FACTORS INFLUENCING SELF-MANAGEMENT BEHAVIORS AMONG
RECURRENT STROKE PERSONS IN WENZHOU, CHINA

FANG HE

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
2024

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The Thesis of Fang He 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

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KEYWORDS: SELF-MANAGEMENT BEHAVIORS, RECURRENT STROKE, STROKE PREVENTION KNOWLEDGE, ILLNESS REPRESENTATION, HOPE

FANG HE : FACTORS INFLUENCING SELF-MANAGEMENT BEHAVIORS AMONG RECURRENT STROKE PERSONS IN WENZHOU, CHINA. ADVISORY COMMITTEE: NIPHAWAN SAMARTKIT, Ph.D. KHEMARADEE MASINGBOON, D.S.N. 2024.

Good self-management behavior can prevent stroke recurrence.This study aimed to describe self-management behaviors and determine whether the stroke prevention knowledge, illness representation and hope can predict self-management behaviors among recurrent stroke persons in Wenzhou China. A total of 100 participants who were admitted to eight Neurology out-patient departments of the Second Affiliated Hospital of Wenzhou Medical University were recruited by using simple random sampling technique. The research instruments included the demographic data questionnaire, the Chinese Version of Stroke Self-management Scale, Stroke Prevention Knowledge Questionnaire, Brief Illness Perceptions Questionnaire, Herth Hope Index. The Cronbach's α coefficients for the scales were .84, .81, .81, .84, respectively. Descriptive statistics and multiple regression were used for data analysis.

The results of this study showed that the mean score of self-management behaviors among participants was 106.32 (SD = 15.15) out of 150. The score indicator of the total score was 70.9 %, which means moderate level of self-management behaviors. Multiple regression analysis revealed that stroke prevention knowledge (β = .476, p < .001) and hope (β = .276, p < .01) were the influencing factors of self-management behaviors. However, the illness representation could not significantly predict self-management behaviors. All the factors explained 44.7% of the variance in self-management behaviors among recurrent stroke persons (adjust R^2 = 44.7%, $F_{3,96}$ = 27.72, p < .001).

The findings provide an evidence for nurses and nursing researchers to develop intervention programs to promote stroke prevention knowledge and hope of recurrent stroke persons which can be improve their self-management behavior.

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INTRODUCTION

Statements and significance of the problems

Stroke defined as clinical syndrome caused by sudden brain blood vessel disorder. It is a severe neurological disorder and has been continuously increasing in annual incidence. Stroke remains the second-leading cause of death and the third-leading cause of death and disability combined, as expressed by disability-adjusted life-years lost – DALYs, in the world (Feigin et al., 2022). In China, the incidence of stroke in China continues to be higher than the global average level and the level of developed countries such as Britain, The United States and Japan (Feigin et al., 2021), which is the leading cause of death in China. Ischemic stroke is the most common, accounting for 85% of all stroke types ("Brief report on stroke prevention and treatment in China, 2019," 2020). Data showed that the incidence of ischemic stroke in China in 2019 was 1,700 cases per 100,000 people (The National Health Commission Statistic report by the Guidelines for Stroke Prevention and Treatment in China, 2021). More importantly, one in four stroke cases experienced the recurrence (Hao et al., 2021).

Recurrent stroke means that the patient has had a previous ischemic stroke, or more than one. The risk of recurrent ischemic stroke was highest (Yu, Liu, Yang, Fu, & Fan, 2019) recurrent strokes make up almost 25% of the nearly 800,000 strokes that occur annually in the United States. Studies in Germany and Denmark have shown that the risk of recurrent stroke is very high and increases over time (Skajaa et al., 2021; Stahmeyer, Stubenrauch, Geyer, Weissenborn, & Eberhard, 2019). A study in China showed that, the pooled stroke recurrence rate was 7.7% at 3 months, 9.5% at 6 months, 10.4% at 1 year, 16.1% at 2 years, 16.7% at 3 years, 14.8% at 5 years, 12.9% at 10 years, and 39.7% at 12 years after the initial stroke (B. Lin et al., 2021), a study in Chengdu (a province in China) showed that the recurrence rate of stroke was 11.51% in the first year, 16.76% in the second year, and 20.07% in the third year (Jing Zhang et al., 2019). In a study in Shaoxing, Zhejiang province, the recurrence rate of stroke was 23.9% after 1 year of follow-up (Zhao Ke, 2021). In Wenzhou, based on the Stroke Research Center survey, from the persons discharged from

hospital with stroke, the recurrence rate was 20.7% (Statistic report by the Stroke Research Center of 2nd Affiliated Hospital of Wenzhou Medical University, 2021). It can be seen that the recurrence rate of stroke in China is much higher than that in other countries in the world, and the recurrence rate of stroke increases gradually with the extension of time.

Stroke causes death and disability throughout the world and recurrent events lead to prolonged hospitalization, worsened functional outcome, and increased mortality (He et al., 2017). Recurrent stroke often results in an accumulation of physical and cognitive disabilities and further loss of quality of life (Brouwer, Wondergem, Otten, & Pisters, 2021). The most common types of disability after stroke are changes to speech, learning and understanding, and weakness or paralysis on one side of the body (Tabah, Sham, Zakaria, Hashim, & Dasiman, 2020). Regardless of stroke or recurrent stroke persons, in addition to physical harm, they also face psychological harm. Depression is common after a stroke (Villa, Ferrari, & Moretti, 2018). Some recurrent stroke persons may feel anxiety, even have personality and behavioral changes (Rafsten, Danielsson, & Sunnerhagen, 2018). Stroke-related physical and cognitive disabilities require daily assistance for stroke survivors (J. S. Kim, 2016).

