อไปนี้และทำเครื่องหมาย √ ลงใน ช่อง □ ที่ตรงกับความเป็นจริงเกี่ยวกับตัวคุณมากที่สุด

1. คุณรู้สรรพคุณของยาที่คุณกินทุกตัว

□ จริง □ ค่อนข้างจริง □ ไม่แน่ใจ □ ค่อนข้างไม่จริง □ ไม่จริงเลย

2. คุณรู้ถึงผลข้างเคียงของยาที่คุณกินทุกตัว

□ จริง □ ค่อนข้างจริง □ ไม่แน่ใจ □ ค่อนข้างไม่จริง □ ไม่จริงเลย

3. คุณรู้ถึงผลเสียของการที่คุณไม่กินยาตามที่หมอสั่ง

□ จริง □ ค่อนข้างจริง □ ไม่แน่ใจ □ ค่อนข้างไม่จริง □ ไม่จริงเลย

.
.
.
.
.
.
.
.
.
.

47. คุณตกลงร่วมกันกับหมอเพื่อเลือกการรักษาที่เหมาะกับตัวคุณ

□ จริง □ ค่อนข้างจริง □ ไม่แน่ใจ □ ค่อนข้างไม่จริง □ ไม่จริงเลย

Research instrument

Second draft

แบบสอบถามพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

<u>คำชี้แจง</u> ข้อคำถามต่อไปนี้ต้องการถามข้อมูลเกี่ยวกับการกินยารักษาโรคหลอดเลือดหัวใจของคุณ กรุณาอ่านข้อความและทำเครื่องหมาย √ ลงใน □ ที่ตรงกับความเป็นจริงเกี่ยวกับตัวคุณมากที่สุด

ข้อ	ข้อความ	จริง	ค่อนข้างจริง	ไม่แน่ใจ	ค่อนข้างไม่จริง	ไม่จริงเลย
1	ฉันรู้สรรพคุณของยาที่ฉันกินทุกตัว					
2	ฉันรู้ผลข้างเคียงของยาที่ฉันกินทุกตัว					
3	ฉันรู้ถึงผลเสียของการที่ฉันไม่กินยาตามที่หมอสั่ง					
4	ฉันรู้วิธีการกินยาที่ถูกต้อง					
43	ฉันตกลงร่วมกันกับหมอเพื่อเลือกใช้ยาที่เหมาะกับตัวฉัน					

Research instrument

Final draft

แบบสอบถามเพื่อการวิจัยเรื่อง

การพัฒนาเครื่องมือประเมินพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

ตอนที่ 1 แบบสอบถามพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

คำชี้แจง ข้อคำถามต่อไปนี้ต้องการถามข้อมูลเกี่ยวกับการกินยารักษาโรคหลอดเลือดหัวใจของคุณ กรุณาอ่านข้อความและทำเครื่องหมาย √ ลงในช่องที่ตรงกับความเป็นจริงเกี่ยวกับตัวคุณมากที่สุด

จริง หมายถึง ข้อความนั้นตรงกับตัวคุณทั้งหมด

ค่อนข้างจริง หมายถึง ข้อความนั้นตรงกับตัวคุณเป็นส่วนใหญ่

ไม่แน่ใจ หมายถึง ข้อความนั้นมีทั้งตรงและไม่ตรงกับตัวคุณอย่างละครึ่ง

ค่อนข้างไม่จริง หมายถึง ข้อความนั้นตรงกับตัวคุณเป็นส่วนน้อย

ไม่จริงเลย หมายถึง ข้อความนั้นไม่ตรงกับตัวคุณเลย

ข้อ	ข้อความ	จริง	ค่อนข้างจริง	ไม่แน่ใจ	ค่อนข้างไม่จริง	ไม่จริงเลย
1	ฉันรู้สรรพคุณของยาที่หมอสั่งให้ฉันกินทุกตัว					
2	ฉันรู้ถึงอาการผิดปกติที่อาจเกิดขึ้นจากยาที่หมอสั่งให้ฉันกินทุกตัว					
3	ฉันรู้ถึงผลเสียของการที่ฉันไม่กินยาตามที่หมอสั่ง					
31	ฉันมีส่วนร่วมในการตัดสินใจเลือกใช้ยารักษาที่เหมาะกับตัวฉัน					

Research instrument

The Final MAS

แบบสอบถามเพื่อการวิจัยเรื่อง

การพัฒนาเครื่องมือประเมินพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

ตอนที่ 1 แบบสอบถามพฤติกรรมการใช้ยาตามเกณฑ์การรักษาสำหรับผู้ที่เป็นโรคหลอดเลือดหัวใจ

<u>คำชี้แจง</u> ข้อคำถามต่อไปนี้ต้องการถามข้อมูลเกี่ยวกับการกินยารักษาโรคหลอดเลือดหัวใจของคุณ กรุณาอ่านข้อความและทำเครื่องหมาย √ ลงในช่องที่ตรงกับความเป็นจริงเกี่ยวกับตัวคุณ<u>มากที่สุด</u>

จริง หมายถึง ข้อความนั้นตรงกับตัวคุณทั้งหมด

ค่อนข้างจริง หมายถึง ข้อความนั้นตรงกับตัวคุณเป็นส่วนใหญ่

ไม่แน่ใจ หมายถึง ข้อความนั้นมีทั้งตรงและไม่ตรงกับตัวคุณอย่างละครึ่ง

ค่อนข้างไม่จริง หมายถึง ข้อความนั้นตรงกับตัวคุณเป็นส่วนน้อย

ไม่จริงเลย หมายถึง ข้อความนั้นไม่ตรงกับตัวคุณเลย

ข้อ	ข้อความ	จริง	ค่อนข้างจริง	ไม่แน่ใจ	ค่อนข้างไม่จริง	ไม่จริงเลย
1	ฉันรู้สรรพคุณของยาที่หมอสั่งให้ฉันกินทุกตัว					
2	ฉันรู้ถึงอาการผิดปกติที่อาจเกิดขึ้นจากยาที่หมอสั่งให้ฉันกินทุกตัว					
3	ฉันรู้ถึงผลเสียของการที่ฉันไม่กินยาตามที่หมอสั่ง					
25	ฉันมีส่วนร่วมในการตัดสินใจเลือกใช้ยารักษาที่เหมาะกับตัวฉัน					

ตอนที่ 2 แบบบันทึกข้อมูลส่วนบุคคล

1. เพศ ☐ ชาย ☐ หญิง

2. อายุ .....ปี

3. สถานภาพสมรส ☐ โสด ☐ คู่ ☐ หม้าย ☐ หย่า/แยก

4. ระดับการศึกษาสูงสุด ☐ ไม่ได้เรียน ☐ อนุปริญญา หรือ ปวส.
☐ ประถมศึกษา ☐ ปริญญาตรี
☐ มัธยมศึกษาตอนต้น ☐ สูงกว่าปริญญาตรี
☐ มัธยมศึกษาตอนปลาย หรือ ปวช.

