PREDICTORS OF MEDICATION ADHERENCE AMONG OLDER ADULTS WITH UNCONTROLLED HYPERTENSION

XIAOPING XIANG

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR MASTER DEGREE OF NURSING SCIENCE
(INTERNATIONAL PROGRAM)
IN ADULT NURSING PATHWAY
FACULTY OF NURSING
BURAPHA UNIVERSITY
2025

-

XIAOPING XIANG

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรพยาบาลศาสตรมหาบัณฑิต (หลักสูตรนานาชาติ)

คณะพยาบาลศาสตร์ มหาวิทยาลัยบูรพา

2568

PREDICTORS OF MEDICATION ADHERENCE AMONG OLDER ADULTS WITH UNCONTROLLED HYPERTENSION

XIAOPING XIANG

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR MASTER DEGREE OF NURSING SCIENCE
(INTERNATIONAL PROGRAM)
IN ADULT NURSING PATHWAY
FACULTY OF NURSING
BURAPHA UNIVERSITY
2025

The Thesis of Xiaoping Xiang has been approved by the examining committee to be partial fulfillment of the requirements for the Master Degree of Nursing Science (International Program) in Adult Nursing Pathway of Burapha University

Advisory Committee

Principal advisor

.....

(Associate Professor Dr. Pornpat Hengudomsub)

Co-advisor

.....

(Associate Professor Dr. Pornchai Jullamate)

.....

(Assistant Professor Dr. Panicha Ponpinij)

Examining Committee

.....

Principal examiner

(Associate Professor Dr. Jom Suwanno)

.....

Member

(Associate Professor Dr. Pornpat Hengudomsub)

.....

Member

(Assistant Professor Dr. Panicha Ponpinij)

.....

Member

(Associate Professor Dr. Chanudda Nabkasorn)

.....

Dean of the Faculty of Nursing

(Associate Professor Dr. Pornchai Jullamate)

.....

This Thesis has been approved by Graduate School Burapha University to be partial fulfillment of the requirements for the Master Degree of Nursing Science (International Program) in Adult Nursing Pathway of Burapha University

.....

Dean of Graduate School

(Associate Professor Dr. Witawat Jangiam)

.....

63910145: MAJOR: ADULT NURSING PATHWAY; M.N.S. (ADULT NURSING PATHWAY)
KEYWORDS: MEDICATION ADHERENCE/ MEDICATION SELF-EFFICACY/ HEALTH LITERCY/ SOCIAL SUPPORT/ OLDER ADULTS/ UNCONTROLLED HYPERTENTION

XIAOPING XIANG : PREDICTORS OF MEDICATION ADHERENCE AMONG OLDER ADULTS WITH UNCONTROLLED HYPERTENSION. ADVISORY COMMITTEE: PORNPAT HENGUDOMSUB, PORNCHAI JULLAMATE PANICHA PONPINIJ 2025.

High blood pressure greatly raises the risk of stroke and heart disease, which are major causes of death and disability. Medication adherence is vital for older patients, especially those with uncontrolled hypertension. The purposes of this study were to describe medication adherence and its influencing factors among older adults with uncontrolled hypertension. A total of 137 participants were recruited from the Second Affiliated Hospital of Wenzhou Medical University using a simple random sampling technique. Research instruments included questionnaires to gather data for : 1) demographic information, 2) Medication adherence, 3) Medication self-efficacy, 4) Medication literacy, and 5) Social support. Cronbach's α coefficients of Medication self-efficacy, Medication literacy, Social support and Medication adherence obtained from this study were .742, .821, .772 and .762respectively. Data were analyzed by using descriptive statistics and standard multiple regression.

The results of this study showed that the mean score of medication adherence was 5.59 (SD= .98), which can be classified as a low level. Medication self-efficacy, medication literacy, and Social support could explained variance of medication adherence for 30. 8 % (Adjusted R^2 =.308,$F(3,133)=21.185$, $p < .001$). The strongest predictor of medication adherence was medication self-efficacy ($\beta= .431$, $p<. 001$), followed by medication literacy ($\beta=. 240$, $p<. 05$, whereas social support ($\beta=. 015$, $p > 0.05$) is not a significant predictor of medication adherence.

The results of this study offer a deeper understanding of medication adherence in older adults with uncontrolled hypertension. The low level of adherence, particularly in this population, emphasize the importance of nurses to implement strategies for improving medication adherence. When developing these strategies, it is also essential to focus on key predictors, such as medication self-efficacy and medication literacy.

ACKNOWLEDGEMENTS

This thesis marks the end of a long and memorable journey that I could not have completed without the dedicated support of my supervisors and peer colleges. First and foremost, I would like to extend my sincere gratitude to my principal advisor, Associate Professor Dr.Pormpat Hengudomsub, and assistant Professor Dr.Panicha for their selfless effort in helping me throughout the process of my study. The study wouldn't have taken its shape without their unwavering support and motivation. I would also like to thank my examining committee member for their valuable guidance and feedback. My work would not have been possible without the help of these experienced people. Their insightful suggestions have contributed immensely to the quality of this study.

I would also like to express my heartfelt thanks to the University of Burafa School of Nursing. My studies at this institute over the past there years have been a true blessing, enriching me with knowledge and wisdom, which I will always respect. I would also like to extend my sincere gratitude to Wenqin Liu. During my most challenging and perplexing moments, she consistently provided me with invaluable assistance and support.

Finally, I would like to thank my family, who have always supported me, encouraged me and made me have a firm belief to move forward. No matter in material or spiritual company, I feel extremely lucky.

Xiaoping Xiang

TABLE OF CONTENTS

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER 1
INTRODUCTION

Background and significance

Hypertension is the leading cause of cardiovascular disease and premature death worldwide. With the widespread use of antihypertensive medications, global mean blood pressure (BP) has remained constant or decreased slightly over the past four decades. By contrast, the prevalence of hypertension has increased, especially in low and middle-income countries(Mills et al., 2020). It is one of the main modifiable risk factors linked to cardiovascular diseases, and its prevalence as well as severity both increase with age(Leszczak et al., 2024).

This disease becomes a major health concern in both developing and developed countries (Mittal & Singh, 2010). The older adults are the most rapidly growing population group in the world. Number of studies have demonstrated the increasing prevalence of hypertension with age. Hypertension is one of the main modifiable risk factors linked to cardiovascular diseases, and its prevalence as well as severity both increase with age1. US National Health and Nutrition Examination Survey (NHANES) showed that 70% of older adults over 65 years of age have hypertension

According to the National Clinical Research Center of the Geriatric Diseases-Chinese Alliance of Geriatric Cardiovascular Disease (2019), over half of Chinese older adults have hypertension, and for those aged 80 years or over, the prevalence rate was reached 90%. Hypertension is the leading risk factor for cardiovascular and cerebrovascular diseases, kidney disease and death (Kokubo & Iwashima, 2015). This disease becomes a prime concern due to its pervasiveness. With its increasing number, it is considered as a serious warning in health care arena and provoke more attention regarding this silent disease. According to the China Cardiovascular Disease Health and Disease Report 2020, there are over 245 million people suffered from hypertension in China (Ma et al., 2020). With the rapid rates of social and economic changes, this leads to the greater risks for cardiovascular diseases which included hypertension. However, the report has shown the estimated prevalence of awareness, treatment, and control were 55.7, 46.5, and 20.3% among

Chinese adults with hypertension, respectively(Wei et al., 2021). The number of cardiovascular diseases in China still continuously and rapidly increase in the next 10 years. The higher blood pressure, the higher the risk of heart attack, heart failure, and stroke. According to(Ma et al., 2020), the risk of cardiovascular disease is doubled for increasing of blood pressure in every 20/10 mmHg. Uncontrolled blood pressure and constantly progressive hypertension can eventually evolve to become severe complications and morbidities. Uncontrolled hypertension among older adults is a leading cause of morbidity and mortality worldwide(Lee et al., 2022).

Once the complication of hypertension is discovered, the patient's disability rate and mortality rate became high. Meanwhile hypertension will reduce the quality of life of patients, and cause burden to families and the country. Effective treatment exists for the management of hypertension including both non-pharmacological and pharmacological approaches. These therapies could also help delay or prevent the risk of hypertensive complications.

According to (De Geest & Sabaté, 2003), medication adherence refers to the degree to which a patient complies with a mutually agreed medication regimen. (Benetos et al., 2019) postulated that for most older adults with hypertension, both lifestyle modifications and antihypertensive medications are needed to normalize blood pressure and reduce the risks of stroke and cardiovascular disease. Persistent adherence to medication and lifestyle change is a significant contributor for achieving adequate blood pressure control. Adherence has been defined as the “active, voluntary, and collaborative involvement of the patient in a mutually acceptable course of behavior to produce a therapeutic results(Delamater, 2006). Low-medication adherence is considered a worldwide problem(Al-Ramahi, 2015). Previous study found that low-medication adherence among people with chronic diseases was over 50% in developed countries and much higher in developing countries. Medication adherence is the key approach for effectively controlling blood pressure and essential for the success of treatment. According to the World Health Organization, one of the global targets for noncommunicable diseases is to reduce the prevalence of hypertension by 33% between 2010 and 2030.

Despite the global improvements in the treatment, controlling this disease in the older age group, it is still a big challenge for many countries, China in particular.

In China, the medication adherence of elderly patients is quite low. Based on the Report of Chinese Cardiovascular Disease Health and Disease Report 2020, nearly 60% of older patients with hypertension failed to be controlled standardly. Therefore, it is urgent to improve the medication adherence among older adults with hypertension.

Medication non-adherence lowers the effectiveness of treatments and lead to the increase of medical costs. Therefore, medication adherence is an important issue in the management of patients with chronic diseases, hypertension in particular. In older patients, medication adherence is decreased due to various possible factors such as multiple prescriptions, recognition and memory impairment, and physical limitations such as visual hearing impairment, etc. Based on the study results of the study(Shen et al., 2020), it was found that 60.9% of patients with hypertension reported low adherence to medications.

Despite advances in management, poor adherence to antihypertensive medications is often reported and medication adherence among older adults with hypertension is varied considerably due to the influence of several factors. Based on empirical findings, medication self-efficacy, medication literacy, and social support would be significant factors affecting medication adherence and will be the selected predictors proposed to be examined in this study.

Firstly, self-efficacy towards medication adherence plays a critical role in promoting adherence to antihypertensive drug taking and self-management among patients with hypertension. Self-efficacy refers to the individuals' confidence in making use of his or her own ability to achieve the desired goal. It helps determine the individual's choices, persistence, and effort towards the particular tasks. For this study context, the task can be linked to adherence to prescribed medication. Self-efficacy also affects the way that an individual is thinking and feeling in the process of performing such task(Bandura et al., 1999). For a wide range of health behaviors, self-efficacy served as a known predictor for health-related behaviors which included medication adherence. In a study (Schoenthaler et al., 2009), the negative influence of depression on medication adherence was mediated by self-efficacy. Patients with higher medication self-efficacy had better blood pressure control. Older adults with higher self-efficacy level would have significantly increased possibilities in adhering

to medications. Patients with high levels of self-efficacy had greater confidence that they would be willing to take antihypertensive drugs as prescribed. In spite of the high prevalence of hypertension and the increase the treatment and control of hypertension are unacceptably low.

Secondly, medication literacy which is health-related literacy focusing on the medication use (Neiva Pantuzza et al., 2022). The believes and personal circumstances among the patients would be relevant to medication literacy. Safe and correct self-medication adherence contributed to the optimal blood pressure control (Bennadi, 2013). For patients with hypertension, adherence to prescribed medication regimen and taking antihypertensives in a right way and necessary for achieving optimal blood pressure control and improving the patients' long-term outcomes (Peacock & Krousel-Wood, 2017). Previous study showed that patients with hypertension who had higher health literacy also reported higher adherence to medication regimen (McNaughton et al., 2014). According to Previous study (Shen et al., 2020), medication literacy had a positive effect on medication adherence in patients with hypertension.

Thirdly, social support also plays an important role in improving medication adherence (Gu et al., 2017). Treatment nonadherence is a major problem in the management of hypertension. Given that there are many factors influencing the treatment adherence of hypertensive patients, one study reported that social support between patients and their family increases adherence to the treatment (Turan et al., 2019). Rujiwatthanakorn, Panpakdee, Malathum., &Tanomsup (2011) found that persons with uncontrolled hypertension did not receive sufficient support from their family caregivers. Therefore, more active involvement of family caregivers is also needed in order to help these persons with uncontrolled hypertension have sustainable health behavioral changes. (Rujiwatthanakorn et al., 2011)Therefore, the improvement of social support does positively accelerate the healing process and increases the quality of life of patients by reducing social isolation.

Although adherence to antihypertensive medication is crucial for blood pressure control among older adults with hypertension, only a few studies have been conducted to examine factors affecting medication adherence in the older patients in China. Therefore, it is meaningful to determine the factors affecting medication

adherence among elderly patients with hypertension, which is an important health concern in China. Better understanding towards the factors affecting medication adherence is essential for the development and refinement of interventions aimed at promoting older adults' medication adherence. These would lead to better control of high blood pressure among older adults with hypertension and in turn lead to better quality of life among these older adults.

Research objectives

1. To describe medication adherence among older adults with uncontrolled hypertension.

2. To examine the influence of medication self-efficacy, medication literacy, and social support on medication adherence among older adults with uncontrolled hypertension.

Research hypothesis

Medication self-efficacy, medication literacy, and social support can predict medication adherence among older adults with uncontrolled hypertension.

Conceptual framework

The conceptual framework of this study is based on medication adherence concept postulated by World Health Organization and related literature reviews. Medication adherence is an important issue in the management of patients with chronic diseases, hypertension in particular. Medication adherence can be briefly described as the degree to which the patients take their medication as prescribed. There are a number of factors relevant to medication adherence. According to (Burnier & Egan, 2019), multidimensional factors can be classified into individual factor such as patient's knowledge, their health literacy especially medication literacy and self-efficacy. Social/economic factor such as age, income, social support, and medication condition related factor such as number of chronic conditions, drug abuse, quality of life); therapeutic factor such as adverse effect, treatment duration; and health care team-related factor such as patient-clinician relationship, medical

insurance, communication style etc.. Based on the reviews of related literatures, medication self-efficacy, medication literacy, and social support were found to be significant factors affecting medication adherence among older adults, with uncontrolled hypertension in particular. These selected factors were examined in this study. The older adults who have well adherence with medication will be those who have better self-efficacy for medication management, medical literacy, and perceived well social support. The research conceptual framework for this study is shown in Figure 1.

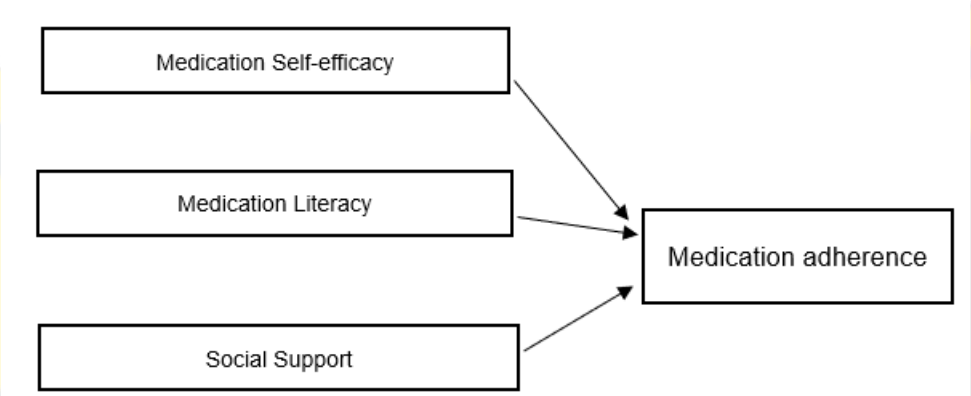


Figure 1 Conceptual framework

Scope of the study

The purposes of this study are to describe medication adherence and its predictors among elderly patients with uncontrolled hypertension in Wenzhou, China. The study participants included 137 older adults with hypertension who came for follow-up visit at the outpatient of cardiology department of the Second Affiliated Hospital of Wenzhou Medical University. Data collection was conducted from September 1, 2022 to December 30, 2022.