Many stroke persons had to dependent on their families because they are unable to live by themselves, and recurrent stroke persons need follow-up therapy like rehabilitation (Lui & Nguyen, 2018), requires emergent and expensive care. It imposes a heavy financial burden on persons, especially for some social groups that are vulnerable to economic risks (Ma, Deng, Meng, & Wu, 2021), 70% of stroke survivors in China experienced economic burden due to loss of income and cost of health care. Because of the severity and high economic burden of recurrent stroke, it is particularly important to prevent recurrent stroke. Moreover, recurrent stroke affects not only individuals, but families as well.

Due to the characteristics of Chinese culture, recurrent stroke persons are often taken care by their family (X. Qiu, Sit, & Koo, 2018). The family caregiver is the person who helps the recurrent stroke persons carry out all basic and instrumental activities of daily living (Badaru, Ahmad, Lawal, & Usman, 2019). Therefore, caregiving for recurrent stroke persons brings physical, psychological, social burdens

that leads to an imbalance between the personal lives of caregivers and their care-giving functions. This is likely to negatively affect all aspects of the caregivers' quality of life (Elsheikh et al., 2020).

Family function is one of the main factors affecting self-management behavior (Shu et al., 2019). A study shows that when family members help their loved ones in post-stroke physical therapy sessions, the patients show improvement in balance, motor function, distance they can walk, and other general activities of daily life (Dharma, Damhudi, Yardes, & Haeriyanto, 2018). In China, caring for post stroke survivor is generally undertaken by families at home. Families play an important role in supporting and promoting self-management (Whitehead, Jacob, Towell, Abu-qamar, & Cole-Heath, 2018). Family partnership in self-management is related to the improvement of self-management capability. The individual or family assumes responsibility for individual and family self-management and it may occur in collaboration with healthcare professionals (Ryan & Sawin, 2009). Persons with good family function are more likely to receive emotional support from family members. Family function plays an important role and task in persons' rehabilitation period. Good family function can not only enhance patients' confidence in treatment and improve coping style, but also alleviate patients' adverse psychology, improve patients' rehabilitation compliance and improve prognosis. For patients with recurrent stroke, family function level not only reflects patients' psychology, behavior management and problem solving ability, but also has a positive effect on rehabilitation training (Le Danseur, 2020).

At present we are constantly seeking the best way to treatment of stroke, actively explore recurrence forecast method, but there are still many risk factors causing stroke recurrence rate is high, urgent need for effective risk management strategy, reasonable allocation of medical resources, in order to reduce the recurrent stroke, reduce the overall burden of stroke in China (Zhao et al., 2019). According to literature review, risk factors for recurrent stroke such as age, underlying diseases (hypertension, diabetes, dyslipidemia, atrial fibrillation) (Chin, Sakinah, Aryati, & Hassan, 2018). Poor health behaviors (smoking, drinking, irregular use of antithrombotic drugs, lack of exercise) could also contribute to the incidence of recurrence (Rahayu, Sudrajat, Nurdina, Agustina, & Putri, 2019). The dominant risk

factors for stroke recurrence in Indonesia is cardiovascular disease (Rahayu et al., 2019).

It can be seen from this that although recurrent stroke has a high incidence and disability rate, it is preventable and controllable if keep a good living habits, self-management style. Ryan and Sawin (2009) believe that living with a chronic condition is "complex and requires integration of self-management behaviors into the lifestyles of individuals and household". Self-management behavior considered to be used not only to manage chronic symptoms but also to engage in health promotion.

Self-management, defined as the active management by individuals of their treatment, symptoms, lifestyle and the physical and psychological consequences inherent in living with a chronic condition (Lorig & Holman, 2003). There are many studies shown that stroke self-management behaviors appear to be effective at improving overall risk factor control (Sakakibara, Kim, & Eng, 2017). Self-control and management, such as enhancing active treatment awareness, actively controlling various risk factors, maintaining medication compliance, increasing exercise, rationally controlling diet, and actively changing lifestyle, play an important role in recurrent stroke prevention and control, improving prognosis of persons and improving quality of life (Turan et al., 2018).

Successful self-management is an important aim following stroke and is believed to promote effective use of healthcare resources (Oh et al., 2021). However, some studies in China show that the level of self-management behavior in stroke persons is low and needs to be strengthened (Guan, Wang, & Lian, 2018; Mu, Li, Liu, & ZHENG, 2016). Studies consistently show medication adherence to be suboptimal within the stroke population (Laver et al., 2020; Sakakibara, Kim, & Eng, 2017). In addition to, the utilization rate of stroke rehabilitation clinics in the United States was 35.5% (Ayala et al., 2018), while it was less than 20% in China (Z. Qiu et al., 2017). Especially the social interpersonal management, dietary management and disease management behaviors need to be improved (ying, 2021). It is precisely because of such self-management behaviors that stroke recurred again and again, so we need pay more attention to the self-management behaviors of recurrent stroke persons (Y. Li et al., 2021). Therefore, it is of great practical significance to take targeted prevention and intervention measures to improve persons' self-management behaviors, reduce the

risk of stroke recurrence, reduce the recurrence rate and disability rate of persons, and improve the quality of life of persons.

Self-management behaviors of stroke persons were very complex, there were many factors related to self-management behaviors, including stroke prevention knowledge, education level, financial status, social support, post-stroke depression, self-efficacy, hope, illness representation . Some studies revealed that improvement of knowledge could enhance the understanding of self-management behaviors and increase self-efficacy (Lee & Chang, 2020; Xing & Wei, 2021). Moreover, there has a dynamic interplay between illness representations, self-management, and health outcomes, having a correct illness representations of the disease can make it quicker to take the right behavior to deal with it (). Moreover, in patients with chronic illness, hope is a prerequisite to effective coping and decision-making, and it has a protective function against stress (Tantisuvanitchkul, Thanakiatpinyo, & Kuptniratsaikul, 2020).