5. อาชีพ ☐ ไม่ได้ประกอบอาชีพ ☐ ค้าขาย
☐ นักศึกษา ☐ ข้าราชการ
☐ รับจ้างทั่วไป ☐ ธุรกิจส่วนตัว
☐ พนักงานบริษัท/เอกชน ☐ พนักงานรัฐวิสาหกิจ
☐ อื่นๆ โปรดระบุ .....

6. รายได้ต่อเดือน .....บาท

7. จำนวนยาที่ได้รับ .....ชนิด

*******ขอขอบคุณที่กรุณาให้ความร่วมมือตอบแบบสอบถามในครั้งนี้ค่ะ*********

Appendix H Content validity index

First draft

ข้อ	I-CVI	ข้อ	I-CVI
1	1	25	1
2	1	26	1
3	1	27	.86
4	.71	28	1
5	1	29	1
6	1	30	1
7	1	31	1
8	1	32	1
9	1	33	1
10	1	34	1
11	1	35	1
12	0.71	36	0.71
13	1	37	1
14	1	38	1
15	1	39	1
16	1	40	.86
17	1	41	.86
18	1	42	.86
19	1	43	1
20	1	44	1
21	1	45	1
22	0.71	46	.86
23	1	47	1
24	1		

Appendix I Testing Assumption for CFA

Confirmatory factor analysis was used to test construct validity of the MAS. Before testing construct validity, testing assumption for the CFA include normality, multicollinearity, Bartlett's test of sphericity, and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy were examined.

Normality testing of the MAS

As shown in Table 14, mean scores of the 25 item MAS ranged from 3.18 to 4.91, with a standard deviation ranging from 0.37 to 1.77. Each item score ranged from 1 to 5. The skewness ranged from -6.82 to -0.22 and the kurtosis ranged -1.57 to 52.83. There were 10 items which had skewness values falling inside the range of -1 to +1 (Hair et al., 1998), and the magnitude of the kurtosis is less than 2 (Wagner et al., 1998). These represented item characteristics of non-normal distribution.

Table 14 Mean, standard deviation, min, max, skewness, and kurtosis of the 25 item

The MAS	Mean	SD	Min	Max	Skewness	Kurtosis
knowing about medication properly	**3.97**	**0.85**	**1.71**	**5.00**	**-0.71**	**-0.39**
Item 1 (Know1)	3.90	1.31	1.00	5.00	-0.94	-0.37
Item 2 (Know2)	3.18	1.52	1.00	5.00	-0.22	-1.37
Item 3 (Know3)	3.81	1.44	1.00	5.00	-0.90	-0.58
Item 4 (Know4)	4.57	0.77	1.00	5.00	-2.11	5.02
Item 5 (Know5)	4.04	1.25	1.00	5.00	-1.21	0.42
Item 6 (Know6)	3.64	1.38	1.00	5.00	-0.63	-0.81
Item 7 (Know7)	4.64	0.79	1.00	5.00	-2.69	7.71
Storing medication appropriately	**4.69**	**0.57**	**2.33**	**5.00**	**-1.93**	**3.34**
Item 8 (Storage2)	4.91	0.44	1.00	5.00	-6.82	52.83
Item 9 (Storage4)	4.76	0.72	1.00	5.00	-3.56	13.24
Item 10 (Storage5)	4.39	1.30	1.00	5.00	-1.93	2.06
Self-regulating in taking medication correctly and continuously	**4.56**	**0.43**	**2.00**	**5.00**	**-1.45**	**3.91**
Item 11 (Self1)	3.46	1.77	1.00	5.00	-0.49	-1.57
Item 12 (Self2)	4.51	1.10	1.00	5.00	-2.33	4.24
Item 13 (Self3)	4.74	0.67	1.00	5.00	-3.24	11.59
Item 14 (Self4)	4.60	0.71	1.00	5.00	-2.15	5.27

Table 14 Mean, standard deviation, min, max, skewness, and kurtosis of the 25 item MAS (N=457) (Continued)

The MAS	Mean	SD	Min	Max	Skewness	Kurtosis
Item 15 (Self5)	4.81	0.48	2.00	5.00	-2.88	9.43
Item 16 (Self6)	4.89	0.37	2.00	5.00	-4.28	21.92
Item 17 (Self7)	4.83	0.66	1.00	5.00	-4.53	21.15
Item 18 (Self11)	4.86	0.53	1.00	5.00	-4.76	26.03
Item 19 (Self12)	3.89	1.58	1.00	5.00	-1.05	-0.62
Item 20 (Self13)	4.84	0.62	1.00	5.00	-4.69	23.30
Item 21 (Self14)	4.70	0.84	1.00	5.00	-3.29	10.53
participating in medication treatment plan	**4.37**	**0.66**	**1.00**	**5.00**	**-1.09**	**1.67**
Item 22 (Par1)	4.71	0.63	1.00	5.00	-2.59	7.95
Item 23 (Par2)	4.50	0.91	1.00	5.00	-2.13	4.51
Item 24 (Par3)	4.84	0.56	1.00	5.00	-4.37	21.53
Item 25 (Par4)	3.46	1.69	1.00	5.00	-0.50	-1.47

Multicollinearity testing

The results indicated that the tolerance values were not close to 0 (ranging from .457 to .842) and the variance inflation factor (VIF) values were less than 10 (ranging from 1.187 to 2.186) (Table 15). The tolerance and VIF values indicated no evidence of muliticollinearity.