Definition of terms

Older adults with uncontrol hypertension is defined as the older patients with hypertension who is on antihypertensive treatment and having SBP/DBP >140/ 90 mmHg which were in accordance with the Chinese Guidelines for Prevention and Treatment of Hypertension (Joint Committee for Guideline, 2019).

Medication adherence refers to the ability and willingness of the older adults with hypertension to follow recommended health practices regarding medication management. The Morisky Medication Adherence Scale (MMAS 8-scale) (Morisky et al., 2008) in Chinese version(Yan et al., 2014) was used to examine this medication adherence.

Medication literacy is a health-related literacy focusing on the context of medication use. It is the degree to which the older adults with hypertension would be able to obtain, comprehend, communicate, calculate, and process information about their medications, to make informed medication and health decisions in order to safely and effectively use their medications regardless of the mode by which the content is delivered. Medication literacy developed by (Pouliot et al., 2018) in Chinese version developed by (Shen et al., 2020) was used in this study.

Medication Self-efficacy refers to the level of a person's confidence in his or her ability to successfully perform a certain behavior. Self-efficacy in this study context placed as emphasis on medication management. Medication Adherence Self-Efficacy Scale-Revision MASES-R in Chinese version(Shen et al., 2020) was used in this study.

Social support refers to the perception of older adults with hypertension in receiving help or support regarding informational, emotional, esteem, tangible support from family, friends, and significant others. In this study, social support was measured by using the multidimensional scale of Perceived Social Support (MPSS) in Chinese version (Jiang, 2001).

Contribution to nursing science

Previous studies have shown that the medication adherence of older patients with uncontrolled hypertension is generally low, and the influencing factors of medication adherence are varied. So, this study based on the investigation towards the predictors pertinent to medication literacy among the older adults with uncontrolled hypertension will be conducted. Data obtained from this study would provide the basis for clinical nurses regarding their practices and health education works. This would help improve blood pressure control and treatment for these patients.

CHAPTER 2
LITERATURE REVIEW

This chapter reviews the research literature focusing on three major parts. These three parts will present relevant details focused in this study. The first part describes an overview of hypertension/uncontrolled hypertension in older adults. The second part focuses on medication adherence. The third part presents the factors affecting medication adherence including medication self-efficacy, medication literacy, and social support.

Overview of hypertension

For better understanding regarding hypertension, its definition, classification, Stages of hypertension, causes of hypertension, Diagnostic and clinical tests for hypertension, Hypertension in Chinese older adults, and management of hypertension will be described in the following details.

Definition of hypertension and uncontrolled hypertension

Hypertension is a medical condition that significantly increases the risk of heart, brain, kidney, and other diseases. Globally, hypertension is one of the leading burdens of disease as well as a public health problem (Irazola et al., 2016). In China, hypertension is also one of the most common diseases occurred with the Chinese population. Blood pressure is a measurement of the force against the artery walls, as the heart pushes blood into the arteries and circularity system. Blood pressure is measured in millimeters of Mercury. According to the 2018 Revision of the Guidelines for the prevention and treatment of hypertension in China, high blood pressure is specified as having systolic blood pressure (SBP) ≥140 mmHg and/or diastolic blood pressure (DBP) of ≥90 mmHg in the clinic without the use of antihypertensive drugs (Liu, 2020). Typically, more attention is given to systolic blood pressure as a major risk factor for cardiovascular disease for people age over 50 years old. Actually, systolic blood pressure rises steadily with age due to the increasing stiffness of large arteries, long-term of emerged plaque and an increased incidence of cardiac and vascular disease. Uncontrolled hypertension is defined as a

person who has been diagnosed by a physician as having high blood pressure, on hypertension treatment and whose blood pressure level is greater than 140/90. millimeter of mercury

Classification of hypertension

Hypertension can be classified as primary hypertension and secondary hypertension. Primary hypertension is the most common type of hypertension and represents about 90-95 % of all cases of hypertension (Manosroi & Williams, 2019). The specific cause to explain primary hypertension is unknown and there is no single specific cause that has been identified. Nevertheless, several genetic and environmental factors could contribute to this condition. The pathology included the interaction between genetic and environmental or lifestyle factors. Additionally, environmental and lifestyle factors have been identified to explain an elevated blood pressure along with the increase of sodium consumption, alcohol and high caloric intake, stress and physical inactivity (Adeniyi et al., 2012). For the primary hypertension, this type of hypertension has no definite cause, or clear identifiable etiology. Whereas the secondary hypertension is occurred with possible identifiable causes. Specifically, classification of hypertension in the elderly can be divided into two types according to the cause of the disease as follows:

1. Primary (essential) hypertension is high blood pressure that is multi-factorial and doesn't have one distinct cause. It's also known as idiopathic or essential hypertension. Older adults with this type of hypertension, they must be counseled on health behavior modifications in conjunction with antihypertensive drug therapy to prevent complications from the disease.

1.1. Isolated systolic hypertension [ISH] means the systolic blood pressure is greater than or equal to 140 mm Hg and the systolic blood pressure is equal to or greater than 140 mm Hg. and blood pressure when the heart is relaxed is less than 90 mm Hg. which is the most common type in the elderly.

1.2. Transient hypertension when measuring blood pressure in the clinics, hospitals or public health facilities (white coat hypertension [WCH] or isolated office hypertension), which is common in the elderly. This condition is not related to taking antihypertensive medications. But they are often found to have high blood pressure levels while in the medical facilities in which a blood pressure level greater than

140/90 mm Hg. But at normal times, with continuous ambulatory blood pressure, the blood pressure level is less than 135/85 mm Hg. Continuous blood pressure measurements can confirm a diagnosis of WCH and there is no organ damage .

1.3. Masked hypertension is defined as a normal blood pressure (BP) in the clinic or office (<140/90 mmHg), but an elevated BP out of the clinic (ambulatory daytime BP or home BP>135/85 mmHg).

1.4. Postural hypo/hypertension, which is more common with increasing age. It is caused by hardening of the walls of large blood vessels. as well as the reduced work of baroque savers. (baroreceptor) and the control system of the autonomic nervous system Affects the adjustment of blood pressure when changing posture.

2. Secondary hypertension or known cause of disease (secondary hypertension) means high blood pressure that has a clear cause or has a pre-existing disease. and then develop from complications of that disease until the disease is high blood pressure The main reasons included:

2.1 Hypertension caused by abnormalities of the kidneys or renal artery stenosis, which is caused by the degeneration of blood vessels with increasing age or with many comorbid conditions, but can be prevented and inhibited if possible with receive timely treatment. With the narrow of the blood vessels within the kidneys, this reduced the blood flow within the kidneys by up to 70 percent, resulting in a decrease in the pressure inside the glomerulus causing the activation of the Rennin System Angiotensin Aldosterone (RAAS) This resulted in the increased water reabsorption. resulting in increased blood pressure levels.

2.2 Taking certain medications such as corticosteroids (corticosteroid) and phenylpropanolamine. Some patients when taking these medications will cause the body to be stimulated to cause the level of blood pressure to rise. But the blood pressure level will drop after the patient stops taking these medications.

2.3. Endocrine diseases, such as adrenal tumors which resulting in the secretion of the hormone aldosterone (aldosterone) causing the congestion of sodium. So causing blood pressure to rise. Pheochromocytoma causes the secretion of catecholamine. (catecholamine). So, there will be more epinephrine and norepinephrine entering the bloodstream causing blood vessels to be constricted and

high blood pressure.

2.4 Neurological diseases such as brain tumors, encephalitis, and abnormally elevated intracranial pressure including the body's response to stress. These causes the sympathetic nervous system to release norepinephrine. The RAAS system is stimulated, causing the blood vessels to All over the body there is a contraction. The peripheral arteries have increased resistance. and if the body is unable to adjust to normal conditions will increase blood pressure levels.

Stages of Hypertension

Hypertension, or high blood pressure, is classified into different stages based on the severity of the condition. The classification is important because it helps guide treatment and lifestyle changes. The stages are defined by systolic blood pressure (the top number) and diastolic blood pressure (the bottom number). The current stages of hypertension was based on the American College of Cardiology (ACC) and American Heart Association (AHA) guidelines: According to JNC VII (2017), it is critical that health care providers follow the standards for accurate BP measurement. BP should be categorized as normal, elevated, or stages 1 or 2 hypertension to prevent and treat high blood pressure. Normal BP is defined as the blood pressure values <120/<80 mmHg; elevated BP 120-129/<80 mm Hg; Hypertension stage 1; High blood pressure falls in Stage 1 when the blood pressure consistently ranges from 130-139 systolic or 80-89 mm Hg diastolic. At this stage of high blood pressure, physicians are likely to recommend lifestyle changes and may consider adding blood pressure medication based on any possible risks of atherosclerotic cardiovascular disease, such as heart attack or stroke. Whereas hypertension that falls in stage 2 is when blood pressure consistently ranges at 140/90 mmHg or higher. At this stage, physicians are likely to prescribe a combination of blood pressure medications and recommendations for lifestyle changes. It should be concerned that in labeling a person with hypertension, it is important to use an average based on ≥2 readings obtained on ≥2 occasions to estimate the individual’s level of BP. For the most recent guidelines, JNC 8, which were released in 2014, provide recommendations for diagnosing and managing hypertension. However, in terms of classification, JNC 7 (released in 2003) is still widely used for staging hypertension. JNC 8 did not make major changes to the classification system but provided guidelines for treatment and management.

Causes of Hypertension

Approximately 5-10 percent hypertension cases are due to identifiable causes in which a renal disease being the most common contributor to 2.5- 6 % of all causes of secondary hypertension. Other causes of secondary hypertension include; endocrine conditions, such as Cushing's syndrome, hyperthyroidism, hypothyroidism, acromegaly, hyperaldosteronism, hyperparathyroidism and pheochromocytoma (Oparil et al., 2018). For the other causes that possibly contribute to secondary hypertension include obesity, sleep disturbance, and pregnancy, some effects from certain prescription medicines, herbal remedies, and some illegal drugs.

Diagnostic and clinical tests for hypertension

According to recommendation by AHA guideline (Whelton et al., 2018), patients with hypertension are often asymptomatic, however specific symptoms can suggest secondary hypertension or hypertensive complications that require further investigation. A complete medical and family history is recommended and should be taken into account for assessment. Regarding blood pressure, the new onset hypertension, duration, previous BP levels, current and previous antihypertensive medication, other medications/over the counter medicines that can influence BP, history of intolerance (side-effects) of antihypertensive medications, adherence to antihypertensive treatment, previous hypertension with oral contraceptives or pregnancy should be also investigated. Regarding the risk factors, data regarding personal history of CVD (myocardial infarction, heart failure [HF], stroke, transient ischemic attacks [TIA], diabetes, dyslipidemia, chronic kidney disease [CKD], smoking status, diet, alcohol intake, physical activity, psychosocial aspects, history of depression should be assessed as well. In addition, family history of hypertension, premature CVD, (familial) hypercholesterolemia, diabetes should also be taken into consideration for exploration. In assessing the overall cardiovascular risk, this should be in line with local guidelines/recommendations. For symptoms/signs of hypertension/coexistent illnesses, investigation of chest pain, shortness of breath, palpitations, claudication, peripheral edema, headaches, blurred vision, nocturia, hematuria, dizziness, these all also needed to be investigated. For symptoms suggestive of secondary hypertension, the muscle weakness/tetany, cramps, arrhythmias (hypokalemia/primary aldosteronism), flash pulmonary edema (renal

artery stenosis), sweating, palpitations, frequent headaches, snoring, daytime sleepiness, symptoms related with thyroid disease should be taken into account for assessment. For physical examination, a comprehensive physical examination would help confirm the diagnosis of hypertension. Lastly, the identification of hypertension mediated organ damage and/or secondary hypertension should be concerned as well.

Circulation and heart, pulse rate/rhythm/character, jugular venous pulse/pressure, apex beat, extra heart sounds, basal crackles, peripheral edema, bruits, radio-femoral delay. For other organs/systems, enlarged kidneys, neck circumference >40 cm, enlarged thyroid, increased body mass index (BMI)/waist circumference, and fatty deposits should be further investigated. For laboratory investigations and ECG, blood tests of sodium, potassium, serum creatinine and estimated glomerular filtration rate (eGFR) are recommended. If available, lipid profile and fasting glucose, urine test and 12-lead ECG should be investigated. Additional diagnostic tests may include: echocardiography, carotid ultrasound, kidneys/renal artery and adrenal imaging, fundoscopy, brain CT/MRI, Ankle-brachial index. If further testing for secondary hypertension if suspected, aldosterone-renin ratio, plasma free metanephrines, late-night salivary cortisol or other screening tests for cortisol excess should also be incorporated.

Hypertension in Chinese Older Adults

The elderly are the most rapidly growing population group in the world. Data collected over a 30-year period have demonstrated the increasing prevalence of hypertension with age. China's population aged rapidly between 2000 and 2017, with life expectancy at birth increasing from 71.4 years to 76.7 years and the proportion of the population over 60 rising from 7.0 to 17.3% (Zhong et al., 2020). According to the National Clinical Research Center of the Geriatric Diseases-Chinese Alliance of Geriatric Cardiovascular Disease (2019), over half of Chinese older adults have hypertension, and for those aged 80 years or over, the prevalence rate was reached 90%. As mentioned, hypertension has become one of the leading burdens of disease and a public health problem globally. According to the "Report on Disease of Cardiovascular in China 2018", there were 270 million patients in China diagnosed with hypertension, which was at the top of the list of all cardiovascular diseases(Ma et al., 2020). Uncontrolled blood pressure and constantly progressive hypertension can

eventually evolve to become severe complications and morbidities.

Factors associated with uncontrolled hypertension in the older adults

Uncontrolled hypertension in older adults was found to be related with multiple factors(Beilin & Puddey, 2006; Kretchy et al., 2014). The summary of the reviews are as follows:

1. Eating salty food. This is a major obstacle that prevents the control for blood pressure. In addition, from the anatomical and physiological changes among the elderly, these deteriorate the nervous systems used for taste, especially salty and bitter tastes among the elderly thus causing the elderly to eat more salty food and resulted in the rise of blood pressure. When there is an excess of sodium ions (Na+) in the body, it will affect the extracellular water (extravascular fluid [EVF]).When the body have increased Na+ will result in the increases concentration (osmolality) in the plasma causing water to be extracted from the cells. causing water in the blood vessels (intravascular fluid [IVF]) increased in volume increase blood pressure.

2. Medication non adherence. Medication adherence is important in the control of hypertension. If the elderly lack of cooperation in medication use, it will result inability to control blood pressure within a normal level. This leads to the spread of the disease causing complications and can be life threatening. This may be caused by the elderly having a decreased memory as they age, causing them to forget that they have taken the medicine or have not taken it or the older adults may feeling bored for taking a large amount of pills or may stop taking the medications when there are no symptoms of the disease causing the older adults to not take the medications according to the doctor's treatment plan. In addition, the elderly may not be able to read the letters written on the fronts of the medication pack because they are unclear and small. Therefore , the older adults use the method of remembering the color or size of the medications. These may also result in incorrect medication intake.