Stroke prevention knowledge refers to the information and understanding of a person about stroke care, signs and risk factors, medication(Soto-Cámara et al., 2020).The study found that stroke knowledge can affect the self-management behavior, and the higher the knowledge of stroke, the higher the level of self-management behavior of persons (r = .369, p < .001) (Breland, Wong, & McAndrew, 2020). Moreover, the stroke prevention knowledge is positively correlated with the self-management behavior of stroke persons, that is, stroke persons with high self-management level can better monitor the disease and exercise rehabilitation (Mu et al., 2016). Stroke prevention knowledge is the key factor in determining the behavior of the sufferer, the more knowledge you have about the disease, the more positive and healthy behaviors you can adopt, and you can prevent the recurrent stroke. It means that may be stroke prevention knowledge influencing self-management behavior of recurrent stroke persons.

Illness representation are one's beliefs about their illness, including its effect on their life and their treatment, which comprise several dimensions, including perceptions of the disease's symptoms, its cause, its duration, its consequences, and the level of control the individual has over the disease (Sullivan & Waugh, 2007). It helps persons take the right behavior to prevent stroke recurrence (Rivera et al., 2018). McAndrew et al. (2018) proposed a self-management framework that discusses a

person's illness representation reflects a person's behavior in various ways in response to a threat or disease. Some studies found that the persons always had normal drug-taking behavior when they realized that the disease could be treated with drugs (Ruksakulpiwat, Liu, Yue, & Fan, 2020). When the patient realizes that the disease is a chronic disease, he or she will be given continuous medical care (Kongkaew, Naka, & Kritpracha, 2020). When patients realize that the impact of stroke is very serious and have a high degree of anxiety and fear, they decide to receive early treatment (Leventhal, Phillips, & Burns, 2016). Therefore, the illness representation may be an important influencing factor for self-management behaviors. However, if persons with recurrent stroke think they have recovered and don't realize that the disease will recur, they will stop taking the medication and do not receive treatment at a specified time (Dhand et al., 2019) .

Hope refers to a kind of belief that made individuals think they could achieve a desired goal in the near future and also referred to a sense of cognition that could guide people's behavior (Suangpo, Srisangpang, & Sangsuwan, 2014). Moreover, hope is a thought process that almost all people use throughout their life, especially when they are facing illness and/or losses (Henh & Cutcliffe, 2002). In patients with chronic illness, hope is a prerequisite to effective coping and decision-making, and it has a protective function against stress (DuFault & Martocchio, 1985). Stress is reduced because hope encourages the strength needed to solve problems and to face losses and suffering, and this improves quality of life (Park, Williams, & Zurba, 2020). Although the mechanism is not yet clear, hope is believed to effectuate a positive effect on neurotransmission, which helps to promote neuro-recovery in stroke patients (Jørgensen & Rendtorff, 2018) . Moreover, hope was found to be one of the predictors of positive rehabilitation outcomes (Fukuhara, Kurita, Wakita, Green, & Shibagaki, 2019). previous study found that if patients had hope, they were more likely to overcome their stress and obstacles, perform better health behaviors, which made them more likely to achieve better patient outcomes (Yıldırım & Arslan, 2020) . It means that hope may influence self-management behavior among recurrent stroke persons.

However, in China most studies about the relationship between these variables are focused on first ever stroke person or mix all condition of stroke

persons. Even if the evident in China show that the stroke persons had low self-management behaviors (Ruksakulpiwat & Zhou, 2021b). Also, there are no studies on the self-management behaviors and the influence between these three factors in recurrent stroke persons in China, including Wenzhou.

Accordingly, guided by the individual and family self-management theory (IFSMT), this study explored the status of self-management behavior of recurrent stroke persons and examine whether stroke prevention knowledge, Illness representation, hope are predicting factors of self-management behavior among recurrent stroke persons, in Wenzhou, China. This study will provide information for health care providers in Wenzhou to develop advance nursing intervention for recurrent stroke persons, to support and guide them to effectively carry out disease management behaviors and will provide a new direction for secondary prevention in recurrent stroke persons, then improve their health outcomes and improve quality of life.

Research objectives

The objectives of the study are:

1. To describe self-management behaviors among recurrent stroke persons in Wenzhou, China.

2. To determine the stroke prevention knowledge, Illness representation, hope can predict self-management behaviors among recurrent stroke persons in Wenzhou, China.

Research hypotheses

Stroke prevention knowledge, Illness representation, hope can predict self-management behaviors among recurrent stroke persons in Wenzhou China.

Scope of the study

This study was descriptive correlational research design, the purposes of this study is to describe the current status of self-management behaviors and to examine whether the stroke prevention knowledge, Illness representation, hope were

influencing factors of self-management behaviors among recurrent stroke persons. The data was collected in the department of Neurology out-patient, the Second Affiliated Hospital of Wenzhou Medical University during June to August in 2022.

Conceptual framework

The framework of the study was designed based on the individual and family self-management theory (IFSMT) of Ryan and Sawin (Ryan & Sawin, 2009). The theory defines self-management behavior as the outcome of actual participation in self-management process and affected by context (risk and protective factors).

IFSMT illustrated self-management as multidimensional including context, process, and outcome. Context includes specific conditional factors, physical and social environment, as well as personal and family factors, which affect the process dimension or directly affect the outcome dimension.

The context describes three main categories: condition-specific factors, physical and social environment, and individual and family factors. The first category includes complexity of conditions or treatment (i.e., Illness representation), trajectory, physiological stability or physiological transitions. The second category refers to physical and social aspects, transportation, health care access, culture and social capital. The third category composes of developmental stage, learning ability, literacy, family functioning and capacity to self-management.