Table 15 The tolerance and VIF values of the MAS (N=457)

The MAS	Tolerance	VIF
Knowing about medication properly		
Item 1 (Know1)	.665	1.503
Item 2 (Know2)	.546	1.833
Item 3 (Know3)	.502	1.992
Item 4 (Know4)	.617	1.621
Item 5 (Know5)	.457	2.186
Item 6 (Know6)	.503	1.987
Item 7 (Know7)	.686	1.458
Storing medication appropriately		
Item 8 (Storage2)	.785	1.274
Item 9 (Storage4)	.817	1.223
Item 10 (Storage5)	.842	1.187
Self-regulating in taking medication correctly and continuously		
Item 11 (Self1)	.693	1.443
Item 12 (Self2)	.721	1.386
Item 13 (Self3)	.659	1.516

Table 15 The tolerance and VIF values of the MAS (N=457) (Continued)

The MAS	Tolerance	VIF
Item 14 (Self4)	.726	1.377
Item 15 (Self5)	.475	2.103
Item 16 (Self6)	.478	2.094
Item 17 (Self7)	.774	1.291
Item 18 (Self11)	.702	1.425
Item 19 (Self12)	.726	1.378
Item 20 (Self13)	.818	1.222
Item 21 (Self14)	.814	1.228
Participating in medication treatment plan		
Item 22 (Par1)	.503	1.987
Item 23 (Par2)	.593	1.687
Item 24 (Par3)	.769	1.301
Item 25 (Par4)	.792	1.263

Bartlett's test of sphericity and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy

The results showed that the MAS was significant (χ^2 = 2934.98, *df*=300, and *p*=.000). This means that the scale had normal multivariate distribution and the correlation matrix was not an identity matrix. Moreover, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy test showed that the size of the overall KMO was .807.

Table 16 Bartlett's test of sphericity and KMO of 25 items MAS (n=457)

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.807
Bartlett's Test of Sphericity	Approx. Chi-Square	2934.98
	Df	300
	Sig.	.000

Appendix J Output CFA

LISREL 8.53 BY Karl G. J”reskog & Dag S”rbom

This program is published exclusively by Scientific Software International, Inc.

7383 N. Lincoln Avenue, Suite 100 Lincolnwood, IL 60712, U.S.A.

Phone: (800)247-6113, (847)675-0720, Fax: (847)675-2140

Website: www.ssicentral.com

The following lines were read from file D:\KANOKLEKHA WORK\25 item new\new med adhere25.SPJ:

Med Adhere

Raw Data from file 'D:\KANOKLEKHA WORK\25 item new\med adhere 25item new.psf'

Sample Size = 457

Latent Variables Knowing Storage Staffing Participate 'Med Adhere'

Relationships

KNOW1 = Knowing

KNOW2 = Knowing

KNOW3 = Knowing

KNOW4 = Knowing

KNOW5 = Knowing

KNOW6 = Knowing

KNOW7 = Knowing

STORAGE2 = Storage

STORAGE4 = Storage

STORAGE5 = Storage

SELF1 = Staffing

SELF2 = Staffing

SELF3 = Staffing

SELF4 = Staffing

SELF5 = Staffing

SELF6 = Staffing

SELF7 = Staffing

SELF11 = Staffing
SELF12 = Staffing
SELF13 = Staffing
SELF14 = Staffing
PAR1 = Participate
PAR2 = Participate
PAR3 = Participate
PAR4 = Participate
Knowing = 'Med Adhere'
Storage = 'Med Adhere'
Staffing = 'Med Adhere'
Participate = 'Med Adhere'
Path Diagram
End of Problem
Sample Size = 457
Med Adhere

Covariance Matrix

	KNOW1	KNOW2	KNOW3	KNOW4	KNOW5	KNOW6
KNOW1	1.73					
KNOW2	0.81	2.32				
KNOW3	0.73	1.18	2.07			
KNOW4	0.40	0.35	0.43	0.59		
KNOW5	0.57	0.87	0.91	0.44	1.56	
KNOW6	0.63	1.02	0.93	0.33	1.06	1.89
KNOW7	0.28	0.16	0.20	0.20	0.31	0.36
STORAGE2	0.08	0.02	0.00	0.03	0.05	0.03
STORAGE4	0.05	0.02	-0.06	0.12	0.12	0.05
STORAGE5	0.33	0.24	0.06	0.13	0.18	0.22
SELF1	0.59	1.01	0.87	0.27	0.63	0.69
SELF2	0.14	0.11	0.11	0.19	0.15	0.17
SELF3	0.18	0.14	0.03	0.12	0.09	0.07
SELF4	0.13	0.17	0.09	0.10	0.11	0.12
SELF5	0.09	0.09	0.04	0.05	0.08	0.05
SELF6	0.05	0.05	0.03	0.05	0.06	0.03
SELF7	0.08	0.04	0.08	0.03	0.12	0.03

SELF11	0.07	0.04	0.01	0.05	0.05	0.00
SELF12	0.35	0.73	0.83	0.31	0.57	0.58
SELF13	0.10	0.05	0.04	0.06	0.09	0.08
SELF14	0.15	0.10	0.06	0.06	0.21	0.20
PAR1	0.13	0.19	0.15	0.13	0.24	0.21
PAR2	0.14	0.27	0.14	0.14	0.31	0.30
PAR3	0.00	0.04	0.08	0.04	0.04	0.01
PAR4	0.37	0.75	0.50	0.16	0.63	0.64