3. Stress, it was found that stress can affect the central nervous system. The stimulation of the sympathetic autonomic nervous system may cause the changes in the cardiovascular system by causing an increase in the resistance of the peripheral arteries causing the heart to squeeze harder. As a result, the amount of blood leaving the heart increases causing the level of blood pressure to be increased.

4. Smoking: The nicotine in cigarettes has been found to stimulate the body's

release of epinephrine and norepinephrine resulting in narrowing of the arteries and causing the increased heart rate and becomes stronger which cause the heart to work more resulted in high blood pressure level.

5. Drinking alcoholic beverages, it was found that alcoholic beverages had an effect on blood pressure levels. This depends on the type of alcohol consumed, drinking volume, age, sex and ethnicity. Alcohol causes an increase in blood lipids (hyperlipidemia) causes the arteries to harden faster, especially in the elderly (Beilin & Puddey, 2006), this can lead to higher blood pressure levels.

6. Exercise: It was found that exercise was associated with blood pressure levels if the exercise is effective, sufficient and continuous. Exercising is one of the health behavior modifications and can help control blood pressure levels. By exercising, it would help increase the flexibility of the blood vessels, reduce the resistance of the blood vessels causing the amount of blood to be pumped in each time were decreases and the level of norepinephrine in the blood also decreases. Thus, resulting in lower blood pressure levels

7. The aging process, it was found that with age, the cardiovascular system will change, causing more resistance in peripheral blood vessels. Because of the hardening of the blood vessels, causing the lack of flexibility resulting in increased blood pressure levels Therefore, it is often found the older persons tend to have Blood pressure greater than 140/90 mm Hg.

8. Obesity, obesity is estimated by calculating the body mass index (BMI). It is considered to be overweight when a BMI is > 23, weight (kg)/height (m2) or overweight when BMI > 25 weight (kg)/height (m2) and waist circumference (WC) was measured in standing position > 90 cm in men or > 80 cm.

9. In women, it is considered as having abdominal obesity. It was found that those who weighed more than 10-20% of standard body weight or BMI greater than 25 weight (kg)/height (m2) will have higher blood pressure because the tissue will expand in size. As a result, the amount of blood leaving the heart in 1 minute increases. These cause the rise of blood pressure to rise.

10. Co-morbidity, it was found that high blood pressure may relate to co-morbidities in the early stage of hypertension. There are 4 comorbidity diseases of high blood pressure, namely coronary heart disease, diabetes, hyperlipidemia

Therefore, it is important for the prevention and treatment of hypertension and comorbidities in the elderly (Liu et al., 2016).

11. Exercise: It was found that exercise was associated with blood pressure levels if the exercise is effective, sufficient and continuous. Exercising is one of the health behavior modifications and can help control blood pressure levels. By exercising, it would help increase the flexibility of the blood vessels, reduce the resistance of the blood vessels causing the amount of blood to be pumped in each time were decreases and the level of norepinephrine in the blood also decreases. Thus, resulting in lower blood pressure levels

12. The aging process, it was found that with age, the cardiovascular system will change, causing more resistance in peripheral blood vessels. Because of the hardening of the blood vessels, causing the lack of flexibility resulting in increased blood pressure levels Therefore, it is often found the older persons tend to have Blood pressure greater than 140/90 mm Hg.

13. Obesity, obesity is estimated by calculating the body mass index (BMI). It is considered to be overweight when a BMI is > 23, weight (kg)/height (m2) or overweight when BMI > 25 weight (kg)/height (m2) and waist circumference (WC) was measured in standing position > 90 cm in men or > 80 cm.

14. In women, it is considered as having abdominal obesity. It was found that those who weighed more than 10-20% of standard body weight or BMI greater than 25 weight (kg)/height (m2) will have higher blood pressure because the tissue will expand in size . As a result, the amount of blood leaving the heart in 1 minute increases. These cause the rise of blood pressure to rise .

15. Co-morbidity, it was found that high blood pressure may relate to co-morbidities in the early stage of hypertension. There are 4 comorbidity diseases of high blood pressure, namely coronary heart disease, diabetes, hyperlipidemia. Therefore, it is important for the prevention and treatment of hypertension and comorbidities in the elderly(Liu et al., 2016).

Management of hypertension in older adults

Hypertension is an asymptomatic chronic condition. For most adults, both lifestyle modifications and antihypertensive medications are needed to normalize blood pressure and also help reduce the risks of stroke and cardiovascular disease

(Dolor et al., 2009). According to the Joint National Committee (JNC 8) Hypertension Guidelines, in comparison with previous hypertension treatment guidelines (JNC 7), the JNC 8 guidelines advise higher blood pressure goals and less use of several types of antihypertensive medications(Page, 2014). This new guideline emphasizes controlling systolic blood pressure and diastolic blood pressure by taking into consideration of age and comorbidity specific treatment. These new guidelines also introduced new recommendations aimed at promoting the safer use of antihypertensive medications which included angiotensin converting enzyme (ACE) inhibitors and angiotensin receptor blockers (ARBs). The major changes from the JNC 7 guidelines are summarized as follows: 1) For in patients aged 60 years or older who did not have diabetes or chronic kidney disease, the goal for blood pressure level is now <150/90 mm Hg. 2) For in patients aged 18 to 59 years who do not have major comorbidities, and in patients aged 60 years or older who have diabetes, chronic kidney disease (CKD), or both conditions, the new goal blood pressure level is <140/90 mm Hg. 3) The first line and later-line treatments should now be limited to 4 classes of medications namely thiazide-type diuretics, calcium channel blockers (CCBs), ACE inhibitors, and ARBs. For the second and the third line treatment included higher doses or combinations of ACE inhibitors, ARBs, thiazide-type diuretics, and CCBs. In addition, several medications are now designated as later-line alternatives, including the following: beta-blockers, alpha blockers, alpha1/beta-blockers, vasodilating beta-blockers, central alpha2/-adrenergic agonists, direct vasodilators, loop diuretics, aldosterone antagonists, and peripherally acting adrenergic antagonists. Furthermore, the use of ACE inhibitors and ARBs is recommended in all patients with chronic kidney disease regardless of ethnic background, either as first-line therapy or in addition to first line therapy. Thiazide-type diuretics should be used instead of ACE inhibitors and ARBs in patients over the age of 75 years with impaired kidney function due to the risk of hyperkalemia, increased creatinine, and further renal impairment. Apart from pharmacological management, non-pharmacological management also recommend. According to World Health Organization, non-pharmacological management included therapeutic lifestyle modification regarding to healthy eating, stress management, regular physical exercise, weight reduction, avoidance of alcohol intake, smoking cessation.

Medication adherence among older adults with hypertension

Definition of medication adherence

The low percentage of patients with controlled blood pressure has become a great concern in many other countries (Ofili et al., 2015). The great efforts and costs have been invested in addressing the problem (Jafar et al., 2018). Adherence can be defined as the “active, voluntary, and collaborative involvement of the persons in acceptable course of behaviors to achieve therapeutic results (Delamater, 2006).

According to this definition, the patient has a choice. Both the patients and the care providers mutually establish treatment goals and the medical regimen. Medication adherence usually refers to whether patients take their medications as prescribed such as twice daily as well as whether the patients continue to take a prescribed medication. Medication adherence behavior can be divided into 2 main concepts including adherence and persistence(Cramer et al., 2008), adherence refers to the intensity of drug use during the treatment duration. Whereas persistence refers to the overall duration of drug treatment. Persistent adherence to medication and lifestyle change is a significant contributor to achieving adequate blood pressure control(Chen et al., 2007), medication adherence emphasized the involvement of patients in such medication-taking behaviors. The World Health Organization(De Geest & Sabaté, 2003) defines adherence to medications as a multidimensional aspects determined by the interplay of five sets of factors including social/economic, therapy-related, patient-related, condition-related and health system/healthcare team. It has been mentioned that medication adherence seems to be simple, but in reality, it did extremely complex. Based on a systematic review(Kardas et al., 2013), medication non-adherence is affected by multiple determinants. Therefore, the prediction of non-adherence of individual patients is difficult, and suitable measurement and multifaceted interventions may be the most effective answer toward unsatisfactory adherence. To uniformize the discourse in this area, the authors of the Ascertaining Barriers to Compliance project's medication adherence taxonomy proposed new definitions, based on both behavioral and pharmacological sciences(Vrijens et al., 2012). As such, medication adherence was conceptualized as a continuous entity, divided in 3 phases including: 1) Initiation phase which encompassed the act of taking the first dose of medication as prescribed,2)

Implementation phase when the patient takes their prescribed medication and 3) Discontinuation phase when the patients completely stop taking the medications.

Another essential conceptualization is the division of medication nonadherence into intentional and unintentional aspects This stems from the fact that not all nonadherence behaviors are conscious and intentional: patients can be passively inconsistent in their medication taking habits. For example, unintentionally nonadherent may be due to forgetfulness,(Mentz et al., 2018). The recognition of both intentional and unintentional nonadherence behavior patterns provoked the need to address these issues, whether individually or as a whole, since they most likely coexist in the same patient(Mukhtar et al., 2014).

Factors affecting medication adherence

Factors affecting medication adherence among older adults with hypertension encompassed of medication self-efficacy, medical literacy, and social support. The reviews of each factor are as follows:

Medication self-efficacy

Several behaviors change theories have been applied to the understanding of medication adherence and attempt at changing medication-related behavior to improve adherence. The concept of self-efficacy within Social Cognitive Theory offers a practical framework. Specifically, self-efficacy is one’s belief that the persons can successfully perform a specific behavior to achieve a desired outcome. Self-efficacy is considered a person factor through the following four sources: mastery experiences, vicarious experiences, verbal persuasion/encouragement, and interpretation of emotional and physiological states. Self-efficacy served as a powerful force in behavior change. Self-efficacy refers to the individual's confidence to make use of his or her own ability to achieve a certain goal, which can determine the individual's choices, persistence, and effort to pursue and complete the particular tasks. It also affects the individual's way of thinking and feeling in doing and completing tasks (Bandura et al., 1999). Previous studies have shown that self-efficacy was one of the determinants of medication adherence in patients with chronic diseases (Daniali et al., 2017). Patients with high levels of self-efficacy had greater confidence that they would be willing to take antihypertensive drugs as prescribed on

different occasions (Yang et al., 2016). In other words, individuals with higher self-efficacy level have significantly increased chances of medication adherence (Alhalaiqa et al., 2013). Furthermore, self-efficacy did not only have direct effect on patients' medication adherence but also did mediate the relationship between medication adherence and a various psychosocial factors like health literacy, depression, and weight discrimination (Huang et al., 2018).

Medication literacy

There are multiple concepts that have been used for defining health literacy in the context of medication use exist. These included medication literacy, pharmacotherapy literacy, pharmacy health literacy (Pouliot et al., 2018), medication literacy is the degree to which the persons are able to obtain, comprehend, communicate, calculate and process patient-specific information about their medications in order to make informed medication and health-related decisions in order to have effective use of medications, regardless of the mode by which the content is delivered (e.g written, oral and visual). It is health literacy in the context of medication use. There are four dimensions of knowledge, attitude, skill, and behavior specified in medication literacy (Zhong et al., 2016). The four dimension is key to warranting the safe use of medication among the patients. Correct and adequate knowledge about hypertension and its medication treatment along with positive perceptions and attitudes toward disease treatment for patients with hypertension is a prime concern with an aim to promote safe use of medication as well as persistence adherence (Al-Noumani et al., 2018). In addition, appropriate skills to calculate and process patient-specific information about their medications are prerequisites for making informed medication and health decisions to achieve safe and effective medication behavior (Foster et al., 2018). Inadequate medication literacy levels have been reported by related studies for other populations (Cordina et al., 2018). However, to the best of our knowledge, there is a paucity of studies assessing medication literacy for hypertensive patients. In addition, lower medication literacy was found to be associated with inappropriate medication-taking behavior(Lee et al., 2017). Health literacy has been identified of having direct or indirect effects on medication adherence and blood pressure control (Wannasirikul et al., 2016).

Social support

Social support can be considered both ‘emotional and practical support characterizing good social relations’ and a social determinant of health (Williams et al., 2004). Any individual is more likely to engage in healthy behaviors such as adhere to medication regimen when the person perceived the availability of social support, whereas perception of lacking social support would interfere with the success in adherence to medication regimen.

In summary, the literature reviews identified that medication self-efficacy, medication literacy, and social support seem to be reliable predictors. Since, these factors are supported by both theoretical base and empirical findings. Additionally, these variables examined in this study could somehow be modified by nurses, making them more important in nursing practice aimed at promoting medication adherence among older persons with hypertension. A better understanding towards these affecting factors promises an effective nursing intervention to promote medication adherence among the older adults with hypertension, especially those with uncontrolled hypertension.

CHAPTER 3
RESEARCH METHODOLOGY

This chapter describes research design, population and sample, setting of study, instruments, human right protection, process of data collection, and statistical methods for data analysis.

Research design

This study is a predictive cross- sectional design aimed at describing medication adherence and examine whether medication self-efficacy, medication literacy, and social support could predict medication adherence among the older adults with uncontrolled hypertension.

Population and sample

Population

Older adults diagnosed with hypertension in the cardiology department of the Second Affiliated Hospital of Wenzhou Medical University were this study target population. Approximately, there are 5,000 older adults with hypertension came to receive health service at the outpatient department of cardiology for follow-up care every year.

Sample

The sample are the OPD older patients aged 60 years old and older with the diagnosis of essential hypertension. These patients were those who had come to receive medical services at the Cardiology Clinic of the Second Affiliated Hospital of Wenzhou Medical University in Wenzhou, China. The sample was randomly selected from the target population. The inclusion criteria include:

1) Age 60 years or older.

2) Had uncontrolled hypertension by being hypertensive patients as diagnosed by the physician, on antihypertensive medications and SBP/DBP >140/90 mmHg which indicated as having uncontrolled hypertension.

3) Fluent in Chinese language for listening, speaking, and writing.

4) Not have cognitive impairment as screened by using a culturally adapted Chinese version of the Mini-Mental State Examination Cognitive impairment: the highest score was 30, and a score of 27-30 was normal, score less than 27 were cognitive dysfunction; 2 dementia classification criteria: illiteracy ≤17 points, primary school ≤20 points, middle school (including technical secondary school) ≤22 points, undergraduate (including junior college) ≤23 points; 3. Severity of dementia: mild MMSE ≥21 points; Moderate, 10-20 MMSE ; Severe, MMSE ≤9 points

5) Voluntarily agree to participate to this study and sign the inform consent.

However, if the patients had met the above inclusion criteria, they would have been excluded if

1) Have psychiatric disorders or serious medical diseases such as dementia, cancer, and kidney failure.

Sample size

"The sample size for this study was calculated using the G*Power 3.1 program. Linear multiple regression was chosen as the statistical test, with an alpha level of 0.05, a test power of 0.90, a medium effect size of 0.13 (Laerkner et al., 2015), and three independent variables. This calculation resulted in a required sample size of 114 participants. To account for incomplete data, an additional 20% was added, leading to the recruitment of 23 more participants. Thus, a total of 137 participants were needed for the study.

Sampling method

In this study, simple random sampling method was used to randomly select eligible elderly patients with uncontrolled hypertension from the OPD of Cardiology Department of the Second Affiliated Hospital of Wenzhou Medical University. There were 4 cardiologists in each day from Monday to Sunday in OPD. Totally about 240-250 patients in which approximately 20-30% with hypertension visited these cardiologists in OPD. About 5 to 10 patients each day were recruited in this study.

Research setting

The study sample of older adults with hypertension was recruited from the Outpatient Department of Cardiology of the Second Affiliated Hospital of Wenzhou Medical University. The second affiliated hospital of Wenzhou Medical University is

located in Zhejiang province. The hospital has 89 clinical departments and 3,121 beds, and patients from all over the country come here to meet their health needs. The outpatient department of cardiology treats about 5000 older adults with hypertension every year.