The process dimension of this theory refers to the self-management process of patients. The process dimension is composed of knowledge and belief, self-regulation skills and ability, and social facilitation, which can promote patients' participation in self-management behavior. In the first category, knowledge and beliefs are defined as factual information and perceptions about a health condition or health behavior, and the knowledge (i.e., stroke prevention knowledge) and beliefs impact behavior-specific self-efficacy, outcome expectancy (i.e., hope), and goal congruence. The third dimension of the theory is the result dimension, which is divided into proximal outcome and distal outcome. The self-management behavior of patients' participation is the proximal outcome, while maintaining good health and higher quality of life is the distal outcome. The context, risk and protective factors affect each other. And factors in the context dimension affect an individual's and

family's ability to engage in the process dimension. Constructs in the process dimension are internally related and affect the outcome dimension.

Illness representation, knowledge and hope belong to the process in IFSMT. The person's illness representation reflects a person's behavior in various ways in response to a threat or disease (Leventhal, Phillips, & Burns, 2016). When combined with action plans, illness representations direct decisions and behaviors related to threat self-management behaviors (Breland, Wong, & McAndrew, 2020). Ryan and Sawin (2009) propose that the improvement of knowledge can increase the understanding of self-management behavior and increase self-efficacy. In patients with chronic illness, hope is a prerequisite to effective coping and decision-making, and it has a protective function against stress (Park, Williams, & Zurba, 2020), performing better self-management behaviors, which will make them more likely to achieve better patient outcomes (Yıldırım & Arslan, 2020).

Stroke prevention knowledge and Illness representation, hope was mentioned as critical to the success of a person's ability to self-manage. IFSMT shows that the above three factors may have an influence with self-management behavior. Previous studies have shown an influence between that stroke prevention knowledge, Illness representation, and hope with self-management behaviors .

Therefore, guiding by the IFSMT, in this study, the stroke prevention knowledge, illness representation, hope is presented as the independent variables and may influence self-management behavior. Figure 1 depicts the relationship between all variables in this study.

Stroke prevention knowledge

Illness representation

Hope

Self-management behaviors among recurrent stroke persons
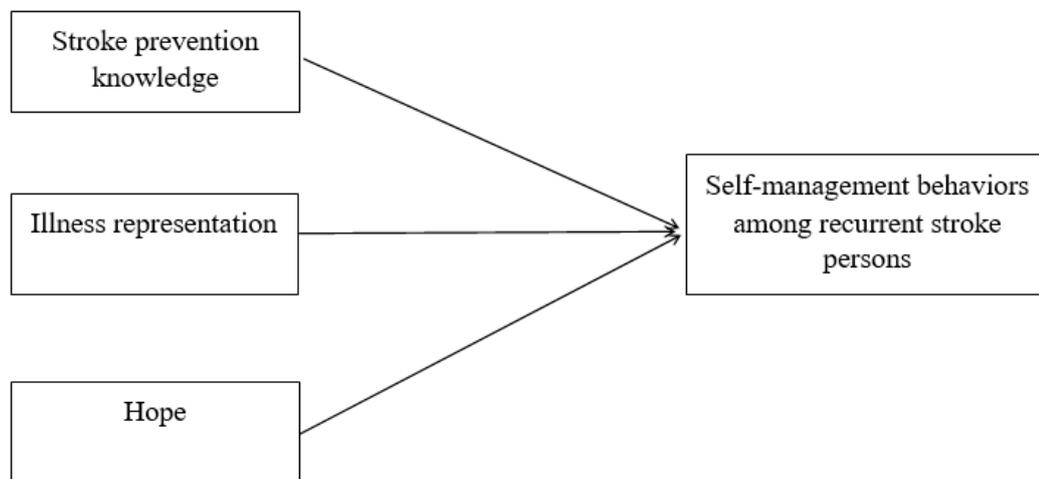
Figure 1 Research framework

Definition of terms

The definitions of variables in this study are as follows:

Recurrent stroke person refers to the person who has had a previous ischemic stroke which occur more than one time.

Stroke self-management behaviors refer to the active management by recurrent stroke persons about their medical, symptoms, role, lifestyle and emotional to promote physical and psychological consequences inherent in living with post stroke condition. It was be measured by the Stroke Self-Management Scale (SSMS) (Kuo, Lin, & Chen, 2021).

Stroke prevention knowledge refers to the information and understanding of a person about stroke care, including knowledge about stroke, physical activity, nutrition, a low-salt diet, smoking abstinence, unhealthy use of alcohol, medication adherence. Signs and risk factors, including BP check-ups, stroke warning symptoms, stroke risk factors and medication. It was measured by Chinese version of Stroke Prevention Knowledge Questionnaire (SPKQ) (Morris et al., 2019).

Illness representation refers to the perception and expectations of persons with recurrent stroke about how the stroke effect on their life and their treatment, which including perceptions of the disease's symptoms, its cause, its duration, its consequences, and the level of control the individual has over the disease. It was

measured by Brief Illness Perceptions Questionnaire (BIPQ), Chinese version (BIPQ) (Wan et al., 2014).