Covariance Matrix

	KNOW7	STORAGE2	STORAGE4	STORAGE5	SELF1	SELF2
KNOW7	0.63					
STORAGE2	0.11	0.20				
STORAGE4	0.10	0.02	0.51			
STORAGE5	0.20	0.04	0.20	1.69		
SELF1	0.26	0.00	0.12	0.28	3.12	
SELF2	0.15	0.06	0.13	0.25	0.52	1.22
SELF3	0.11	0.03	0.10	0.14	0.13	0.28
SELF4	0.02	0.03	0.02	0.02	0.21	0.12
SELF5	0.02	0.03	0.05	0.07	0.06	0.04
SELF6	0.03	0.05	0.04	0.05	0.00	0.04
SELF7	0.02	0.05	0.04	0.05	0.09	0.05
SELF11	0.01	0.04	0.05	0.03	0.03	0.08
SELF12	0.13	0.05	0.07	0.19	0.84	0.23
SELF13	0.03	0.03	0.07	-0.05	-0.05	0.06
SELF14	0.05	0.05	0.04	-0.02	0.10	0.04
PAR1	0.09	0.03	0.04	0.07	0.10	0.19
PAR2	0.08	0.01	0.07	0.13	0.12	0.27
PAR3	0.03	0.02	0.03	-0.04	0.07	0.11
PAR4	0.18	-0.02	-0.02	0.27	0.72	0.33

Covariance Matrix

	SELF3	SELF4	SELF5	SELF6	SELF7	SELF11
SELF3	0.45					
SELF4	0.14	0.50				
SELF5	0.10	0.13	0.23			

SELF6	0.07	0.09	0.12	0.14		
SELF7	0.10	0.05	0.09	0.09	0.44	
SELF11	0.10	0.10	0.10	0.06	0.11	0.28
SELF12	0.09	0.22	0.04	0.07	-0.01	0.01
SELF13	0.07	0.05	0.05	0.04	0.04	0.08
SELF14	0.09	0.12	0.11	0.06	0.09	0.09
PAR1	0.14	0.13	0.08	0.05	0.05	0.11
PAR2	0.16	0.11	0.07	0.04	0.07	0.09
PAR3	0.08	0.06	0.03	0.04	0.03	0.04
PAR4	0.10	0.11	0.04	0.03	0.02	0.02

Covariance Matrix

	SELF12	SELF13	SELF14	PAR1	PAR2	PAR3
SELF12	2.51					
SELF13	0.10	0.39				
SELF14	0.25	0.07	0.70			
PAR1	0.11	0.11	0.10	0.40		
PAR2	0.11	0.09	0.09	0.34	0.83	
PAR3	0.10	0.07	0.07	0.12	0.15	0.31
PAR4	0.71	0.02	0.12	0.23	0.30	0.13

Covariance Matrix

	PAR4
PAR4	2.86

Med Adhere

Number of Iterations = 85

LISREL Estimates (Maximum Likelihood)

Measurement Equations

KNOW1 = 0.71*Knowing, Errorvar.= 1.22 , R^2 = 0.29

(0.088)

13.93

KNOW2 = 0.98*Knowing, Errorvar.= 1.35 , R^2 = 0.42

(0.100) (0.10)

9.86 13.08

KNOW3 = 0.97*Knowing, Errorvar.= 1.13 , R^2 = 0.45

(0.096) (0.089)

10.10 12.75

KNOW4 = 0.43*Knowing, Errorvar.= 0.40 , R^2 = 0.32

(0.048) (0.029)

9.08 13.77

KNOW5 = 0.97*Knowing, Errorvar.= 0.62 , R^2 = 0.60

(0.089) (0.058)

10.87 10.80

KNOW6 = 1.00*Knowing, Errorvar.= 0.90 , R^2 = 0.53

(0.095) (0.075)

10.52 11.93

KNOW7 = 0.31*Knowing, Errorvar.= 0.53 , R^2 = 0.16

(0.045) (0.036)

6.97 14.58

STORAGE2 = 0.13*Storage, Errorvar.= 0.18 , R^2 = 0.087

(0.014)

13.22

STORAGE4 = 0.30*Storage, Errorvar.= 0.43 , R^2 = 0.17

(0.093) (0.039)

3.18 10.80

STORAGE5 = 0.49*Storage, Errorvar.= 1.45 , R^2 = 0.14

(0.16) (0.12)

3.12 11.77

SELF1 = 0.31*Staffing, Errorvar.= 3.03 , R^2 = 0.030

(0.20)

14.99

SELF2 = 0.29*Staffing, Errorvar.= 1.13 , R^2 = 0.070

(0.10) (0.076)

2.83 14.83

SELF3 = 0.34*Staffing, Errorvar.= 0.34 , R^2 = 0.25

(0.10) (0.024)

3.21 13.89

SELF4 = 0.36*Staffing, Errorvar.= 0.37 , R^2 = 0.26

(0.11) (0.027)

3.22 13.81

SELF5 = 0.36*Staffing, Errorvar.= 0.11 , R^2 = 0.55

(0.11) (0.0100)

3.31 10.68

SELF6 = 0.26*Staffing, Errorvar.= 0.070 , R^2 = 0.49

(0.079) (0.0061)

3.30 11.51

SELF7 = 0.27*Staffing, Errorvar.= 0.36 , R^2 = 0.17

(0.087) (0.025)

3.13 14.35

SELF11 = 0.28*Staffing, Errorvar.= 0.20 , R^2 = 0.29

(0.087) (0.014)

3.24 13.63

SELF12 = 0.31*Staffing, Errorvar.= 2.41 , R^2 = 0.039

(0.12) (0.16)

2.54 14.95

SELF13 = 0.18*Staffing, Errorvar.= 0.36 , R^2 = 0.081

(0.061) (0.024)

2.89 14.78

SELF14 = 0.30*Staffing, Errorvar.= 0.61 , R^2 = 0.12

(0.097) (0.042)

3.05 14.59

PAR1 = 0.54*Particip, Errorvar.= 0.11 , R^2 = 0.72

(0.022)

4.89

PAR2 = 0.62*Particip, Errorvar.= 0.44 , R^2 = 0.47

(0.056) (0.042)

11.13 10.49

PAR3 = 0.23*Particip, Errorvar.= 0.26 , R^2 = 0.17

(0.030) (0.018)

7.66 14.29

PAR4 = 0.47*Particip, Errorvar.= 2.63 , R^2 = 0.078

(0.090) (0.18)

5.28 14.78

Structural Equation

Knowing = 0.52*Med Adhe, Errorvar.= 0.73 , R^2= 0.27

(0.074) (0.13)

6.99 5.42

Storage = 0.63*Med Adhe, Errorvar.= 0.60 , R^2 = 0.40

(0.18) (0.34)