Research instruments

Instruments for data collection included general information questionnaires and the other 4 scales including the Morisky Medication Adherence Scale-8 (MMAS-8) in Chinese version, Chinese Medication Literacy Scale for Hypertensive Patients (C-MLSHP), Self-Rated Abilities for Health Practices Scale (SRAHPS), and the Multidimensional Scale of Perceived Social Support (MSPSS). Details are as follows:

Mental status exam

A Chinese version of the Mini-Mental State Examination was used to screen for cognitive impairment. The Mini-Mental State Examination (MMSE) is the most commonly used methods in cognitive impairment detection in both clinical and research fields(Hawkins et al., 2014). The MMSE is a 30-point questionnaire used extensively in clinical and research settings to measure cognitive impairment, including simple tasks in a number of areas: the test of time and place, the repeating lists of words, arithmetic such as serial subtractions of seven, language use and comprehension, and basic motor skills(Folstein et al., 1975). MMSE has good sensitivity and specificity for detecting dementia. Creavin et al. reported that in the community, a pooled sensitivity of 0.85 and specificity of 0.90 at a cut point of 24, and sensitivity of 0.87 and specificity of 0.82 at a cut point of 25(Creavin et al., 2016). Pooled estimates of 15 studies showed a sensitivity of 0.89 and specificity of 0.89 at a cut point of 23 or less or 24 or less(Patnode et al., 2020).

Demographic Information

Demographic questionnaire was developed by the researcher in order to obtain information on socio-demographic variables such as gender, age, level of education, annual income, marital status, occupational status, registered family residence, type of medical insurance, family history of hypertension, complications of hypertension (comorbid conditions), number of antihypertensive drugs prescribed, living conditions, and the number of persons in each patient household.

Medication Adherence

MMAS-8 in Chinese version was used to assess medication adherence. Originally, the MMAS-8 was developed by Morisky and their research team(Morisky et al., 2008). The eight-item medication adherence scale yielded good reliability and validity for assessing medication adherence in patients with hypertension, with a Cronbach's alpha coefficient of 0.83(Morisky et al., 2008). In this scale, the response format is "yes/no" for seven items with the dichotomous response options and a five-point Likert scale response option for the last 1 item. These items provide information about the barriers to medication adherence, such as forgetting to take medication, not taking medication when one feels worse, and having difficulties in complying with a treatment regimen. The scores for the eight items were then summed to create an overall adherence score ranging from 0 to 8, in which the higher scores indicating better adherence. The recommended cutoff point of 6 will be used, to indicate having medication adherence. An MMAS-8 with the scores < 6 indicated low adherence, scores ≥ 8 was considered high adherence. Whereas the scores between ≥ 6 and <8 indicated moderate medication adherence(Morisky et al., 2008). A Chinese version of the MMAS-8 (Yang et al., 2014) , namely "C-MMAS-8" will be used in this study. This scale was already validated in a group of Chinese myocardial infarction patients. It yielded acceptable values for both the reliability and validity (Cronbach's α was 0.77, and pretest and post-test correlation coefficient were 0.88). In the previous study conducted with Chinese older persons with hypertension, the Cronbach's α coefficient obtained was 0.71.

Medication Literacy

Medication literacy was administered to the older participants by using Chinese Medication Literacy Scale for Hypertensive Patients (C-MLSHP). This is a validated scale for examining the medication Literacy for patients with hypertension. This scale(Zhong et al., 2020) was developed by Zhong. There are four dimensions which included knowledge, attitude, skills, and behaviors, The scale contained 37 items. The knowledge dimension covered 9 items, the attitude dimension included 8 items, the skill dimension included 7 items, and the behavior dimension comprised 13 items. The Cronbach's α coefficient was 0.849 for the full scale and ranged from 0.744 to 0.783 for the dimensions. The scores for the 37 items will be summed to

create an overall medication literacy score ranging from 0 to 37, with higher scores indicating a higher level of medication literacy.

Medication Self-Efficacy

Medication Adherence Self-Efficacy Scale-Revision MASES-R was used to examine medication this particularly, self-efficacy among older persons with hypertension in this study. It is a self-administered scale with a single domain including 13 items. It was originally adapted for using with hypertensive African Americans (Fernandez et al., 2008). It aims to measure medication adherence self-efficacy for hypertensive patients. All the items in this scale cover the perceived confidence toward medication adherence in the circumstances in which patients with hypertension may encounter during the process of their everyday medication administration. Each item has a 4-point Likert response format (0 = not sure at all, 1 = a little sure, 3 = pretty sure, 4 = fully sure). The total score for this scale is calculated as the average score of all the items, ranging from 1 to 4. A higher score indicates higher medication adherence self-efficacy. (Shen et al., 2020)were authorized by the owner of this scale to translate the MASES-R into Chinese version and test its reliability and validity in 445 Chinese hypertensive patients, the results yielded acceptable reliability and validity.

Social support

The Multidimensional Scale of Perceived Social Support (MSPSS) developed by Zimet (Zimet et al., 1988),Presently, there is in a Chinese version (Huang et al., 1996), will be used for examining social support in this study. The MSPSS consists of 12 questions to assess some aspects of perceived social support, including support from family, friends and significant others. The study participants will be asked to rate each item on a 7-point Likert type scale ranging from 1 (very strongly disagree) to 7 (very strongly agree). The total score ranged from 12 to 84, with higher scores indicating more social support. The Chinese version of MSPSS (Huang et al., 1996) yielded an acceptable reliability Cronbach alpha of .94.

Quality of instruments

The instruments used in this study were the Chinese version. They are tested and validated by the experts in some previous studies, which means all instruments

have good validity. The Cronbach's alpha can be found in previous studies to show that the reliability of all instruments applied in this study is acceptable. The reliability of the instrument was used Cronbach's alpha coefficients to determine the reliability of each questionnaire with additional 30 older adults with uncontrolled hypertension (not selected from the existing sample), who had the same characteristics as the sample of the study. Cronbach's α coefficients of Medication self-efficacy, Medication literacy, Social support and Medication adherence obtained from this study were .742, .821, .772 and .762respectively.

Protection of human rights for subjects

The study proposal was submitted to Burapha University Ethics Committee on Human Research (BUU EC) and Institution Review Board (IRB) of BUU and the Ethics Committee of the Second Affiliated Hospital of Wenzhou Medical University for obtaining ethical approval, the IRB approval code number from BUU and WMU were G-HS050/2565 and 2022-K-123-01. Participants were explained about the purpose, procedures, and benefits of the study. Informed consent was reviewed and signed by each participant before data collection. Participants were guaranteed their right to refuse to participate or withdraw without penalty at any time. We had guaranteed the anonymity and confidentiality of participants and had not disclosed personal information to anyone else. All data had been stored in secure locations and had been used only for research purposes. The data will be destroyed one year after the study is published.

Data collection procedures

The data collection procedures in this study were conducted by the researcher as follows:

1. Data collection has been conducted after the ethical approvals were obtained from the Institutional Review Board of Burapha University, Thailand and the Ethics Committee of the Second Affiliated Hospital of Wenzhou Medical.

2. A permission letter issued by the Dean of Graduate Affairs at Burapha University has been presented to the Director of the Second Affiliated Hospital of

Wenzhou Medical University in order to obtain authorization for data collection.

3. Research study details had been informed to the chief of the Cardiovascular Department, physicians, and nurses at the out-patient clinic.".

4. A simple random sampling method had been used to select the participants. The process of data collection was performed by the researcher on weekday mornings, when older adults with hypertension came for follow-up treatment at the cardiology clinic.

5.The researcher explained participants about research purposes, method of collecting data, human protection, and ask for participation. Then participants had been requested to sign in consent form according to their willingness to participate in this study.

6. Data had been collected by using self-reported questionnaires. The researcher had provided instructions on how to respond to the questionnaires and then allowed the participants to fill out the questionnaires in the room that had been provided. It had taken about 30-40 minutes for participants to answer all the questionnaires.

7. Coding was finally added to each questionnaire, and then all data were entered into the statistical program for data analysis.

Data analysis

All data had been analyzed using the IBM SPSS version 23.0 for mac system. The significant level is set at less than 0.05. Plan for data analyses are as follows:

1. For demographic data, these had been analyzed by using frequency, percent, range, mean, and standard deviation.

2. For all variable description, these had been analyzed by range, mean, and standard deviation.

3. For testing the influence of selected predictors on medication adherence, a standard multiple linear regression analysis was conducted. Before performing the regression, five assumptions were checked: 1) Linear relationship, 2) No multicollinearity, 3) Independence, 4) Homoscedasticity, and 5) Multivariate normality. All assumptions were met.

CHAPTER 4
RESULTS

This study aimed to investigate medication adherence and its influencing factors in the older adults with uncontrolled hypertension. These factors include three elements: medication self-efficacy, medication literacy, and social support. Data were collected from 137 Older adults diagnosed with hypertension in the cardiology department of the Second Affiliated Hospital of Wenzhou Medical University, in Wenzhou, China. The research results were presented in five parts as follows:

Part I: Demographic characteristics of adults with hypertension

Part II: Descriptive information of medication adherence

Part III: Factors related to medication adherence

Part IV: Correlation of the studied variables

Part V: Factors influencing medication adherence

Part I: Demographic characteristics of older adults with uncontrolled hypertension

Table 1 showed that the numbers of male and female participants in the study with male representing 54.7 % and female 45.3%. The mean age of participants was 71.5(SD=7.65) The majority of the participants were in the age group of 60-70 and consisted of 50.4 %. Most of the participants had attended junior middle school and consisted of 65.7 %. Majority of the participants in the study were retired and consisted of 56.2%. 73.7 % of the participants were married. Majority of the participants earn RMB 30000-49999 per year and consisted of 43.8 % of the total participants. 58.4% participants lived in urban while 41.6% lived in countryside. Most patients have 2 to 4 co-lived person and consisted of 67.9%.The description of medical information which includes complication of hypertension numbers of hypertensive drugs, duration of hypertension, and family history of hypertension of the participants are showed that 73.7% of the participants had complication of hypertension. 52.6% patients had 1 hypertensive drugs, while 39.4% patients had 2-3 hypertensive drugs, and only 8% have 4 or more hypertensive drugs. Majority of

participants with 73.7% had family history of hypertension. The duration of hypertension <3 years was 7.3%, within 3-4years was 21.9%, within 5-9years was 35%, ≥10years was 35.8%.

Table 1 Characteristics of participants (n=137)

Variables	**Number (n)**	**Percentage (%)**
Age		
60-70	69	50.4
71-80	51	37.2
> 81	17	12.4
Mean=71.05; SD= 7.65		
Gender		
Male	75	54.7
Female	62	45.3
Occupational status		
Employed	38	27.7
Retired	77	56.2
Unemployed	22	16.1
Educational level		
Primary school and below	31	22.6
Junior middle school	90	65.7
High school	7	5.1
Junior College	7	5.1
College degree and above	2	1.5
Annual Household income Chinese RMB (¥)		
< 10000/year	18	13.1
10000-29999/year	22	16.1

Table 1 (Continued)

Variables	Number (n)	Percentage (%)
30000-49999/year	60	43.8
50000-99999/year	27	19.7
≥100000/year	10	7.3
Marital status		
Married	101	73.7
Divorced or widowed	36	26.3
Registered residence		
Urban	80	58.4
Countryside	57	41.6
Hypertension complication		
Yes	101	73.3
No	36	26.3
Number of co-lived person		
One or none	7	5.1
2-4	93	67.9
5-7	35	25.5
8 or more	2	1.5
Duration of hypertension		
< 3years	10	7.3
3-4years	30	21.9
5-9years	48	35
≥10years	49	35.8
Family history of hypertension		
yes	103	75.2
no	34	24.8

Table 1 (Continued)

Variables	Number (n)	Percentage (%)
Number of prescribed antihypertensive drugs		
one	72	52.6
2-3	54	39.4
4 or more	11	8

Part II: Descriptive information of medication adherence

The scores for the eight items were then summed to create an overall adherence score ranging from 0 to 8, in which the higher scores indicating better adherence. The recommended cutoff point of 6 will be used, to indicate having medication adherence. The scores < 6 indicated low adherence, scores ≥ 8 was considered high adherence. Whereas the scores between ≥ 6 and <8 indicated moderate medication adherence, In this study population, 67.2% of the patients exhibited a moderate level of low adherence. As shown in Table 2. The mean score for medication adherence in this study was 5.59 (SD= .981) which can be classified in the low level of medication adherence.

Table 2 Description of Medication Adherence (n=137)

Medication Adherence	Mean (SD)	Score range	Number (n)	Percentage (%)
Total	5.59(.98),		137	
Low adherence		< 6	92	67.2
Moderate adherence		6-7	44	32.1
High adherence		≥8	1	0.7

Part III: Factors related to medication adherence

This study investigated four factors associated with medication adherence, medication self-efficacy, medication literacy, and social support. The findings indicated that the mean score for medication literacy was 27.07 (SD=3.03), While the mean score for Self-Efficacy was 2.53 (SD=.67). Additionally, social support received a mean score of 53.56 (SD=9.35) As shown in Table 3.

Table 3 Mean and Standard Deviation (SD) of the factors related to Medication Adherence (n=137)

Variables	Possible range	Actual range	Mean	S.D.
Medication Literacy	0-37	20.00-35.00	27.07	3.03
Medication Self-Efficacy	1-4	1-3.76	2.53	.67
Social support	12-84	20-75	53.56	9.35

Part IV: Correlation of the studied variables

The Pearson correlation test was employed to investigate the associations among medication self-efficacy, medication literacy, social support and medication adherence.

From the correlation matrix results, medication self-efficacy, medication literacy, and social support had significant positive correlations with medication adherence (r=. 520, p<. 01; r=. 399, p<. 01; r=. 217, p<. 01) as shown in Table 4. All correlation coefficients examined in this study did not exceed 0.08, indicating no multicollinearity.

Table 4 Correlation between predictors and Medication Adherence (n=137)

Variables	1	2	3	4
1. Medication Adherence	1			
2. Medication Literacy	.399**	1		
3. Medication Self-efficacy	.520**	.355**	1	
4. Social support	.217*	.414**	.239**	1

**p < .01 *p < .05

Part V: Factors influencing medication adherence

Prior to analysis, the assumptions of the multiple regression tests were tested. Medication Adherence were the dependent variable, and medication self-efficacy, medication literacy, and social support were the four independent variables. Variance inflation factor (VIF) was used to test the collinearity between independent variables. The VIF value ranged from 1.157 to 1.371 in this study indicating that the data met the assumptions of multiple linear analysis. A VIF value below 5 indicates a well-constructed model with linear independent variables and log odds. The normal distribution of data was demonstrated through regression residuals, Q-Q plots, and scatter plots. All variables were found to have a correlation coefficient smaller than 5, with no evidence of severe multicollinearity or outliers. Additionally, the homoscedasticity test yielded significant results ($p < .001$). The coefficient of correlation (R) is a crucial indicator for assessing the linearity between variables and also reflects the degree of regression fitting. Typically, R values range from 0 to 1, with larger values indicating stronger linear relationships. In this study, the correlation coefficient R was found to be .569, indicating a significant positive relationship between medium and higher levels of the variables under investigation. Additionally, R2 represents the proportion of variance in the dependent variable that can be explained by changes in the independent variable.