      Hope refers to a kind of belief that made recurrent stroke persons think they will achieve a desired goal in the near future and also referred to a sense of cognition that could guide their behavior. It was measured by the Herth Hope Index (Kaye Herth PhD, 1991), Chinese version (HHI) (Broadbent, Petrie, Main, & Weinman, 2006).
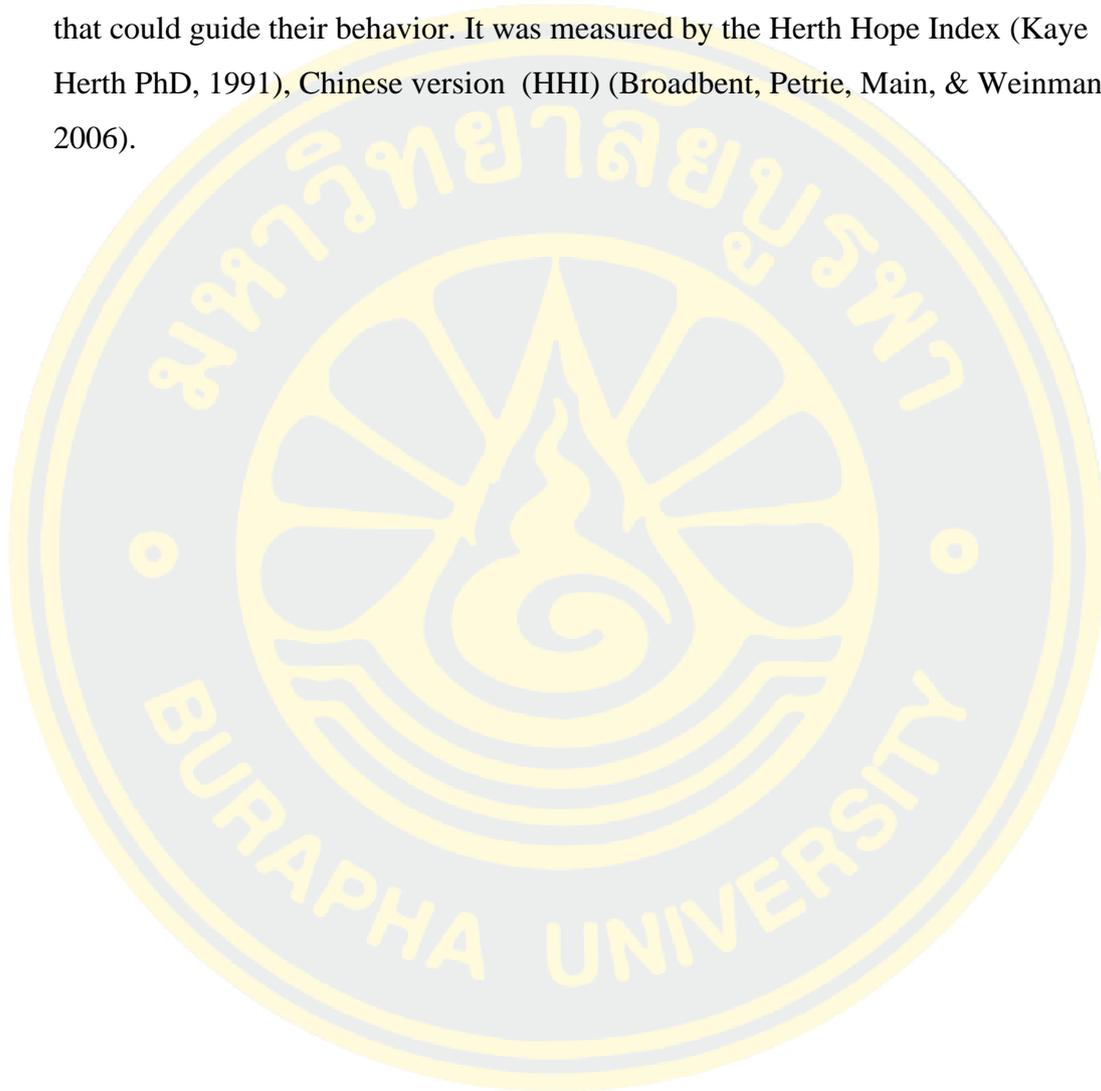
CHAPTER 2
LITERATURE REVIEW

This chapter summarizes ischemic stroke, recurrent ischemic stroke, the self-management behaviors among recurrent Ischemic stroke persons, and the factors influencing the self-management behaviors among recurrent Ischemic stroke persons were as follows.

1. Ischemic stroke

    1.1 Definition of ischemic stroke

    1.2 Epidemiology and risk factors of ischemic stroke

    1.3 Pathophysiology, signs and symptom of ischemic stroke

    1.4 Recurrent Ischemic stroke

        1.4.1 Definition of recurrent Ischemic stroke

        1.4.2 Incidence of recurrent Ischemic stroke

        1.4.3 Effects of recurrent stroke

        1.4.4 Rehabilitation of stroke person and their family support

        1.4.5 Prevention and therapies of recurrent Ischemic stroke

2. The Individual and family self-management theory (IFSMT)

3. Concept of self-management behaviors

    3.1 Definition of self-management behaviors

    3.2 Self-management behaviors among recurrent stroke persons

4. Factors influencing self-management behaviors

    4.1 Stroke prevention knowledge

    4.2 Illness representation

    4.3 Hope

5. Summary

Concept of Ischemic stroke

1. Definition of Ischemic stroke

Stroke is defined as a neurological deficit attributed to an acute focal injury of the CNS (ie, brain, retina, or spinal cord) by a vascular cause (Mei Yaqi, 2015). Stroke is divided into ischemic stroke and hemorrhagic stroke. Ischemic stroke is defined an episode of neurological dysfunction caused by focal cerebral, spinal, or retinal infarction.

Most strokes are ischemic due to reduced blood flow, generally resulting from arterial occlusion. Ischemic stroke accounts for about 85% of strokes and hemorrhagic stroke 15% of strokes, and the proportion of ischemic stroke is higher than that of hemorrhagic stroke in all countries (Sacco et al., 2013; Zhao, 1997) . Ischemic stroke is differentiated from transient ischemic attack by the presence of an infarct on brain imaging. Patients diagnosed with transient ischemic attack, by use of former clinical definitions that were based on symptom resolution within 24 h, have evidence of infarction on diffusion-weighted MRI in approximately 40% of cases and represent a group who are at high risk for recurrent stroke (Krishnamurthi et al., 2018).