3.60 1.77

Staffing = 0.71*Med Adhe, Errorvar.= 0.50 , R^2 = 0.50

(0.22) (0.31)

3.21 1.62

Particip = 0.71*Med Adhe, Errorvar.= 0.49 , R^2 = 0.51

(0.071) (0.10)

10.03 4.79

Correlation Matrix of Independent Variables

	Med Adhe
	1.00

Covariance Matrix of Latent Variables

	Knowing	Storage	Staffing	Particip	Med Adhe
Knowing	1.00				
Storage	0.33	1.00			
Staffing	0.37	0.45	1.00		
Particip	0.37	0.45	0.50	1.00	
Med Adhe	0.52	0.63	0.71	0.71	1.00

Goodness of Fit Statistics

Degrees of Freedom = 271

Minimum Fit Function Chi-Square = 1025.75 (P = 0.0)

Normal Theory Weighted Least Squares Chi-Square = 1110.27 (P = 0.0)

Estimated Non-centrality Parameter (NCP) = 839.27

90 Percent Confidence Interval for NCP = (740.29 ; 945.78)

Minimum Fit Function Value = 2.25

Population Discrepancy Function Value (F0) = 1.84

90 Percent Confidence Interval for F0 = (1.62 ; 2.07)

Root Mean Square Error of Approximation (RMSEA) = 0.082

90 Percent Confidence Interval for RMSEA = (0.077 ; 0.087)

P-Value for Test of Close Fit (RMSEA < 0.05) = 0.00

Expected Cross-Validation Index (ECVI) = 2.67

90 Percent Confidence Interval for ECVI = (2.45 ; 2.91)

ECVI for Saturated Model = 1.43

ECVI for Independence Model = 12.06

Chi-Square for Independence Model with 300 Degrees of Freedom = 5449.89

Independence AIC = 5499.89

Model AIC = 1218.27

Saturated AIC = 650.00

Independence CAIC = 5628.01

Model CAIC = 1495.00

Saturated CAIC = 2315.52

Normed Fit Index (NFI) = 0.81

Non-Normed Fit Index (NNFI) = 0.84

Parsimony Normed Fit Index (PNFI) = 0.73

Comparative Fit Index (CFI) = 0.85

Incremental Fit Index (IFI) = 0.85

Relative Fit Index (RFI) = 0.79

Critical N (CN) = 146.85

Root Mean Square Residual (RMR) = 0.15

Standardized RMR = 0.089

Goodness of Fit Index (GFI) = 0.84

Adjusted Goodness of Fit Index (AGFI) = 0.80

Parsimony Goodness of Fit Index (PGFI) = 0.70

The Modification Indices Suggest to Add the

Path to	from	Decrease in Chi-Square	New Estimate
KNOW3	Storage	29.4	-0.51
KNOW3	Staffing	8.3	-0.19
KNOW4	Storage	15.9	0.22
KNOW7	Storage	26.9	0.31
STORAGE2	Staffing	18.0	0.15
SELF1	Knowing	66.1	0.80
SELF1	Storage	10.4	0.54
SELF2	Storage	24.1	0.50
SELF2	Particip	25.8	0.36
SELF3	Storage	12.2	0.20
SELF3	Particip	13.2	0.14
SELF5	Knowing	11.2	-0.07
SELF5	Particip	15.2	-0.10
SELF6	Knowing	8.0	-0.05
SELF6	Particip	16.4	-0.08

SELF12	Knowing	55.3	0.66
SELF12	Storage	7.9	0.42
SELF13	Particip	16.4	0.16
PAR4	Knowing	28.8	0.50
Knowing	Staffing	13.7	-0.64
Knowing	Particip	9.9	0.56
Storage	Staffing	9.9	0.66
Storage	Particip	13.7	-0.79
Staffing	Knowing	13.7	-0.44
Staffing	Storage	9.9	0.55
Particip	Knowing	9.9	0.38
Particip	Storage	13.7	-0.65

The Modification Indices Suggest to Add an Error Covariance

Between	and	Decrease in Chi-Square	New Estimate
Staffing	Knowing	13.7	-0.32
Staffing	Storage	9.9	0.33
Particip	Knowing	9.9	0.27
Particip	Storage	13.7	-0.39
KNOW3	KNOW2	23.3	0.34
KNOW4	KNOW1	9.1	0.11
KNOW5	KNOW1	13.7	-0.20
KNOW6	KNOW4	20.1	-0.15
KNOW6	KNOW5	19.7	0.24
KNOW7	KNOW2	16.5	-0.18
KNOW7	KNOW3	9.5	-0.13
KNOW7	KNOW4	9.7	0.07
STORAGE2	KNOW7	34.0	0.09
STORAGE4	KNOW3	12.9	-0.13
STORAGE4	KNOW4	13.1	0.08
STORAGE5	STORAGE4	8.1	0.19
SELF1	KNOW2	17.9	0.43
SELF1	KNOW3	11.3	0.31
SELF2	KNOW4	8.7	0.10
SELF2	SELF1	25.8	0.45
SELF3	KNOW7	11.7	0.07
SELF3	SELF2	42.2	0.20

SELF5	SELF2	22.9	-0.09
SELF5	SELF3	11.1	-0.04
SELF6	STORAGE2	14.3	0.02
SELF6	SELF1	17.9	-0.10
SELF6	SELF2	13.0	-0.06
SELF6	SELF5	99.7	0.07
SELF7	SELF4	9.7	-0.06
SELF12	KNOW3	21.2	0.38
SELF12	SELF1	35.5	0.76
SELF12	SELF5	12.7	-0.10
SELF13	STORAGE5	8.8	-0.11
SELF14	SELF12	8.1	0.17
PAR1	SELF11	10.3	0.03
PAR1	SELF13	11.5	0.05
PAR4	KNOW2	8.6	0.28
PAR4	SELF1	21.5	0.62
PAR4	SELF12	25.9	0.61

Time used: 0.187 Seconds

LISREL 8.53 BY Karl G. J”reskog & Dag S”rbom

This program is published exclusively by Scientific Software International, Inc.