Multiple regression analysis revealed that medication self-efficacy, medication literacy, and social support significantly explained 30.8% of the variance in medication adherence ($F (3,133) =21.185$, $p<. 001$). The best predictor found in

this study was medication self-efficacy (β= .431, p<. 001), followed by medication literacy (β=. 240, p<. 05). Contrary to expectations social support (β=. 015, p＞0.05) did not have significant effect on medication adherence. The analysis results are shown in Table 5.

Table 5 The influence of factors predicting

Predicting factors	**B**	**SE**	**β**	**t**	**p-value**
Medication Literacy	.078	.026	.240	2.928	.004
Medication Self-Efficacy	.628	.112	.431	5.623	< .001
Social support	.002	.008	.015	.192	.848
Constant=1.740,p < .05,R=.569[a],R^2=.323, ^{2}adjust=.308,F(3,133)=21.185,p < .001					

CHAPTER 5
CONCLUSION AND DISCUSSION

This chapter presents a summary of the research, discussion, study limitations, implications of the findings as well as recommendations for further research.

Summary of the study

The objective of this cross-sectional study is to assess medication adherence among older adults with uncontrolled hypertension and examine the influence of medication self-efficacy, medication literacy, and social support on adherence in this population. This study focuses on a sample of 137 elderly patients with uncontrolled hypertension who came for follow-up visit at the outpatient of cardiology department of the Second Affiliated Hospital of Wenzhou Medical University from September 1, 2022 to December 30, 2022. The findings indicated that the numbers of male and female participants in the study with male representing 54.7 % and female 45.3%. Majority of the participants were in the age group of 60-70 and consisted of 50.4 %. Most of the participants had attended junior middle school and consisted of 65.7 %. Majority of the participants in the study were retired and consisted of 56.2%. 73.7 % of the participants were married. Majority of the participants earn RMB 30000-49999 per year and consisted of 43.8 % of the total participants. 58.4% participants lived in urban while 41.6% lived in countryside. Most patients have 2 to 4 co-lived person and consisted of 67.9%.The description of medical information which includes complication of hypertension, numbers of hypertensive drugs, duration of hypertension, and family history of hypertension of the participants are showed that 73.7% of the participants had complication of hypertension. 52.6% patients had 1 hypertensive drugs, while 39.4% patients had 2-3 hypertensive drugs, and only 8% have 4 or more hypertensive drugs. Majority of participants with 73.7% had family history of hypertension. The duration of hypertension <3 years was 7.3%, within 3-4years was 21.9%, within 5-9years was 35%, ≥10years was 35.8%. The duration of hypertension in most patients is greater than 5 years. In this study population, 67.2% of the patients exhibited low adherence. This study investigated 3 selected factors

associated with medication adherence namely medication self-efficacy, medication literacy, and social support. Multiple regression analysis showed that medication self-efficacy, medication literacy, and social support significantly explained 30.8% of the variance in medication adherence ($F(3,133) = 21.185$, $p < .001$). The best predictor is medication self-efficacy ($\beta = .431$, $p < .001$), followed by medication literacy ($\beta = .240$, $p < .005$), it can significantly positively affect patients' medication adherence, contrary to expectations social support ($\beta = .015$, $p > 0.05$) is not a significant predictor of medication adherence.

Discussion

In accordance with study objectives, the discussion covers details of medication adherence in older patients with uncontrolled hypertension and factors predicting medication adherence.

Medication adherence in older patients with uncontrolled hypertension

The first objective of this study was to describe medication adherence among older adults with uncontrolled hypertension. The average level of medication adherence in this study was 5.59 (SD = 0.981), indicating a low level of adherence, consistent with findings from Abegaz et al. (2017). Most participants had attended junior middle school, accounting for 65.7% of the sample. Among these, elderly hypertensive patients with lower education levels demonstrated a poorer understanding and acceptance of the importance of medication adherence, which aligns with findings from Uchmanowicz et al. (2018). In this study, 52.6% of patients were taking one antihypertensive drug, 39.4% were on more than two, and 70.2% had a history of hypertension lasting over five years. Managing multiple antihypertensive medications and adhering to the prescribed regimen is particularly challenging for elderly patients. Ensuring good medication adherence is crucial for the safe and effective use of these drugs (Cross et al., 2020).

Several factors may explain the low medication adherence observed in these patients with uncontrolled hypertension. One factor is the side effects of antihypertensive medications, which can discourage consistent use (Tedla & Bautista, 2016). Burnier and Michel (2020) also highlight the impact of side effects from commonly used antihypertensive drugs in elderly patients with multiple

comorbidities. Another contributing factor is the lack of symptoms in hypertension, which may reduce the perceived urgency to take medications, ultimately leading to non-adherence (Hamrahian, 2020). Additionally, some elderly individuals may distrust pharmaceutical treatments and prefer alternative remedies, which can result in inconsistent medication use and low adherence (Schnabel, K., 2014).

Factors predicting medication adherence

The second objective of this study is to examine the predictive factors of medication adherence. The standard multiple linear regression method was employed, with all factors entered simultaneously. Medication self-efficacy, medication literacy, and social support significantly explained 30.8% of the variance in medication adherence ($F(3,133) = 21.185$, $p < .001$). The best predictor is medication self-efficacy ($\beta = .431$, $p < .001$), followed by medication literacy ($\beta = .240$, $p < .005$), whereas social support ($\beta = .015$, $p > 0.05$) is not a significant predictor of medication adherence.

Medication self-efficacy was the best predictor for medication adherence among uncontrolled hypertension. Medication self-efficacy refers to an individual's belief in their ability to successfully manage and adhere to their prescribed medication regimen. This belief can positively influence medication adherence through several mechanisms: 1) Increased confidence: When older patients feel confident in their abilities to manage their medication, they are more likely to follow their treatment plan regularly and correctly. There was positive a relationship between self-efficacy and medication adherence, especially in older populations(Martos-Méndez & Issues, 2015). 2) Better Self-management: High medication self-efficacy encourages individuals to actively engage in their health care by setting reminders, organizing medications, and seeking advice when needed, which promotes consistent adherence(Ruppar et al., 2008), 3) Motivation and commitment: older patients with higher self-efficacy are more likely to be motivated to maintain their medication regimen, even in the face of challenges such as side effects or complex schedules. Medication self-efficacy in older adults plays a key role in their ability to stay motivated and adhere to their medication regimens, even when faced with challenges such as side effects or complex medication schedules(Horne et al., 2013). 4) Problem-solving skills: Older individuals with strong medication self-efficacy are more adept

at addressing barriers to adherence, such as difficulty with taking medications on time or dealing with adverse effects, leading to sustained adherence. According to the study conducted by Yu Wang and Pan (2024), medication self-efficacy in older adults contributes to enhanced problem-solving skills, helping them manage barriers such as complex medication schedules, forgetfulness, and side effects, there by supporting sustained adherence and 5) improved Health Beliefs: A strong sense of self-efficacy in medication management can lead to a better understanding of the importance of adherence and how it affects long-term health, motivating patients to remain consistent with their treatment. In the study of Remm, et al. (2023), self-efficacy in medication management helps individuals, particularly older adults, recognize the importance of adhering to treatment regimens and the long-term health benefits, thereby motivating sustained adherence to prescribed therapies.

Medication literacy is the second best predictor of medication adherence found in this study. Possible mechanisms that explain how medication literacy affects adherence are as followed: 1) Improved understanding of medication instructions: Medication literacy ensures that individuals understand medication labels, dosages, and instructions, which enhances their abilities to follow the prescribed regimen correctly. Better comprehension helps prevent mistakes and encourages more consistent adherence. According to Shi, Shen, et al. (2019), medication literacy enhances patients' understanding of their medications, fosters greater confidence, improves problem-solving abilities, and strengthens communication with healthcare providers, ultimately leading to improved medication adherence. 2) Increased confidence in medication management: With greater medication literacy, patients feel more empowered and confident in managing their medications, making it more likely that they will stick to their prescribed regimen. This may include understanding how and when to take medications, how to manage side effects, or the importance of staying on schedule. Greater medication literacy helps patients feel more confident and empowered in managing their medications, which improves their ability to follow prescribed regimens, manage side effects, and adhere to medication schedules(Zhang et al., 2014). 3) Ability to recognize and address side Effects, with higher medication literacy, it helps individuals recognize side effects early, seek appropriate guidance from healthcare providers, and make adjustments if needed. Understanding how to

manage side effects reduces barriers to adherence. According to the study of Taufek (2025), medication literacy enables individuals to better recognize side effects, seek appropriate advice from healthcare providers, and make necessary adjustments to their regimen, ultimately reducing barriers to adherence and promoting better health outcomes. To summarize, medication literacy improves patients' understanding of medication usage, fosters confidence, enhances problem-solving skills, and strengthens communication with healthcare providers, all of which promote better medication adherence.

This study focus on the effect of perceived social support on medication adherence. Generally, this study demonstrated that patients' perceived social support did not had a positive impact on medication adherence. This may be due to the fact that the particular social support that exactly had impact on medication adherence could not be identified through the general measurement tool used.Furthermore,while social support is generally beneficial, its effectiveness in promoting adherence may depend more on the quality rather than the quantity of support individuals receive. For example, if the support lacks relevant knowledge (such as understanding the importance of a medication regimen), it may not lead to better adherence. Additionally, the type of social support may matter—emotional or informational support could be more effective than instrumental support (e.g., help with remembering to take medications). Emotional support alone may not directly influence adherence behaviors.

The patient's perception of support is also crucial. If patients do not feel that their family, friends, or caregivers are actively involved in or concerned about their health, it may not motivate them to adhere to the regimen, regardless of the support offered. As Scheurer et al. (2012) noted, patients may not adhere to their medication if they do not perceive their social network as actively engaged with their regimen.

Furthermore, personal beliefs or attitudes play a role in adherence. For example, a patient who is resistant to taking medications or doubts their necessity may not follow the regimen, even with strong social support. According to Krousel-Wood, Holt, & Muntner (2011), patients' attitudes and beliefs about the necessity of medication can significantly impact their adherence.

There are also other barriers to adherence, such as medication complexity,

side effects, or financial constraints, which may not be addressed by social support alone. DiMatteo, Haskard, and Williams (2007) emphasize that factors like these can present significant challenges, making social support insufficient on its own. These reasons suggest that social support, while valuable, should be paired with other interventions to effectively promote adherence.

Limitations in this study

This study had some certain limitations. One is the use of a cross-sectional design, so data collected from longitudinal study is better suited to fully describe medication adherence and its predictive factors. Another limitation is the settings for data collection. The study was conducted at only one hospital namely the Second Affiliated Hospital of Wenzhou Medical University in Wenzhou, China, it may limit the generalization of the findings.

Implication of the findings

The findings obtained from this study can be applied for clinical practice, and nursing education as follows:

1. For clinical practice

The results of this study provide nurses with a deeper understanding of medication adherence among older adults with uncontrolled hypertension. The low levels of medication adherence in this population highlight the need for nurses to implement strategies that improve adherence. It is essential for nurses to consider significant predictors, such as medication self-efficacy and medication literacy, when developing these strategies.

2. For nursing education

The findings of this study identified key predictors of medication adherence among older adults with uncontrolled hypertension. As a result, educating nursing students about these predictors and effective strategies to enhance them would be highly beneficial.

Recommendation for future research

Based on the findings of low medication adherence among older adults with uncontrolled hypertension, the following recommendations for future studies could be

made:

1. Examine the Impact of Tailored Interventions: Future research should investigate the effectiveness of personalized interventions aimed at addressing specific barriers to medication adherence in older adults, particularly those with uncontrolled hypertension. These barriers may include cognitive decline, side effects, and complex medication regimens. Given that medication adherence in this study is influenced by medication self-efficacy and medication literacy, testing interventions that boost confidence, skills, and motivation for consistent adherence to prescribed medications could improve health outcomes. Additionally, promoting medication literacy to enhance patients' understanding of medication usage, improve problem-solving skills, and strengthen communication with healthcare providers could lead to higher rates of medication adherence.

2. Investigate the Role of Technology: Future studies could explore how technology, such as medication management apps, reminder systems, or telemedicine, influences medication adherence, particularly in older adults with uncontrolled hypertension. Research should investigate the potential of digital tools to enhance adherence by providing timely reminders, facilitating communication with healthcare providers, and offering personalized support, all of which could help improve medication adherence rates in this population.

3. Longitudinal studies on adherence patterns: Conducting longitudinal studies would allow researchers to track changes in medication adherence over time in older adults, identifying critical periods when adherence drops and testing strategies to maintain long-term commitment to medication regimens are recommended.

4. Examine socioeconomic barriers: Future studies should investigate the impact of socioeconomic factors, such as income, access to healthcare, and medication affordability, on medication adherence in older adults with uncontrolled hypertension. This could guide policy recommendations to alleviate such barriers. By exploring these areas, future studies can provide valuable insights into how to improve medication adherence and, ultimately, the health outcomes of older adults with uncontrolled hypertension.

REFERENCES

Adeniyi, A., Idowu, O., Ogwumike, O., & Adeniyi, C. (2012). Comparative influence of self-efficacy, social support and perceived barriers on low physical activity development in patients with type 2 diabetes, hypertension or stroke. *Ethiopian journal of health sciences*, *22*(2), 113-119.

Al-Noumani, H., Wu, J. R., Barksdale, D., Knafl, G., AlKhasawneh, E., & Sherwood, G. (2018). Health Beliefs and Medication Adherence in Omanis With Hypertension. *J Cardiovasc Nurs*, *33*(6), 518-526. https://doi.org/10.1097/jcn.0000000000000511

Al-Ramahi, R. (2015). Adherence to medications and associated factors: A cross-sectional study among Palestinian hypertensive patients. *Journal of Epidemiology and Global Health*, *5*(2), 125-132. https://doi.org/https://doi.org/10.1016/j.jegh.2014.05.005

Alhalaiqa, F., Deane, K. H., & Gray, R. (2013). Hypertensive patients' experience with adherence therapy for enhancing medication compliance: a qualitative exploration. *J Clin Nurs*, *22*(13-14), 2039-2052. https://doi.org/10.1111/j.1365-2702.2012.04321.x

Bandura, A., Freeman, W. H., & Lightsey, R. J. J. o. C. P. (1999). Self-Efficacy: The Exercise of Control. *Journal of Cognitive Psychotherapy*, *13*, 158 - 166.

Beilin, L. J., & Puddey, I. B. (2006). Alcohol and hypertension: an update. *Hypertension*, *47*(6), 1035-1038. https://doi.org/10.1161/01.HYP.0000218586.21932.3c

Benetos, A., Petrovic, M., & Strandberg, T. (2019). Hypertension Management in Older and Frail Older Patients. *Circ Res*, *124*(7), 1045-1060. https://doi.org/10.1161/CIRCRESAHA.118.313236

Bennadi, D. (2013). Self-medication: A current challenge. *Journal of basic and clinical pharmacy*, *5*(1), 19-23. https://doi.org/10.4103/0976-0105.128253

Burnier, M., & Egan, B. M. (2019). Adherence in Hypertension. *Circ Res*, *124*(7), 1124-1140. https://doi.org/10.1161/CIRCRESAHA.118.313220

Chen, C.-H., Wu, J.-R., Yen, M., & Chen, Z.-C. (2007). A model of medication-taking behavior in elderly individuals with chronic disease. *Journal of Cardiovascular Nursing*, *22*(5), 359-365.

Cordina, M., Hämeen-Anttila, K., Lauri, J., Tabone, S., & Enlund, H. (2018). Health and medication literacy and the desire to participate in pharmacotherapy decision making–comparison of two countries. *J Research in Social Administrative Pharmacy*, *14*(9), 817-823.