2. Epidemiology and risk factors of ischemic stroke

The 2016 Global Burden of Disease data that were published in 2019 indicate that one in five people will have a stroke in their lifetime in china. There are estimated to be 9.6 million ischemic strokes globally each year, with a relatively stable incidence adjusted for age in high-income countries but an increasing incidence in low-income and middle-income countries (Liu & Zhu, 2021). The absolute incidence is expected to increase with an ageing population. Moreover, The Global Burden of Disease data show that the incidence of ischemic stroke in China is on the rise, rising from 112 per 100,000 in 2005 to 156 per 100,000 in 2017, indicating an overall upward trend in the incidence of stroke in China. And it also showed that the prevalence of ischemic stroke in China was 1981 per 100,000 in 2017 (age-standardized rate was 1 470 per 100,000).

Estimations indicate that approximately 90% of strokes are attributable to modifiable risk factors (Calvet et al., 2009). Stroke shares many risk factors with other cardiovascular diseases although their relative importance varies. The most

potent risk factor for stroke is high blood pressure, which applies to both ischemic stroke and intracerebral hemorrhage. Smoking, diabetes, hyperlipidemia, and physical inactivity are also significant risks and require interventions that are regulatory and are based in the community to alter lifestyle and the environment, as well as individual treatment (Pandian et al., 2018). Atrial fibrillation, a specific risk factor for ischemic stroke, is increasing in detection and prevalence (Johnson et al., 2019). Strokes related to atrial fibrillation tend to be larger and more disabling than are strokes due to other mechanisms (O'donnell et al., 2010).

3. Pathophysiology, signs and symptom of ischemic stroke

The primary lesion of ischemic stroke is cerebral infarction. With inadequate supply of blood to cerebral tissue, there is first a reversible loss of tissue function and, given enough time, infarction with loss of neurons and supportive structures. Intracranial atherosclerosis with in-situ thrombosis is also an important mechanism of stroke, particularly in Asian and Black ethnic groups (Chugh et al., 2014). Small vessel disease causes small subcortical infarcts (lacunar stroke) and deep intracerebral hemorrhage. Cervical artery dissection is one of the common causes of stroke in younger patients (e.g., <60 years), and arterial inflammation can also cause stroke (e.g., inflammatory arteriopathy after infection is a major cause of pediatric stroke and can also occur after herpes zoster in adults).

When a cerebral artery is occluded and blood flow decreases below a critical level, neuronal electrical function ceases and a clinical deficit develops. If cerebral blood flow is severely reduced, then irreversible tissue injury will ensue rapidly. However, in many patients, collateral blood supply via leptomeningeal anastomoses or the circle of Willis can be enough to maintain cellular viability for a period of time. These hibernating, but potentially salvageable, brain regions are termed the ischemic penumbra. Reperfusion therapies restore blood flow to the ischemic penumbra and substantially reduce disability after ischemic stroke. The salvageable ischemic penumbra can be identified non-invasively by use of the mismatch between the ischemic core, which is irreversibly injured (estimated using diffusion MRI or severely reduced cerebral blood flow on CT perfusion), and the critically hypo-perfused region (estimated as the region of substantially delayed blood flow arrival) (J. S. Kim, Kim, Ahn, & Kim, 2018; Tu et al., 2010). This estimation of salvageable

tissue by use of perfusion imaging has been successfully used to identify patients who would benefit from reperfusion therapies beyond the standard time windows of 6.0 h for endovascular thrombectomy and 4.5 h for intravenous thrombolysis (Campbell et al., 2012).

Most stroke survivors and their caregivers do not realize that stroke can happen again after the first stroke. It is important to learn and recognize the warning signs and symptoms of another stroke (Soto-Cámara et al., 2020; Wang, 2021) (Albers et al., 2018; Warach, Dashe, & Edelman, 1996). It includes sudden trouble with vision from one or both eyes, sudden difficulties with walking, coordination, dizziness, and/or balance, sudden trouble with speaking, confusion, memory, judgment or understanding, sudden numbness/weakness of the face, arms, or legs, particularly on one side of the body, sudden severe headache (described by survivors as "the worst headache of their life") and difficulty swallowing. Sometimes the warning signs may last a short time and go away. These brief episodes, known as transient ischemic attacks or TIAs, are sometimes called "mini-strokes" (Soto-Cámara et al., 2020).

4. Recurrent ischemic stroke

4.1 Definition of recurrent ischemic stroke

A recurrent stroke was defined as a stroke with clinical evidence of the sudden onset of a new focal neurological deficit with no apparent cause other than that of vascular origin (i.e., the deficit could not be ascribed to a concurrent acute illness, epileptic seizure, or toxic effect) occurring at any time after the index stroke[1], or with clinical evidence of the sudden onset of an exacerbation of a previous focal neurological deficit with no apparent cause other than that of vascular origin occurring > 21 days after the index stroke (Wang, 2021). Recurrent stroke means that the patient has had a previous ischemic stroke, or more than one.

4.2 The incidence of recurrent ischemic stroke

Recurrent strokes make up almost 25% of the nearly 800,000 strokes that occur annually in the United States (CDC, 2022). In a systematic review and meta-analysis, the risk of stroke recurrence was 11.1% within 1 year, 26.4% within 5 years, and 39.2% within 10 years of the first stroke worldwide (Xu, Liu, Wu, Zhang, & Yin, 2007). In one prospective cohort study in Norway, the cumulative incidence of

clinical recurrent IS or TIA was 5.4% at 1 year and 11.3% at 5 years (Oza, Rundell, & Garcellano, 2017). The recurrence rate of stroke is high than that in other countries in the world, and the rate increases gradually with the extension of time. A study in China showed that, the pooled stroke recurrence rate was 7.7% at 3 months, 9.5% at 6 months, 10.4% at 1 year, 16.1% at 2 years, 16.7% at 3 years, 14.8% at 5 years, 12.9% at 10 years, and 39.7% at 12 years after the initial stroke (Mohan et al., 2011).