7383 N. Lincoln Avenue, Suite 100 Lincolnwood, IL 60712, U.S.A.

Phone: (800)247-6113, (847)675-0720, Fax: (847)675-2140

Website: www.ssicentral.com

The following lines were read from file D:\KANOKLEKHA WORK\25 item new\new med adhere25.SPJ:

Med Adhere

Raw Data from file 'D:\KANOKLEKHA WORK\25 item new\med adhere 25item new.psf'

Sample Size = 457

Latent Variables Knowing Storage SefReg Particip 'Med Adheate'

Relationships

KNOW1 = 0.71*Knowing

KNOW2 = Knowing

KNOW3 = Knowing

KNOW4 = Knowing

KNOW5 = Knowing

KNOW6 = Knowing

KNOW7 = Knowing

STORAGE2 = 0.13*Storage

STORAGE4 = Storage

STORAGE5 = Storage

SELF1 = 0.31*SefReg

SELF2 = SefReg

SELF3 = SefReg

SELF4 = SefReg

SELF5 = SefReg

SELF6 = SefReg

SELF7 = SefReg

SELF11 = SefReg

SELF12 = SefReg

SELF13 = SefReg

SELF14 = SefReg

PAR1 = 0.54*Particip

PAR2 = Particip

PAR3 = Particip

PAR4 = Particip

Knowing = 'Med Adheate'

Storage = 'Med Adheate'

SefReg = 'Med Adheate'

Particip = 'Med Adheate'

Set the Variance of 'Med Adheate' to 1.00

Set the Error Covariance of KNOW3 and KNOW2 Free

Set the Error Covariance of KNOW5 and KNOW1 Free

Set the Error Covariance of KNOW5 and KNOW2 Free

Set the Error Covariance of KNOW6 and KNOW4 Free

Set the Error Covariance of KNOW6 and KNOW5 Free

Set the Error Covariance of KNOW7 and KNOW2 Free

Set the Error Covariance of STORAGE2 and KNOW7 Free

Set the Error Covariance of STORAGE4 and KNOW3 Free

Set the Error Covariance of STORAGE4 and KNOW4 Free

Set the Error Covariance of SELF1 and KNOW2 Free

Set the Error Covariance of SELF2 and SELF1 Free

Set the Error Covariance of SELF3 and SELF2 Free

Set the Error Covariance of SELF6 and STORAGE2 Free

Set the Error Covariance of SELF6 and SELF1 Free

Set the Error Covariance of SELF6 and SELF2 Free

Set the Error Covariance of SELF6 and SELF5 Free

Set the Error Covariance of SELF12 and KNOW3 Free

Set the Error Covariance of SELF12 and SELF1 Free

Set the Error Covariance of PAR4 and SELF1 Free

Set the Error Covariance of PAR4 and SELF12 Free

Set Error Covariance of SELF1 To KNOW3

Set Error Covariance of SELF7 To SELF6

Set Error Covariance of SELF3 To KNOW7

Set Error Covariance of SELF7 To SELF4

Set Error Covariance of SELF12 To SELF7

Set Error Covariance of SELF13 To STORAGE5

Set Error Covariance of PAR1 To SELF13

Path Diagram

End of Problem

Sample Size = 457

Med Adhere

Covariance Matrix

	KNOW1	KNOW2	KNOW3	KNOW4	KNOW5	KNOW6
KNOW1	1.73					
KNOW2	0.81	2.32				
KNOW3	0.73	1.18	2.07			
KNOW4	0.40	0.35	0.43	0.59		
KNOW5	0.57	0.87	0.91	0.44	1.56	
KNOW6	0.63	1.02	0.93	0.33	1.06	1.89
KNOW7	0.28	0.16	0.20	0.20	0.31	0.36
STORAGE2	0.08	0.02	0.00	0.03	0.05	0.03
STORAGE4	0.05	0.02	-0.06	0.12	0.12	0.05
STORAGE5	0.33	0.24	0.06	0.13	0.18	0.22
SELF1	0.59	1.01	0.87	0.27	0.63	0.69
SELF2	0.14	0.11	0.11	0.19	0.15	0.17
SELF3	0.18	0.14	0.03	0.12	0.09	0.07
SELF4	0.13	0.17	0.09	0.10	0.11	0.12

SELF5	0.09	0.09	0.04	0.05	0.08	0.05
SELF6	0.05	0.05	0.03	0.05	0.06	0.03
SELF7	0.08	0.04	0.08	0.03	0.12	0.03
SELF11	0.07	0.04	0.01	0.05	0.05	0.00
SELF12	0.35	0.73	0.83	0.31	0.57	0.58
SELF13	0.10	0.05	0.04	0.06	0.09	0.08
SELF14	0.15	0.10	0.06	0.06	0.21	0.20
PAR1	0.13	0.19	0.15	0.13	0.24	0.21
PAR2	0.14	0.27	0.14	0.14	0.31	0.30
PAR3	0.00	0.04	0.08	0.04	0.04	0.01
PAR4	0.37	0.75	0.50	0.16	0.63	0.64

Covariance Matrix

	KNOW7	STORAGE2	STORAGE4	STORAGE5	SELF1	SELF2
KNOW7	0.63					
STORAGE2	0.11	0.20				
STORAGE4	0.10	0.02	0.51			
STORAGE5	0.20	0.04	0.20	1.69		
SELF1	0.26	0.00	0.12	0.28	3.12	
SELF2	0.15	0.06	0.13	0.25	0.52	1.22
SELF3	0.11	0.03	0.10	0.14	0.13	0.28
SELF4	0.02	0.03	0.02	0.02	0.21	0.12
SELF5	0.02	0.03	0.05	0.07	0.06	0.04
SELF6	0.03	0.05	0.04	0.05	0.00	0.04
SELF7	0.02	0.05	0.04	0.05	0.09	0.05
SELF11	0.01	0.04	0.05	0.03	0.03	0.08
SELF12	0.13	0.05	0.07	0.19	0.84	0.23
SELF13	0.03	0.03	0.07	-0.05	-0.05	0.06
SELF14	0.05	0.05	0.04	-0.02	0.10	0.04
PAR1	0.09	0.03	0.04	0.07	0.10	0.19
PAR2	0.08	0.01	0.07	0.13	0.12	0.27