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. https://doi.org/10.1111/j.1524-4733.2007.00213.x

Creavin, S. T., Wisniewski, S., Noel-Storr, A. H., Trevelyan, C. M., Hampton, T., Rayment, D., . . . Cullum, S. (2016). Mini-Mental State Examination (MMSE) for the detection of dementia in clinically unevaluated people aged 65 and over in community and primary care populations. *Cochrane Database Syst Rev*, *2016*(1), Cd011145. https://doi.org/10.1002/14651858.CD011145.pub2

Daniali, S. S., Darani, F. M., Eslami, A. A., & Mazaheri, M. (2017). Relationship

between Self-efficacy and Physical Activity, Medication Adherence in Chronic Disease Patients. *Adv Biomed Res*, *6*, 63. https://doi.org/10.4103/2277-9175.190997

De Geest, S., & Sabaté, E. (2003). Adherence to long-term therapies: evidence for action. *Eur J Cardiovasc Nurs*, *2*(4), 323. https://doi.org/10.1016/s1474-5151(03)00091-4

Delamater, A. M. J. C. d. (2006). Improving patient adherence. *Clin Diabetes*, *24*(2), 71-77.

Dolor, R. J., Yancy, W. S., Jr., Owen, W. F., Matchar, D. B., Samsa, G. P., Pollak, K. I., . . . Svetkey, L. P. (2009). Hypertension Improvement Project (HIP): study protocol and implementation challenges. *Trials*, *10*, 13. https://doi.org/10.1186/1745-6215-10-13

Fernandez, S., Chaplin, W., Schoenthaler, A. M., & Ogedegbe, G. (2008). Revision and validation of the medication adherence self-efficacy scale (MASES) in hypertensive African Americans. *J Behav Med*, *31*(6), 453-462. https://doi.org/10.1007/s10865-008-9170-7

Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res*, *12*(3), 189-198. https://doi.org/10.1016/0022-3956(75)90026-6

Foster, B., Brody, A., Dawood, K., Foley, D., Dawood, R., Reed, B., & Levy, P. (2018). 105 Identifying Barriers to Controlling Blood Pressure Using the Adherence to Refills and Medications Scale in Emergency Departments. *J Annals of Emergency Medicine*, *72*(4), S45.

Gu, L., Wu, S., Zhao, S., Zhou, H., Zhang, S., Gao, M., . . . Tian, D. (2017). Association of Social Support and Medication Adherence in Chinese Patients with Type 2 Diabetes Mellitus. *International journal of environmental research and public health*, *14*(12), 1522. https://doi.org/10.3390/ijerph14121522

Hawkins, M. A., Gathright, E. C., Gunstad, J., Dolansky, M. A., Redle, J. D., Josephson, R., . . . Hughes, J. W. (2014). The MoCA and MMSE as screeners for cognitive impairment in a heart failure population: a study with comprehensive neuropsychological testing. *Heart Lung*, *43*(5), 462-468. https://doi.org/10.1016/j.hrtlng.2014.05.011

Horne, R., Chapman, S. C., Parham, R., Freemantle, N., Forbes, A., & Cooper, V. J. P. o. (2013). Understanding patients' adherence-related beliefs about medicines prescribed for long-term conditions: a meta-analytic review of the Necessity-Concerns Framework. *8*(12), e80633.

Huang, L., Jiang, Q., & Ren, W. (1996). Coping style, social support, and psychosomatic symptoms in patients with cancer. *J Chinese Mental Health Journal*, *10*(4), 160-166.

Huang, Y. M., Shiyanbola, O. O., & Smith, P. D. (2018). Association of health literacy and medication self-efficacy with medication adherence and diabetes control. *Patient Prefer Adherence*, *12*, 793-802. https://doi.org/10.2147/ppa.S153312

Irazola, V. E., Gutierrez, L., Bloomfield, G., Carrillo-Larco, R. M., Dorairaj, P., Gaziano, T., . . . Rubinstein, A. (2016). Hypertension Prevalence, Awareness, Treatment, and Control in Selected LMIC Communities: Results From the NHLBI/UHG Network of Centers of Excellence for Chronic Diseases. *Glob Heart*, *11*(1), 47-59. https://doi.org/10.1016/j.gheart.2015.12.008

Jafar, T. H., Gandhi, M., Jehan, I., Naheed, A., de Silva, H. A., Shahab, H., . . . Wee Lim, C. (2018). Determinants of Uncontrolled Hypertension in Rural Communities in South Asia-Bangladesh, Pakistan, and Sri Lanka. *Am J Hypertens*, *31*(11), 1205-1214. https://doi.org/10.1093/ajh/hpy071

Joint Committee for Guideline, R. (2019). 2018 Chinese Guidelines for Prevention and Treatment of Hypertension-A report of the Revision Committee of Chinese Guidelines for Prevention and Treatment of Hypertension. *J Geriatr Cardiol*, *16*(3), 182-241. https://doi.org/10.11909/j.issn.1671-5411.2019.03.014

Kardas, P., Lewek, P., & Matyjaszczyk, M. (2013). Determinants of patient adherence: a review of systematic reviews. *J Frontiers in pharmacology*, *4*, 91.

Kokubo, Y., & Iwashima, Y. (2015). Higher blood pressure as a risk factor for diseases other than stroke and ischemic heart disease. *Hypertension*, *66*(2), 254-259. https://doi.org/10.1161/HYPERTENSIONAHA.115.03480

Kretchy, I. A., Owusu-Daaku, F. T., & Danquah, S. A. (2014). Mental health in hypertension: assessing symptoms of anxiety, depression and stress on anti-hypertensive medication adherence. *Int J Ment Health Syst*, *8*(1), 25. https://doi.org/10.1186/1752-4458-8-25

Lee, C. H., Chang, F. C., Hsu, S. D., Chi, H. Y., Huang, L. J., & Yeh, M. K. (2017). Inappropriate self-medication among adolescents and its association with lower medication literacy and substance use. *PLoS One*, *12*(12), e0189199. https://doi.org/10.1371/journal.pone.0189199

Lee, E. K. P., Poon, P., Yip, B. H. K., Bo, Y., Zhu, M. T., Yu, C. P., . . . Wong, S. Y. S. (2022). Global Burden, Regional Differences, Trends, and Health Consequences of Medication Nonadherence for Hypertension During 2010 to 2020: A Meta-Analysis Involving 27 Million Patients. *J Am Heart Assoc*, *11*(17), e026582. https://doi.org/10.1161/jaha.122.026582

Leszczak, J., Czenczek-Lewandowska, E., Asif, M., Baran, J., Mazur, A., & Wyszyńska, J. (2024). Risk factors and prevalence of hypertension in older adults from south-eastern Poland: an observational study. *Sci Rep*, *14*(1), 1450. https://doi.org/10.1038/s41598-024-52009-3

Liu, J. (2020). Highlights of the 2018 Chinese hypertension guidelines. *Clin Hypertens*, *26*, 8. https://doi.org/10.1186/s40885-020-00141-3

Liu, J., Ma, J., Wang, J., Zeng, D. D., Song, H., Wang, L., & Cao, Z. (2016). Comorbidity Analysis According to Sex and Age in Hypertension Patients in China. *Int J Med Sci*, *13*(2), 99-107. https://doi.org/10.7150/ijms.13456

Ma, L. Y., Chen, W. W., Gao, R. L., Liu, L. S., Zhu, M. L., Wang, Y. J., . . . Hu, S. S. (2020). China cardiovascular diseases report 2018: an updated summary. *J Geriatr Cardiol*, *17*(1), 1-8. https://doi.org/10.11909/j.issn.1671-5411.2020.01.001

Manosroi, W., & Williams, G. H. (2019). Genetics of Human Primary Hypertension: Focus on Hormonal Mechanisms. *Endocrine Reviews*, *40*(3), 825-856. https://doi.org/10.1210/er.2018-00071

Martos-Méndez, M. J. J. J. o. B., Health, & Issues, S. (2015). Self-efficacy and adherence to treatment: the mediating effects of social support. *7*(2), 19-29.

McNaughton, C. D., Jacobson, T. A., & Kripalani, S. (2014). Low literacy is associated with uncontrolled blood pressure in primary care patients with hypertension and heart disease. *Patient Educ Couns*, *96*(2), 165-170.

https://doi.org/10.1016/j.pec.2014.05.007
Mentz, R. J., Greiner, M. A., Muntner, P., Shimbo, D., Sims, M., Spruill, T. M., . . . O'Brien, E. C. (2018). Intentional and unintentional medication non-adherence in African Americans: Insights from the Jackson Heart Study. *Am Heart J*, *200*, 51-59. https://doi.org/10.1016/j.ahj.2018.03.007
Mills, K. T., Stefanescu, A., & He, J. (2020). The global epidemiology of hypertension. *Nat Rev Nephrol*, *16*(4), 223-237. https://doi.org/10.1038/s41581-019-0244-2
Mittal, B. V., & Singh, A. K. (2010). Hypertension in the developing world: challenges and opportunities. *Am J Kidney Dis*, *55*(3), 590-598. https://doi.org/10.1053/j.ajkd.2009.06.044
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. https://doi.org/10.1111/j.1751-7176.2008.07572.x
Mukhtar, O., Weinman, J., & Jackson, S. H. (2014). Intentional non-adherence to medications by older adults. *Drugs Aging*, *31*(3), 149-157. https://doi.org/10.1007/s40266-014-0153-9
Neiva Pantuzza, L. L., Nascimento, E. d., Crepalde-Ribeiro, K., Botelho, S. F., Parreiras Martins, M. A., Camila de Souza Groia Veloso, R., . . . Moreira Reis, A. M. (2022). Medication literacy: A conceptual model. *Research in Social and Administrative Pharmacy*, *18*(4), 2675-2682. https://doi.org/https://doi.org/10.1016/j.sapharm.2021.06.003
Ofili, M. I., Ncama, B. P., & Sartorius, B. (2015). Hypertension in rural communities in Delta State, Nigeria: Prevalence, risk factors and barriers to health care. *Afr J Prim Health Care Fam Med*, *7*(1), 875. https://doi.org/10.4102/phcfm.v7i1.875
Oparil, S., Acelajado, M. C., Bakris, G. L., Berlowitz, D. R., Cífková, R., Dominiczak, A. F., . . . Whelton, P. K. (2018). Hypertension. *Nat Rev Dis Primers*, *4*, 18014. https://doi.org/10.1038/nrdp.2018.14
Page, M. R. (2014). The JNC 8 hypertension guidelines: an in-depth guide. *Am J Manag Care*, *20*(1 Spec No.), E8.
Patnode, C. D., Perdue, L. A., Rossom, R. C., Rushkin, M. C., Redmond, N., Thomas, R. G., & Lin, J. S. (2020). U.S. Preventive Services Task Force Evidence Syntheses, formerly Systematic Evidence Reviews. In *Screening for Cognitive Impairment in Older Adults: An Evidence Update for the U.S. Preventive Services Task Force*. Agency for Healthcare Research and Quality (US).
Peacock, E., & Krousel-Wood, M. (2017). Adherence to Antihypertensive Therapy. *The Medical clinics of North America*, *101*(1), 229-245. https://doi.org/10.1016/j.mcna.2016.08.005
Pouliot, A., Vaillancourt, R., Stacey, D., & Suter, P. (2018). Defining and identifying concepts of medication literacy: An international perspective. *Res Social Adm Pharm*, *14*(9), 797-804. https://doi.org/10.1016/j.sapharm.2017.11.005
Remm, S., Halcomb, E., Hatcher, D., Frost, S. A., & Peters, K. J. J. o. c. n. (2023). Understanding relationships between general self-efficacy and the healthy ageing of older people: An integrative review. *32*(9-10), 1587-1598.
Rujiwatthanakorn, D., Panpakdee, O., Malathum, P., & Tanomsup, S. J. P. R. I. J. o. N. R. (2011). Effectiveness of a self-management program for Thais with essential hypertension. *Pacific Rim International Journal of Nursing Research*, *15*(2), 97-110.

Ruppar, T. M., Conn, V. S., Russell, C. L. J. R., & practice, t. f. n. (2008). Medication adherence interventions for older adults: literature review. *22*(2), 114-147.

Schoenthaler, A., Ogedegbe, G., & Allegrante, J. P. (2009). Self-efficacy mediates the relationship between depressive symptoms and medication adherence among hypertensive African Americans. *Health Educ Behav*, *36*(1), 127-137. https://doi.org/10.1177/1090198107309459

Shen, Z., Shi, S., Ding, S., & Zhong, Z. (2020). Mediating Effect of Self-Efficacy on the Relationship Between Medication Literacy and Medication Adherence Among Patients With Hypertension. *Frontiers in Pharmacology*, *11*, 569092-569092. https://doi.org/10.3389/fphar.2020.569092

Shi, S., Shen, Z., Duan, Y., Ding, S., & Zhong, Z. (2019). Association Between Medication Literacy and Medication Adherence Among Patients With Hypertension. *Front Pharmacol*, *10*, 822. https://doi.org/10.3389/fphar.2019.00822

Taufek, N. H. M. (2025). Global initiatives for improving health and medication literacy. In *Health Literacy in Medicines Use and Pharmacy* (pp. 289-305). Elsevier.

Turan, G. B., Aksoy, M., & Çiftçi, B. (2019). Effect of social support on the treatment adherence of hypertension patients. *Journal of Vascular Nursing*, *37*(1), 46-51. https://doi.org/https://doi.org/10.1016/j.jvn.2018.10.005

Vrijens, B., De Geest, S., Hughes, D. A., Przemyslaw, K., Demonceau, J., Ruppar, T., . . . Urquhart, J. (2012). A new taxonomy for describing and defining adherence to medications. *Br J Clin Pharmacol*, *73*(5), 691-705. https://doi.org/10.1111/j.1365-2125.2012.04167.x

Wannasirikul, P., Termsirikulchai, L., Sujirarat, D., Benjakul, S., & Tanasugarn, C. (2016). HEALTH LITERACY, MEDICATION ADHERENCE, AND BLOOD PRESSURE LEVEL AMONG HYPERTENSIVE OLDER ADULTS TREATED AT PRIMARY HEALTH CARE CENTERS. *Southeast Asian J Trop Med Public Health*, *47*(1), 109-120.

Wei, J., Mi, Y., Li, Y., Xin, B., & Wang, Y. (2021). Factors associated with awareness, treatment and control of hypertension among 3579 hypertensive adults in China: data from the China Health and Nutrition Survey. *BMC Public Health*, *21*(1), 423. https://doi.org/10.1186/s12889-021-10417-4

Whelton, P. K., Carey, R. M., Aronow, W. S., Casey, D. E., Collins, K. J., Himmelfarb, C. D., . . . Wright, J. T. (2018). 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Hypertension*, *71*(6), e13-e115. https://doi.org/doi:10.1161/HYP.0000000000000065

Williams, P., Barclay, L., & Schmied, V. (2004). Defining social support in context: a necessary step in improving research, intervention, and practice. *Qual Health Res*, *14*(7), 942-960. https://doi.org/10.1177/1049732304266997

Yan, J., You, L. M., Yang, Q., Liu, B., Jin, S., Zhou, J., . . . Morisky, D. E. (2014). Translation and validation of a Chinese version of the 8-item Morisky medication adherence scale in myocardial infarction patients. *J Eval Clin Pract*,

20(4), 311-317. https://doi.org/10.1111/jep.12125

Yang, A., Wang, B., Zhu, G., Jiao, Z., Fang, Y., Tang, F., . . . Zhong, M. (2014). Validation of Chinese version of the Morisky Medication Adherence Scale in patients with epilepsy. *Seizure*, *23*(4), 295-299. https://doi.org/https://doi.org/10.1016/j.seizure.2014.01.003

Yang, S., He, C., Zhang, X., Sun, K., Wu, S., Sun, X., & Li, Y. (2016). Determinants of antihypertensive adherence among patients in Beijing: Application of the health belief model. *Patient Educ Couns*, *99*(11), 1894-1900. https://doi.org/10.1016/j.pec.2016.06.014

Yu, H. M., Wang, L., & Pan, C. Z. (2024). The impact of cognitive behavioural therapy-based psychological intervention on emotional improvement in elderly patients with extensive burns. *Int Wound J*, *21*(2), e14594. https://doi.org/10.1111/iwj.14594

Zhang, N. J., Terry, A., & McHorney, C. A. J. A. o. P. (2014). Impact of health literacy on medication adherence: a systematic review and meta-analysis. *48*(6), 741-751.