Studies had shown that the incidence of recurrent ischemic stroke is much higher than that of recurrent hemorrhagic stroke among ischemic stroke persons in China ("Brief report on stroke prevention and treatment in China，2019," 2020). A study of 7,593 patients with ischemic stroke in China, the recurrence rate of stroke at 3 months, 6 months and 1 year was 10.9%, 13.4% and 14.7%. One research which named CHANCE (Clopidogrel in High-risk Patients with Acute Non-disabling Cerebrovascular Events) among 5,170 patients with transient ischemic attack (TIA) or mild ischemic stroke, the 3-month recurrent rate of ischemic stroke was 9.7% and the recurrent rate of hemorrhagic stroke was 0.3%.

4.3 The effects of recurrent stroke

Stroke causes death and disability throughout the world and recurrent events lead to prolonged hospitalization, worsened functional outcome, and increased mortality (He et al., 2017; J. Zhang et al., 2021). Recurrent stroke often results in an accumulation of physical and cognitive disabilities and further loss of quality of life (Khanevski et al., 2019). The most common types of disability after stroke are changes to speech, learning and understanding, and weakness or paralysis on one side of the body (B. Lin et al., 2021). For the psychological harm, depression is common after a stroke (Brouwer et al., 2021). Some recurrent stroke persons may feel anxiety, even have personality and behavioral changes (Tabah et al., 2020). For the family, caregiving for recurrent stroke persons brings physical, psychological, social burdens that leads to an imbalance between the personal lives of caregivers and their care-giving functions. This is likely to negatively affect all aspects of the caregivers' quality of life (Elsheikh et al., 2020).

4.4 Rehabilitation of stroke person and their family support

For people who have had stroke, the ability to return to work and social functions is the key priority. Regular physical activity reduces stroke risk (2018), and

positively affects stroke risk factors. Exercise interventions positively affect disability, aerobic fitness, mobility (walking speed), and functional balance indices after stroke (Rafsten et al., 2018).

In the process of rehabilitation, activities of daily living (ADL) training can promote the improvement of activities daily living, so stroke discharged patients should receive activities of daily living (ADL) training that suits their individual needs and finally adapt to the discharged environment. In the context of defining therapy goals for the post-stroke patient, it is essential that the family be integrated into the process as early as possible. Early involvement of the family unit has been strongly correlated with patient adherence to therapy, better understanding between patient and caregiver of achievable outcomes, and improved communication between patient and caregivers (Mackie et al., 2019; G. Wang et al., 2019). To facilitate optimal outcomes from an exercise-based stroke rehabilitation program, an assessment of familial support should be undertaken. Family members should give stroke persons more care and support, strengthen rehabilitation nursing and carry out more home-based rehabilitation so as to improve their quality of life (Saunders et al., 2020).

Follow the Chinese guideline for the prevention of stroke in patients, all kinds of rehabilitation training have their shortcomings, should be based on individual differences, targeted treatment plan, emphasis on the combination of sensory and motor training, improve the overall rehabilitation effect of stroke patients. Including sensory, limb and other functional rehabilitation, the training intensity should be corresponding to the patient's expectation of the treatment effect and the patient's tolerance. The patient's physical strength, endurance and cardiopulmonary function need to be considered. If conditions permit, the initial stage of at least 45 minutes of daily rehabilitation training can improve the function of the patient. Under the condition that it can be tolerated, appropriately increasing the training intensity is beneficial to improve the functional prognosis.

4.5 Prevention and therapies of recurrent ischemic stroke

Survivors of stroke and transient ischemic attacks are at risk of a recurrent stroke, which is often more severe and disabling than the index event. Optimum secondary prevention of recurrent stroke needs rapid diagnosis and treatment and

prompt identification of the underlying cardiovascular cause. Effective treatments include organized acute assessment and intervention with antithrombotic therapy, carotid revascularization, and control of causal risk factors, as appropriate (Hankey, 2014).

According to the Chinese guideline for the prevention of recurrent stroke in patients (J. Liu & Zhu, 2021). Secondary prevention of ischemic stroke includes optimization of the lifestyle and diet, treatment of risk factors, such as hypertension, diabetes mellitus and hyperlipidemia, prophylaxis of recurrence with antiplatelet treatment in patients with high vascular risk and anticoagulation in atrial fibrillation. Secondary prevention of ischemic stroke includes additional carotid surgery or stenting in selected symptomatic patients after cryptogenic stroke, treatment of insulin resistance, and best medical treatment of intracranial stenosis.

Lifestyle factors, including healthy diet and physical activity, are important for preventing a second stroke. Low-salt and Mediterranean diets are recommended for stroke risk reduction. Patients with stroke are especially at risk for sedentary and prolonged sitting behaviors, and they should be encouraged to perform physical activity in a supervised and safe manner.

Treatment of risk factors, for the hypertension, goal blood pressure for most stroke patients with hypertension is <130/80 mmHg, standardized blood pressure monitoring should be carried out for hypertensive patients.

For patients who have a stroke while prescribed secondary prevention medications, it is important to determine if patients were taking the medications as prescribed, and evaluate reasons for nonadherence, if applicable, before considering a change in therapy. Atrial fibrillation is common in patients with ischemic stroke. Most ischemic stroke patients with atrial fibrillation should be anticoagulated. In most stroke patients, atorvastatin 80 mg daily is recommended to reduce the risk of stroke recurrence and a low-density lipoprotein (LDL) of <70 mg/dl is recommended to reduce the risk of cardiovascular events. Monitoring of blood sugar, In patients with an ischemic stroke or TIA who also have diabetes, multidimensional care (ie, lifestyle counseling, medical nutritional therapy, diabetes self-management education, support, and medication) is indicated to achieve glycemic goals and to improve stroke risk factors. In selected patients, a glucagon-like protein 1 agonist or sodium glucose co-

transporter 2 (SGLT2) inhibitor can be added to metformin. Patients with non-cardioembolic ischemic stroke should be treated with antiplatelet medication, rather than anticoagulation. Short-term dual antiplatelet treatment is recommended in selected patients with symptomatic intracranial atherosclerotic disease or with minor stroke or TIA. Patients with an embolic stroke of unclear source should not be treated empirically with anticoagulation or ticagrelor.