PAR3	0.03	0.02	0.03	-0.04	0.07	0.11
PAR4	0.18	-0.02	-0.02	0.27	0.72	0.33

Covariance Matrix

	SELF3	SELF4	SELF5	SELF6	SELF7	SELF11
SELF3	0.45					
SELF4	0.14	0.50				
SELF5	0.10	0.13	0.23			
SELF6	0.07	0.09	0.12	0.14		
SELF7	0.10	0.05	0.09	0.09	0.44	
SELF11	0.10	0.10	0.10	0.06	0.11	0.28
SELF12	0.09	0.22	0.04	0.07	-0.01	0.01
SELF13	0.07	0.05	0.05	0.04	0.04	0.08
SELF14	0.09	0.12	0.11	0.06	0.09	0.09
PAR1	0.14	0.13	0.08	0.05	0.05	0.11
PAR2	0.16	0.11	0.07	0.04	0.07	0.09
PAR3	0.08	0.06	0.03	0.04	0.03	0.04
PAR4	0.10	0.11	0.04	0.03	0.02	0.02

Covariance Matrix

	SELF12	SELF13	SELF14	PAR1	PAR2	PAR3
SELF12	2.51					
SELF13	0.10	0.39				
SELF14	0.25	0.07	0.70			
PAR1	0.11	0.11	0.10	0.40		
PAR2	0.11	0.09	0.09	0.34	0.83	
PAR3	0.10	0.07	0.07	0.12	0.15	0.31
PAR4	0.71	0.02	0.12	0.23	0.30	0.13

Covariance Matrix

	PAR4

PAR4 2.86

Med Adhere

Number of Iterations = 46

LISREL Estimates (Maximum Likelihood)

Measurement Equations

KNOW1 = 0.71*Knowing, Errorvar.= 1.15 , R^2 = 0.33

(0.087)

13.21

KNOW2 = 0.86*Knowing, Errorvar.= 1.39 , R^2 = 0.38

(0.090) (0.12)

9.51 12.11

KNOW3 = 0.77*Knowing, Errorvar.= 1.24 , R^2 = 0.35

(0.080) (0.093)

9.63 13.28

KNOW4 = 0.44*Knowing, Errorvar.= 0.37 , R^2 = 0.37

(0.045) (0.029)

9.57 13.01

KNOW5 = 0.90*Knowing, Errorvar.= 0.62 , R^2 = 0.60

(0.088) (0.080)

10.27 7.84

KNOW6 = 0.91*Knowing, Errorvar.= 0.95 , R^2 = 0.50

(0.090) (0.094)

10.09 10.07

KNOW7 = 0.32*Knowing, Errorvar.= 0.52 , R^2 = 0.18

(0.042) (0.036)

7.61 14.45

STORAGE2 = 0.13*Storage, Errorvar.= 0.19 , R^2 = 0.051

(0.013)

14.04

STORAGE4 = 0.34*Storage, Errorvar.= 0.44 , R^2 = 0.14

(0.13) (0.038)

2.60 11.54

STORAGE5 = 0.65*Storage, Errorvar.= 1.45 , R^2 = 0.14

(0.25) (0.13)

2.61 11.19

SELF1 = 0.31*SefReg, Errorvar.= 2.90 , R^2 = 0.054

(0.19)

15.00

SELF2 = 0.24*SefReg, Errorvar.= 1.13 , R^2 = 0.078

(0.061) (0.076)

3.88 14.73

SELF3 = 0.27*SefReg, Errorvar.= 0.32 , R^2 = 0.29

(0.065) (0.024)

4.21 13.21

SELF4 = 0.30*SefReg, Errorvar.= 0.34 , R^2 = 0.31

(0.072) (0.027)

4.22 12.64

SELF5 = 0.23*SefReg, Errorvar.= 0.15 , R^2 = 0.37

(0.053) (0.012)

4.29 12.17

SELF6 = 0.15*SefReg, Errorvar.= 0.096 , R^2 = 0.28

(0.037) (0.0073)

4.06 13.18

SELF7 = 0.22*SefReg, Errorvar.= 0.36 , R^2 = 0.18

(0.054) (0.026)

3.97 13.71

SELF11 = 0.23*SefReg, Errorvar.= 0.19 , R^2 = 0.31

(0.053) (0.015)

4.24 12.92

SELF12 = 0.33*SefReg, Errorvar.= 2.36 , R^2 = 0.072

(0.086) (0.16)

3.80 14.75

SELF13 = 0.14*SefReg, Errorvar.= 0.35 , R^2 = 0.090

(0.040) (0.024)

3.57 14.62

SELF14 = 0.25*SefReg, Errorvar.= 0.60 , R^2 = 0.15

(0.064) (0.042)

3.91 14.26

PAR1 = 0.54*Particip, Errorvar.= 0.11 , R^2 = 0.72

(0.022)

5.17

PAR2 = 0.64*Particip, Errorvar.= 0.43 , R^2 = 0.48

(0.056) (0.041)

11.36 10.53

PAR3 = 0.23*Particip, Errorvar.= 0.26 , R^2 = 0.16

(0.030) (0.018)

7.54 14.34

PAR4 = 0.49*Particip, Errorvar.= 2.63 , R^2 = 0.080

(0.089) (0.18)

5.47 14.78

Error Covariance for KNOW3 and KNOW2 = 0.24

(0.076)

3.21

Error Covariance for KNOW5 and KNOW1 = -0.14

(0.054)

-2.70

Error Covariance for KNOW5 and KNOW2 = -0.09

(0.060)

-1.49

Error Covariance for KNOW6 and KNOW4 = -0.11

(0.034)

-3.36

Error Covariance for KNOW6 and KNOW5 = 0.11

(0.071)

1.60

Error Covariance for KNOW7 and KNOW2 = -0.17

(0.041)

-4.25

Error Covariance for STORAGE2 and KNOW7 = 0.089

(0.015)

5.93

Error Covariance for STORAGE4 and KNOW3 = -0.13

(0.035)

-3.62

Error Covariance for STORAGE4 and KNOW4 = 0.068

(0.021)

3.20

Error Covariance for SELF1 and KNOW2 = 0.47

(0.097)