Zhong, Y., Wang, J., & Nicholas, S. (2020). Social support and depressive symptoms among family caregivers of older people with disabilities in four provinces of urban China: the mediating role of caregiver burden. *BMC Geriatr*, *20*(1), 3. https://doi.org/10.1186/s12877-019-1403-9

Zhong, Z., Zheng, F., Guo, Y., & Luo, A. (2016). Medication literacy in a cohort of Chinese patients discharged with acute coronary syndrome. *J International Journal of Environmental Research Public Health*, *13*(7), 720.

Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The Multidimensional Scale of Perceived Social Support. *Journal of Personality Assessment*, *52*(1), 30-41. https://doi.org/10.1207/s15327752jpa5201_2

APPENDIX

QUESTIONNAIRE

Part 1: The Demographic data questionnaire

Direction: Please read the questions in part 1 carefully and give an honest answer. Please choose the answer as follow by tick ☑ or write down your answers in the space provided.

1. Gender:

☐ Male ☐ Female

2. Occupational status:

☐ Employed ☐ Retired ☐ Unemployed

3. Educational level

☐ Primary and below

☐ Junior middle school

☐ High school

☐ Junior College

☐ College degree and above

4. Annual Household income Chinese RMB (¥)

☐ <10,000/year

☐ 10,000~29,999/year

☐ 30,000~49,999/year

☐ 50,000~99,999/year

☐ over than 100,000/year

5. Marital status

☐ Married ☐ Divorced or widowed

6. Registered residence

☐ Urban ☐ Countryside

7. Duration of hypertension

☐ <3years ☐ 3- years ☐ 5- years ☐ ≧10 years

8. Family history of hypertension

☐ Yes ☐ No

9. Hypertension complication

☐ Yes ☐ No

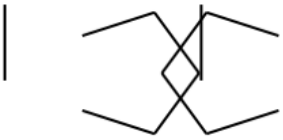
10. Number of prescribed antihypertensive drugs

☐ One ☐ 2-3 ☐ 4 or more

11. Number of co-lived person?

☐ One or none ☐ 2-4 ☐ 5-7 ☐ 8 or more

Part 2: Mini mental state examination(MMSE)

One point for each answer	DATE		
ORIENTATION Year Season Month Date Time	...../ 5	...../ 5	...../ 5
Country Town District Hospital Ward/Floor	...../ 5	...../ 5	...../ 5
REGISTRATION Examiner names three objects (e.g. apple, table, penny) and asks the patient to repeat (1 point for each correct. THEN the patient learns the 3 names repeating until correct).	...../ 3	...../ 3	...../ 3
ATTENTION AND CALCULATION Subtract 7 from 100, then repeat from result. Continue five times: 100, 93, 86, 79, 72, 65 (Alternative: spell "WORLD" backwards: DLROW).	...../ 5	...../ 5	...../ 5
RECALL Ask for the names of the three objects learned earlier.	...../ 3	...../ 3	...../ 3
LANGUAGE Name two objects (e.g. pen, watch).	...../ 2	...../ 2	...../ 2
Repeat "No ifs, ands, or buts".	...../ 1	...../ 1	...../ 1
Give a three-stage command. Score 1 for each stage. (e.g. "Place index finger of right hand on your nose and then on your left ear").	...../ 3	...../ 3	...../ 3
Ask the patient to read and obey a written command on a piece of paper. The written instruction is: "Close your eyes".	...../ 1	...../ 1	...../ 1
Ask the patient to write a sentence. Score 1 if it is sensible and has a subject and a verb.	...../ 1	...../ 1	...../ 1
COPYING: Ask the patient to copy a pair of intersecting pentagons 	...../ 1	...../ 1	...../ 1
TOTAL:	...../ 30	...../ 30	...../ 30

Part 3: The 8-item Morisky Medication Adherence Scale

Direction: This part is about your medication adherence to hypertensive drug. Please tick '√' in the item which best reflects what you actually do. Please answer every question.

1. Do you ever forget to take your anti-hypertensive drugs?
   ☐ Never ☐Once in a while ☐Sometimes ☐Usually ☐All the time
2. In the past month, did you ever forget to take your anti-hypertensive drugs?
   ☐ Never ☐Once in a while ☐Sometimes ☐Usually ☐All the time
3. Do you ever stop taking anti-hypertensive drugs when you feel worse?
   ☐ Never ☐Once in a while ☐Sometimes ☐Usually ☐All the time
4. When you leave home, do you sometimes forget to take your anti-hypertensive drugs along?
   ☐ Never ☐Once in a while ☐Sometimes ☐Usually ☐All the time
5. Did you take your anti-hypertensive drugs yesterday?
   ☐ Never ☐Once in a while ☐Sometimes ☐Usually ☐All the time
6. When you feel better, do you ever stop taking your anti-hypertensive drugs?
   ☐ Never ☐Once in a while ☐Sometimes ☐Usually ☐All the time
7. For some patients, taking medications every day is troublesome. Do you feel anti-hypertensive treatment is difficult?
   ☐ Never ☐Once in a while ☐Sometimes ☐Usually ☐All the time
8. Do you feel it is difficult to remember to take anti-hypertensive drugs?
   ☐ Never ☐Once in a while ☐Sometimes ☐Usually ☐All the time

Part 4: Chinese Medication Literacy Scale for Hypertensive Patient

1. **Knowledge**

Attached following is a list of statements about hypertension disease, treatment and antihypertensives. Please make a judgment about following statements whether they are correct or not according to your own knowledge, and mark in the corresponding box (true, false and don't know).

1.1 Knowledge about hypertension disease and treatment.

Items	Statements	True	False	Don't Know
K1	The diagnostic criterion of hypertension is that the BP value≥140/90mmHg in three successive measurements			
K2	Hypertension is the leading cause of stroke and coronary heart disease			
K3	Hypertension can be induced by weight gain and obesity			
K4	Hypertension treatment includes pharmacological therapy and non-pharmacological therapy			
K5	Long-term and lifetime antihypertensive therapy is needed for hypertension			

1.2 knowledge about antihypertensives

Items	Statements	Yes	No
K6	I know the name of antihypertensives that I have been taking (often take)		
K7	I know the administration method and dosage of antihypertensives that I have been taking (often take)		
K8	I know the side effects and adverse drug reactions of antihypertensives that I have been taking (often take)		
K9	I know the expire date of antihypertensives that I have been taking (often take)		

2. Attitude

Attached following is a list of statements about attitudes to taking antihypertensives, please read each one carefully and choose to tick in one of the boxes (totally disagree to totally agree) which best describes your own opinions about taking antihypertensives.

Items	Statements	Totally agree	Agree	Not sure	disagree	Totally disagree
A1	Patients with hypertension should visit doctors periodically					
A2	Hypertension can have a deleterious influence on health, work and life					
A3	Keep faith that the antihypertensives physician has prescribed could help to control blood pressure and improve health condition					
A4	It is ok to skip or quit taking antihypertensives when I feel good					
A5	Antihypertensives can be quitted once successful or goal blood pressure control is achieved					
A6	I feel that it is too much bother adhering to taking antihypertensives every day					
A7	It's in way over my head remembering to take antihypertensives every day					
A8	I think it is no big deal to miss a couple of antihypertensive administrations					

3. Behavior

Attached following is a list of questions and statements about some related behaviors of hypertensive patients when they are taking antihypertensives. Please read each question carefully and choose one answer which best describes your opinions or experiences.

P1 have you ever searched for any information about antihypertensives?

A. Always B. Often C. Sometimes D. Seldom E. Never

P2 when do you usually search for information about antihypertensive drugs?

A. Prior to and after taking antihypertensive

B. Prior to taking antihypertensives or after physician's medication prescription

C. After taking antihypertensives

D. After other's recommendations of a certain kind of antihypertensive

E. Irregular

P3 I recommend and disseminate antihypertensives with desirable effectiveness to other people (relatives or friends).

A. Always B. Often C. Sometimes D. Seldom E. Never

P4 how often do you seek advice from medical professionals (physician, pharmacist, and nurse) about information about antihypertensives?

A. Always B. Often C. Sometimes D. Seldom E. Never

P5 I purchase antihypertensives according to physician's prescriptions.

A. Always B. Often C. Sometimes D. Seldom E. Never

P6 I self-report adverse drug reactions to medical professionals (physician, pharmacist, and nurse)

A. Always B. Often C. Sometimes D. Seldom E. Never

P7 When you are taking antihypertensives, whether or not they are taken in ways that are in accordance with doctor's advice or pharmaceutical instructions? please tick in the box of yes or no according to your own experiences.

Items	Activities	Yes	No
P7.1	Dosage of antihypertensives		
P7.2	Time of taking antihypertensives		
P7.3	Shifting the type of antihypertensive drugs		
P7.4	Quitting antihypertensive drugs		

P8 how often do you have a blood pressure measurement?

A. Every day. B. once every 2~3 days. C. 4~7 days. D. over 7 days

E. irregular

P9 Attached are two statements about matters needing attention when you are doing BP measurement. Please tick in the box of yes or no according to your own experiences.

Items	Statements	Yes	No
P9.1	Whether there is a 20-minute break prior to your every BP measurement		
P9.2	Whether you take a record of BP value every time after you finish the BP measurement		

4. Skills

Attached are two scenario cases with respect to reading and understanding the physician's prescription and pharmaceutical instruction. Followed with each case, there are several questions about how these prescribed drugs should be administered correctly, please read each case carefully and answer each question by choosing one option which you think is the correct answer according to corresponding cases.

Case 1: Tom have been diagnosed as hypertension and he is always feeling headache and dizziness, the latest BP measurement showed 170/110mmHg. The following is a prescription instruction sheet after visiting a physician. Please read the instruction and answer corresponding questions.

Data: 2016-04-10 **Tel:** 0731-88638888

Physician of prescription: Professor Getz

Metoprolol Succinate Sustained-release Tablets. 23.75mg. Daily in the morning. (dosage forms and strengths: 47.5mg/tablet)

Amlodipine Besylate Tablets. 10mg. Daily in the morning.

Aspirin Enteric-coated Tablets. 50mg. Daily before sleeping

Notes:

The blood pressure should be measured and recorded after taking antihypertensives.

Come back to the hospital for a check in a month.

Quit smoking, restrict alcohol, have a low-salt diet, and take exercises appropriately

S1 According to this prescription sheet, how many times a day should Tom take antihypertensives in total?

Once a day twice a day three times per day four times per day

S2 what is the date Tom go back to physician for a check the next time?

2016-04-24 2016-5-10 2016-5-22 2016-6-5

S3 how many pills of metoprolol succinate sustained-release tablets does Tom need?

One tablet. 1/2 tablet. Two tablets. 1/4 tablet

S4 what measures should be taken in your daily life besides taking antihypertensives as prescribed?

BP measurement. Low-salt diet. Quit smoking. Restricting alcohol. Exercise appropriately. All of the above.

Case 2: Attached is part of the pharmaceutical instructions of Metoprolol Succinate Sustained-release Tablets Tom has been taking, please read it and answer questions.

Instructions for Metoprolol Succinate Sustained-release Tablets

【Indications】 Hypertension, Angina pectoris, Chronic heart failure with stable left ventricular systolic dysfunction

【Dosage and Administration】 Given orally, once per day, better given in the morning, one tablet can be split apart but not chewed or pulverized when it is given, suggested dose should be taken with at lease half cup of water, dosage should be individualized and should avoid the occurrence of bradycardia.

【Warnings and Precautions】 The possible side effects may be vertigo and fatigue, therefore activities that require people to concentrate such as driving and machine operation should be cautiously considered or avoid.

【Storage】 Keep away from sunlight and sealed in dry place

S5 what are the indications of Metoprolol Succinate Sustained-release Tablets?

Hypertension. Angina pectoris. Chronic heart failure with stable symptoms.

All of the above

S6 Tom is a construction worker driving bulldozer, is there any influence on his work by taking this medicine?

No influence. Have no idea. Cautiously considered

S7 please tell Tom how to preserve half tablet left along with other medications?

Put them together. Free placed. Preserved as required in the instruction.

Part 5: Kuesioner MASES-R versi Bahasa Inggris

Direction: this part is about your confidence of taking your blood pressure medications. Please tick ' √ ' in the item which best reflects what you actually do. Please answer every question.

How confident are you that you can take your blood pressure medications?

1. When you are busy at home
   ☐ Not at all sure ☐A little sure ☐Fairly sure ☐Extremely sure
2. When there is no one to remind you
   ☐ Not at all sure ☐A little sure ☐Fairly sure ☐Extremely sure
3. When you worry about taking them for the rest of your life
   ☐ Not at all sure ☐A little sure ☐Fairly sure ☐Extremely sure
4. When you do not have any symptoms
   ☐ Not at all sure ☐A little sure ☐Fairly sure ☐Extremely sure
5. When you are with family members
   ☐ Not at all sure ☐A little sure ☐Fairly sure ☐Extremely sure
6. When you are in a public place
   ☐ Not at all sure ☐A little sure ☐Fairly sure ☐Extremely sure
7. When the time to take them is between your meals
   ☐ Not at all sure ☐A little sure ☐Fairly sure ☐Extremely sure
8. When you are travelling
   ☐ Not at all sure ☐A little sure ☐Fairly sure ☐Extremely sure
9. When you take them more than once a day
   ☐ Not at all sure ☐A little sure ☐Fairly sure ☐Extremely sure
10. When you have other medications to take
    ☐ Not at all sure ☐A little sure ☐Fairly sure ☐Extremely sure
11. When you feel well
    ☐ Not at all sure ☐A little sure ☐Fairly sure ☐Extremely sure
12. If they make you want to urinate while away from home
    ☐ Not at all sure ☐A little sure ☐Fairly sure ☐Extremely sure

Please rate how sure you are that you can carry out the following task:

13. Make taking your medications part of your routine
    ☐ Not at all sure ☐A little sure ☐Fairly sure ☐Extremely sure

Part 6 Multidimensional Scale of Perceived Social Support

Instructions: We are interested in how you feel about the following statements. Read each statement carefully. Indicate how you feel about each statement.

Circle the "1" if you **Very Strongly Disagree**
Circle the "2" if you **Strongly Disagree**
Circle the "3" if you **Mildly Disagree**
Circle the "4" if you are **Neutral**
Circle the "5" if you **Mildly Agree**
Circle the "6" if you **Strongly Agree**
Circle the "7" if you **Very Strongly Agree**

1	There is a special person who is around when I am in need.	1	2	3	4	5	6	7	SO
2	There is a special person with whom I can share my joys and sorrows.	1	2	3	4	5	6	7	SO
3	My family really tries to help me.	1	2	3	4	5	6	7	Fam
4	I get the emotional help and support I need from my family.	1	2	3	4	5	6	7	Fam
5	I have a special person who is a real source of comfort to me.	1	2	3	4	5	6	7	SO
6	My friends really try to help me.	1	2	3	4	5	6	7	Fri
7	I can count on my friends when things go wrong.	1	2	3	4	5	6	7	Fri
8	I can talk about my problems with my family.	1	2	3	4	5	6	7	Fam
9	I have friends with whom I can share my joys and sorrows.	1	2	3	4	5	6	7	Fri
10	There is a special person in my life who cares about my feelings.	1	2	3	4	5	6	7	SO
11	My family is willing to help me make decisions	1	2	3	4	5	6	7	Fam
12	I can talk about my problems with my friends.	1	2	3	4	5	6	7	Fri

The items tended to divide into factor groups relating to the source of the social support, namely family (Fam), friends (Fri) or significant other (SO).

MHESI 8137/1249

Graduate School, Burapha University
169 Longhaad Bangsaen Rd.
Saensuk, Muang, Chonburi
Thailand, 20131

September 1st, 2022

To The president of the Second Affiliated Hospital of Wenzhou Medical University,

Enclosure: 1. Certificate ethics document of Burapha University
2. Research Instruments (Try out)

On behalf of the Graduate School, Burapha University, I would like to request permission for Ms. Xiaoping Xiang to collect data for testing the reliability of the research instruments.

Ms. Xiaoping Xiang, ID 63910145, a graduate student of the Master of Nursing Science program (International Program) in Adult Nursing Pathway, Faculty of Nursing, Burapha University, Thailand, was approved her dissertation proposal entitled: "Predictors of medication adherence among older adults with uncontrolled hypertension" under supervision of Assoc. Prof. Dr. Pornpat Hengudomsub as the principle advisor. She proposes to collect data from 30 elderly patients with uncontrolled hypertension who come for follow-up at the OPD of Cardiology in the Second Affiliated Hospital of Wenzhou Medical University.

The data collection will be carried out from September 1 - 20, 2022. In this regard, you can contact Ms. Xiaoping Xiang via mobile phone +86-1356-6291-219 or E-mail: 81850918@qq.com

Please do not hesitate to contact me if you need further relevant queries.

Sincerely yours,

(Assoc. Prof. Dr. Nujjaree Chaimongkol)
Dean of Graduate School, Burapha University

Carbon Copy: Dr. Zhang Chunmei
Director of Nursing Department

Graduate School Office
Tel: +66 3810 2700 ext. 701, 705, 707
E-mail: grd.buu@go.buu.ac.th
http://grd.buu.ac.th

MHESI 8137/1250

Graduate School, Burapha University
169 Longhaad Bangsaen Rd.
Saensuk, Muang, Chonburi
Thailand, 20131

September 1st, 2022

To The president of the Second Affiliated Hospital of Wenzhou Medical University,

Enclosure: 1. Certificate ethics document of Burapha University
2. Research Instruments

On behalf of the Graduate School, Burapha University, I would like to request permission for Ms. Xiaoping Xiang Liu to collect data for conducting research.

Ms. Xiaoping Xiang, ID 63910145, a graduate student of the Master of Nursing Science program (International Program) in Adult Nursing Pathway, Faculty of Nursing, Burapha University, Thailand, was approved her dissertation proposal entitled: "Predictors of medication adherence among older adults with uncontrolled hypertension" under supervision of Assoc. Prof. Dr. Pornpat Hengudomsub as the principle advisor. She proposes to collect data from 137 elderly patients with uncontrolled hypertension who come for follow-up at the OPD of Cardiology in the Second Affiliated Hospital of Wenzhou Medical University.

The data collection will be carried out from September 21 to December 30, 2022. In this regard, you can contact Ms. Xiaoping Xiang via mobile phone +86-1356-6291-219 or E-mail: 81850918@qq.com

Please do not hesitate to contact me if you need further relevant queries.

Sincerely yours,

(Assoc. Prof. Dr. Nujjaree Chaimongkol)
Dean of Graduate School, Burapha University

Carbon Copy: Dr. Zhang Chunmei
Director of Nursing Department

Graduate School Office
Tel: +66 3810 2700 ext. 701, 705, 707
E-mail: grd.buu@go.buu.ac.th
http://grd.buu.ac.th

สำเนา

ที่ IRB3-070/2565

เอกสารรับรองผลการพิจารณาจริยธรรมการวิจัยในมนุษย์

มหาวิทยาลัยบูรพา

คณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์ มหาวิทยาลัยบูรพา ได้พิจารณาโครงการวิจัย

รหัสโครงการวิจัย : G-HS050/2565

โครงการวิจัยเรื่อง : Predictors of medication adherence among older adults with uncontrolled hypertension

หัวหน้าโครงการวิจัย : MISSXIAOPING XIANG

หน่วยงานที่สังกัด : คณะพยาบาลศาสตร์

BUU Ethics Committee for Human Research has considered the following research protocol according to the ethical principles of human research in which the researchers respect human's right and honor, do not violate right and safety, and do no harms to the research participants.

Therefore, the research protocol is approved (See attached)

1. Form of Human Research Protocol Submission Version 3 : 8 August 2022
2. Research Protocol Version 1 : 16 June 2022
3. Participant Information Sheet Version 3 : 8 August 2022
4. Informed Consent Form Version 3 : 8 August 2022
5. Research Instruments Version 2 : 5 August 2022
6. Others (if any) Version - : -

วันที่รับรอง : วันที่ 11 เดือน สิงหาคม พ.ศ. 2565

วันที่หมดอายุ : วันที่ 11 เดือน สิงหาคม พ.ศ. 2566

ลงนาม *Assistant. Professor Ramorn Yampratoom*

(Assistant. Professor Ramorn Yampratoom)

Chair of The Burapha University Institutional Review Board

Panel 3 (Clinic / Health Science / Science and Technology)

MHESI 8137/1249

Graduate School, Burapha University
169 Longhaad Bangsaen Rd.
Saensuk, Muang, Chonburi
Thailand, 20131

September 1st, 2022

To The president of the Second Affiliated Hospital of Wenzhou Medical University,

Enclosure: 1. Certificate ethics document of Burapha University
2. Research Instruments (Try out)

On behalf of the Graduate School, Burapha University, I would like to request permission for Ms. Xiaoping Xiang to collect data for testing the reliability of the research instruments.

Ms. Xiaoping Xiang, ID 63910145, a graduate student of the Master of Nursing Science program (International Program) in Adult Nursing Pathway, Faculty of Nursing, Burapha University, Thailand, was approved her dissertation proposal entitled: "Predictors of medication adherence among older adults with uncontrolled hypertension" under supervision of Assoc. Prof. Dr. Pornpat Hengudomsub as the principle advisor. She proposes to collect data from 30 elderly patients with uncontrolled hypertension who come for follow-up at the OPD of Cardiology in the Second Affiliated Hospital of Wenzhou Medical University.

The data collection will be carried out from September 1 - 20, 2022. In this regard, you can contact Ms. Xiaoping Xiang via mobile phone +86-1356-6291-219 or E-mail: 81850918@qq.com

Please do not hesitate to contact me if you need further relevant queries.

Sincerely yours,

(Assoc. Prof. Dr. Nujjaree Chaimongkol)
Dean of Graduate School, Burapha University

Carbon Copy: Dr. Zhang Chunmei
Director of Nursing Department

Graduate School Office
Tel: +66 3810 2700 ext. 701, 705, 707
E-mail: grd.buu@go.buu.ac.th
http://grd.buu.ac.th

MHESI 8137/1250

Graduate School, Burapha University
169 Longhaad Bangsaen Rd.
Saensuk, Muang, Chonburi
Thailand, 20131

September 1st, 2022

To The president of the Second Affiliated Hospital of Wenzhou Medical University,

Enclosure: 1. Certificate ethics document of Burapha University
2. Research Instruments

On behalf of the Graduate School, Burapha University, I would like to request permission for Ms. Xiaoping Xiang Liu to collect data for conducting research.

Ms. Xiaoping Xiang, ID 63910145, a graduate student of the Master of Nursing Science program (International Program) in Adult Nursing Pathway, Faculty of Nursing, Burapha University, Thailand, was approved her dissertation proposal entitled: "Predictors of medication adherence among older adults with uncontrolled hypertension" under supervision of Assoc. Prof. Dr. Pornpat Hengudomsub as the principle advisor. She proposes to collect data from 137 elderly patients with uncontrolled hypertension who come for follow-up at the OPD of Cardiology in the Second Affiliated Hospital of Wenzhou Medical University.

The data collection will be carried out from September 21 to December 30, 2022. In this regard, you can contact Ms. Xiaoping Xiang via mobile phone +86-1356-6291-219 or E-mail: 81850918@qq.com

Please do not hesitate to contact me if you need further relevant queries.

Sincerely yours,

(Assoc. Prof. Dr. Nujjaree Chaimongkol)
Dean of Graduate School, Burapha University

Carbon Copy: Dr. Zhang Chunmei
Director of Nursing Department

Graduate School Office
Tel: +66 3810 2700 ext. 701, 705, 707
E-mail: grd.buu@go.buu.ac.th
http://grd.buu.ac.th

涉及人的生物医学研究伦理审查批件

Ethics Committee Approval Letter of Biomedical Research Involving Humans

批件号 Approval NO.：伦审（2022-K-123-01）

项目名称 **Study Title**	老年高血压患者药物依从性的预测因素		
项目来源 **Source**	自选课题		
受理号 **Acceptance Number**	2022-K-123-01		
主要研究者 **Principal Investigator**	项晓萍	承担科室 **Responsible Department**	介入护理单元
审查类别 **Category of Review**	初始审查	审查方式 **Type of Review**	简易审查
审查日期 **Date of Review**	2022 年 9 月 15 日	审查地点 **Location of Review**	/
审查文件清单 **Items Reviewed**	1. 初始审查申请表 2. 研究者履历 3. 临床研究方案（版本号：V1.0；版本日期：2022.08.01） 4. 知情同意书（版本号：V1.0；版本日期：2022.08.01） 5. 病例报告表/数据收集表（版本号：V1.0；版本日期：2022.08.01）		
审评意见 **Evaluation**	批准		
审查决定 **Decision**	委员会对该项目的审查决定为：同意 (Approval)		
主任委员签字 **Chair Signature**			
签发日期 **Date of issue**	2022 年 9 月 15 日		
医学伦理委员会 **Stamp of EC**	医学伦理委员会盖章		
批件有效期 **Period of Validity**	自本医学伦理委员会初始审查批准之日起一年内，本临床研究应在本院启动。逾期未启动的，本批件自行废止。		
年度/定期跟踪审查 **Continue Review**	审查频率为该研究批准之日起每 12 月一次，首次请于 2023 年 9 月 14 日前 1 个月递交研究进展报告。 医学伦理委员会有根据实际进展情况改变跟踪审查频率的权利。		
声明 **Statement**	本医学伦理委员会的职责、人员组成、操作程序及记录遵循《涉及人的生物医学研究伦理审查办法》、《涉及人的健康相关研究国际伦理准则》、《赫尔辛基宣言》、GCP 和 ICH-GCP 等国际伦理指南和国内相关法律法规。		

注意事项：

1. 请遵循我国相关法律、法规和规章中的伦理原则。
2. 请遵循经本医学伦理委员会批准的临床研究方案、知情同意书、招募材料等开展本研究，保护受试者的健康与权利。对研究方案、知情同意书和招募材料等的任何修改，均须得到本医学伦理委员会审查同意后方可实施。
3. 在本院发生的SAE/SUSAR以及研发期间安全性更新报告须按照NMPA/GCP最新要求及时递交本医学伦理委员会，国内外其它中心发生的SAE/SUSAR需定期汇总、评估后递交本医学伦理委员会。
4. 根据报告情况，本医学伦理委员会有权对其评估做出新的决定。
5. 自今日起，无论研究开始与否，请在跟踪审查日到期前1个月提交研究进展报告。
6. 申办方应当向组长单位医学伦理委员会提交中心研究进展报告汇总；当出现任何可能显著影响研究进行或增加受试者危险的情况时，请申请人及时向本医学伦理委员会提交书面报告。
7. 研究纳入了不符合纳入标准或符合排除标准的受试者，符合中止研究规定而未让受试者退出研究，给予错误治疗或剂量，给予方案禁止的合并用药等没有遵从方案开展研究的情况；或可能对受试者的权益或健康以及研究的科学性造成不良影响等违背GCP原则的情况，请申办方、监查员或研究者提交违背方案报告。
8. 申请人暂停或提前终止临床研究，请及时提交暂停或终止研究报告。
9. 完成临床研究，请申请人提交结题报告。
10. 凡涉及中国人类遗传资源采集标本、收集数据等研究项目，必须获得中国人类遗传资源管理办公室批准后方可在本中心开展研究。
11. 凡经本医学伦理委员会批准的研究项目在实施前，申请人应按相关规定在国家卫健委、药审中心等的临床研究登记备案信息系统平台登记研究项目相关信息。

地址：浙江省温州市龙湾区温州大道东段1111号　电话：0577-85676879　邮编：325000

6-Dec-2024
Certificate Number: 2054-3760-3847-1466-6869

To Whom It May Concern:

This is to inform you that XIAOPING XIANG, Scholar student at Burapha University has my permission to use the MMAS-8 (Morisky Medication Adherence Scale 8 item U.S. Reg. No. TX-8-632-533) in this research study and for publication in all formats i.e. print and digital:

"PREDICTORS OF MEDICATION ADHERENCE AMONG OLDER ADULTS WITH UNCONTROLLED HYPERTENSION."

The requirements to use this scale are to cite the following references in the document:

1. **Berlowitz DR, Foy CG, Kazis LE, Bolin L, Lonroy LB, Fitzpatrick P, et al. for the SPRINT Study Research Group. Impact of Intensive Blood Pressure Therapy on Patient-Reported Outcomes: Outcomes Results from the SPRINT Study. N Engl J Med 2017; 377:733-44.**

2. **Bress AP, Bellows BK, King J, Hess R Beddhu S, Zhang Z, et al, for the SPRINT Research Group and the SPRINT Economics and Health Related Quality of Life Subcommittee. Cost-Effectiveness of Intensive versus Standard Blood Pressure Control. N Engl J Med 2017; 377:745-55.**

Terms and conditions are found here:
https://adherence.cc/mmas-8

i. The following footnote is required in all articles, presentations, web postings, reports and submitted manuscripts, and on the first table or figure which present the MMAS-8 as well as in the Acknowledgment Section of manuscripts submitted for publication:

©MMAS 2006 www.adherence.cc

Donald E. Morisky, Sc.D., M.S.P.H., Sc.M. President

Philip Morisky, MBA
Chief Optimus
adherence.
www.adherence.cc
6-Dec-2024

student permission letter_XIAOPING XIANG

Final Audit Report 2024-12-06

Created:	2024-12-06
By:	Philip Morisky (philm715@icloud.com)
Status:	Signed
Transaction ID:	CBJCHBCAABAACil8DkZzMawpCp2O6HDNzvoYdrwxOvxu

"student permission letter_XIAOPING XIANG" History

Document created by Philip Morisky (philm715@icloud.com)
2024-12-06 - 6:51:30 PM GMT- IP address: 4.7.29.210

Document emailed to Philip Morisky (philip.morisky@adherence.cc) for signature
2024-12-06 - 6:51:34 PM GMT

Email viewed by Philip Morisky (philip.morisky@adherence.cc)
2024-12-06 - 6:54:56 PM GMT- IP address: 66.214.146.130

Document e-signed by Philip Morisky (philip.morisky@adherence.cc)
Signature Date: 2024-12-06 - 6:55:23 PM GMT - Time Source: server- IP address: 66.214.146.130

Agreement completed.
2024-12-06 - 6:55:23 PM GMT

BIOGRAPHY

NAME	XIAOPINGXIANG
DATE OF BIRTH	29 July 1981
PLACE OF BIRTH	China
PRESENT ADDRESS	9-1301, Jinyulanwang, Qidu Street, Lucheng District,Wenzhou, Zhejiang Province, China
EDUCATION	Bachelor Degree