4.82

Error Covariance for SELF1 and KNOW3 = 0.41

(0.090)

4.57

Error Covariance for SELF2 and SELF1 = 0.39

(0.079)

4.93

Error Covariance for SELF3 and KNOW7 = 0.067

(0.019)

3.55

Error Covariance for SELF3 and SELF2 = 0.16

(0.031)

5.15

Error Covariance for SELF6 and STORAGE2 = 0.021

(0.0054)

3.92

Error Covariance for SELF6 and SELF1 = -0.05

(0.020)

-2.53

Error Covariance for SELF6 and SELF2 = -0.01

(0.013)

-0.59

Error Covariance for SELF6 and SELF5 = 0.057

(0.0074)

7.66

Error Covariance for SELF7 and SELF4 = -0.06

(0.018)

-3.16

Error Covariance for SELF7 and SELF6 = 0.025

(0.0082)

3.09

Error Covariance for SELF12 and KNOW3 = 0.40

(0.080)

5.02

Error Covariance for SELF12 and SELF1 = 0.57

(0.12)

4.68

Error Covariance for SELF12 and SELF7 = -0.13

(0.042)

-3.07

Error Covariance for SELF13 and STORAGE5 = -0.10

(0.036)

-2.69

Error Covariance for PAR1 and SELF13 = 0.037

(0.013)

2.77

Error Covariance for PAR4 and SELF1 = 0.44

(0.12)

3.56

Error Covariance for PAR4 and SELF12 = 0.59

(0.12)

4.96

Structural Equations

Knowing = 0.59*Med Adhe, Errorvar.= 0.79 , R□ = 0.31

(0.078) (0.14)

7.58 5.58

Storage = 0.48*Med Adhe, Errorvar.= 0.36 , R□ = 0.39

(0.17) (0.25)

2.88 1.44

SefReg = 1.00*Med Adhe, Errorvar.= 0.72 , R□ = 0.58

(0.24) (0.34)

4.20 2.08

Particip = 0.72*Med Adhe, Errorvar.= 0.45 , R□ = 0.54

(0.068) (0.094)

10.61 4.73

Correlation Matrix of Independent Variables

Med Adhe

1.00

Covariance Matrix of Latent Variables

	Knowing	Storage	SefReg	Particip	Med Adhe
Knowing	1.14				
Storage	0.28	0.59			

SefReg 0.59 0.48 1.71

Particip 0.42 0.34 0.72 0.96

Med Adhe 0.59 0.48 1.00 0.72 1.00

Goodness of Fit Statistics

Degrees of Freedom = 244

Minimum Fit Function Chi-Square = 544.58 (P = 0.0)

Normal Theory Weighted Least Squares Chi-Square = 533.78 (P = 0.0)

Estimated Non-centrality Parameter (NCP) = 289.78

90 Percent Confidence Interval for NCP = (226.86 ; 360.45)

Minimum Fit Function Value = 1.19

Population Discrepancy Function Value (F0) = 0.64

90 Percent Confidence Interval for F0 = (0.50 ; 0.79)

Root Mean Square Error of Approximation (RMSEA) = 0.051

90 Percent Confidence Interval for RMSEA = (0.045 ; 0.057)

P-Value for Test of Close Fit (RMSEA < 0.05) = 0.38

Expected Cross-Validation Index (ECVI) = 1.53

90 Percent Confidence Interval for ECVI = (1.39 ; 1.68)

ECVI for Saturated Model = 1.43

ECVI for Independence Model = 12.06

Chi-Square for Independence Model with 300 Degrees of Freedom = 5449.89

Independence AIC = 5499.89

Model AIC = 695.78

Saturated AIC = 650.00

Independence CAIC = 5628.01

Model CAIC = 1110.88

Saturated CAIC = 2315.52

Normed Fit Index (NFI) = 0.90

Non-Normed Fit Index (NNFI) = 0.93

Parsimony Normed Fit Index (PNFI) = 0.73

Comparative Fit Index (CFI) = 0.94

Incremental Fit Index (IFI) = 0.94

Relative Fit Index (RFI) = 0.88

Critical N (CN) = 250.79

Root Mean Square Residual (RMR) = 0.11

Standardized RMR = 0.069

Goodness of Fit Index (GFI) = 0.91

Adjusted Goodness of Fit Index (AGFI) = 0.89

Parsimony Goodness of Fit Index (PGFI) = 0.69

The Modification Indices Suggest to Add the

Path to	from	Decrease in Chi-Square	New Estimate
KNOW3	Storage	9.9	-0.43
STORAGE2	SefReg	21.4	0.13
SELF1	Knowing	21.2	0.42
SELF2	Storage	13.5	0.51
SELF2	Particip	18.3	0.31
SELF4	Storage	8.3	-0.26
SELF11	Knowing	12.1	-0.09
SELF12	Knowing	14.7	0.31
SELF13	Storage	10.1	0.31
PAR4	Knowing	12.8	0.31
Knowing	SefReg	12.3	-0.66
Storage	Particip	12.3	-0.62
SefReg	Knowing	12.3	-0.59
Particip	Storage	12.3	-0.77

The Modification Indices Suggest to Add an Error Covariance

Between	and	Decrease in Chi-Square	New Estimate
SefReg	Knowing	12.3	-0.47
Particip	Storage	12.3	-0.27
KNOW4	KNOW2	10.3	-0.14
KNOW6	KNOW1	9.4	-0.23
STORAGE5	KNOW7	8.4	0.12
STORAGE5	STORAGE4	12.2	0.26

VITA

Commander Kanoklekha Suwannapong was born in 1971 at Bangkok, Thailand. She is an instructor of Royal Thai Navy College of Nursing. Her education background include Bachelor of Nursing Science at Royal Thai Navy College of Nursing in 1993, Master of Nursing Science (Adult Nursing) at Faculty of Nursing, Mahidol University in 1997, and Certificate of Cardiovascular Nursing at Faculty of Nursing, Mahidol University in 2004. The contact information is 504/57 Somdej Phrachao Taksin Road, Bukkhalo, Thonburi, Bangkok, Thailand, 10600. E-mail address is ksuwannapong@yahoo.com.