Recurrent stroke is considered to an incompletely reversible disease, so the goal of treatment is not to cure the disease but to change health behavior and to equip persons with the skills to actively participate in disease management to prevent and alleviate symptoms, improve exercise endurance and health status, prevent exacerbation and slow down the disease process.

In a China's Medium-to-Long Term Plan for the prevention and treatment of chronic diseases(2017–2025) Mountain et al. (2020) suggested to focusing on controlling the risk factors of chronic diseases and constructing a healthy supportive environment through health promotion and health management, for the purposes of improving national health quality, reducing the morbidity risk of high-risk groups, raising patients' quality of life, lowering incidence rates, mortality, and disability of preventable chronic diseases, transitioning from a treatment-based to a health-based orientation and promoting health throughout the entire life cycle. (Kong, 2017; Liu & Zhu, 2021) have shown that the self-management ability and quality of life of stroke persons are positively related and that good self-management behavior is essential for patients in stroke recovery to maximize the recovery of bodily functions, promote healthy behaviors, reduce recurrence, and improve long-term survival. Therefore, it is necessary to strengthen the self-management behavior of recurrent stroke persons in daily treatment and disease management.

Concept of self-management behaviors

Definition of self-management behaviors

Self-management, defined as the active management by individuals of their treatment, symptoms, lifestyle and the physical and psychological consequences inherent in living with a chronic condition (Lorig & Holman, 2003). Lo, Chang, and Chau (2018) proposed that self-management refers to the behavior of patients to

maintain and improve their health, reduce the impact of illness on their social functions, emotions and interpersonal relationships, and consistently treat their illness.

Self-management behavior is used to manage chronic diseases and cooperate with other behaviors to promote health (Ryan & Sawin, 2009). Long-term good self-management behavior plays a useful role in developing a healthy lifestyle and increasing adaptive behavior. It plays a useful role in improving overall risk factor control (Sakakibara et al., 2017), and it is associated with improved recovery outcomes.

The definition of self-management behaviors of chronic diseases is very different in daily life and research. Self-management originates from a research project on children with chronic asthma. Self-management refers to individuals living with chronic diseases who engage in health-promoting behaviors or do behavioral management on a daily basis (Creer, Renne, & Christian, 1976). Boger et al. (2015) believed that self-management refers to the strategies adopted by individuals to manage long-term health conditions, which is potentially important for reducing diseases and protecting individuals' health care (Boger, Demain, & Latter, 2015). In view of the above domestic and foreign scholars on the definition of self-management have put forward different views. However, they ultimately expected that self-management could enable patients to achieve their self-goals, improve their ability of activities of daily living and prevent disability (Chen, Kao, & Hu, 2018; Lin, Liu, Hsu, & Tsai, 2017). Therefore, the accurate definition of terms is the key to science and practice.

In this study, self-management behavior is defined as the health behavior implemented by individuals in the process of dealing with diseases and daily life. People have acquired the necessary behavior to manage and deal with diseases in their daily life, individuals can correctly monitor and timely deal with disease symptoms and take action to reduce the impact of diseases on all aspects of individuals, maintain and improve their own health. Self-management includes medical behavior management, life role management and emotional management.

Medical management refers to the way in which persons can understand their own disease, prevention, symptom treatment and treatment of needle disease, and carry out health-promoting behaviors, such as: doctor's advice compliance,

regular return, understanding of disease symptoms or rehabilitation exercise, drug use, exercise, diet control and other behaviors to prevent stroke again (Lin et al., 2017; Pal et al., 2018). Role management refers to that patients can engage in meaningful activities to promote physical health (Lin et al., 2017). When most patients are diagnosed with stroke, they often feel negative and depressed. Especially in poor health, the disease prevents them from continuing their previous work. Therefore, they must change their role and actively participate in therapeutic health behaviors, such as changing their lifestyle and developing new ways of rehabilitation activities. Changing working hours and looking for health-promoting treatments or advice and information related to stroke (Audulv, Ghahari, Kephart, Warner, & Packer, 2019; Been‐Dahmen, Dwarswaard, Hazes, van Staa, & Ista, 2015). Patients after stroke often show strong negative emotions, which are difficult for them to control. Emotional management refers to patients who can deal with the positive emotions caused by chronic disease, adopt a positive attitude to face negative emotions and keep calm (Audulv et al., 2019).

Self-management behaviors among recurrent stroke persons

The recurrent stroke persons' self-management behavior refers to individuals' behavior in daily life to monitor and management of disease through proactive health behaviors, which reduce the effects of disease through treatment, disease maintenance and health promotion (Oh et al., 2021). Self-management 9behaviors of recurrent stroke persons mainly include medication adherence, health behavior (Monitor blood pressure and blood sugar regularly, aerobic training session and quitting smoking etal.), and keep a positive mood (Swerissen et al., 2006).

Recurrent stroke persons should change their bad living habits and form a good lifestyle (Guan et al., 2018). Instruct patients to eat a light diet with high protein, high vitamin, low salt, low fat and low calorie (Huang et al., 2019), quit smoking (Wein et al., 2018) and limit alcohol consumption (Faiz, Labberton, Thommessen, Rønning, & Barra, 2019). For stroke persons with hypertension, they should prepare a sphygmomanometer at home, measure blood pressure at fixed time every day (such as when they get up in the morning and rest quietly at night), record the daily blood pressure, and communicate with the competent physician regularly to control blood pressure at an appropriate level as far as possible.

Aerobic exercise can help break this relentless cycle by improving aerobic capacity, walking ability, vascular health, and quality of life of stroke survivors (Parikh et al., 2021). A minimum of 8 weeks of aerobic exercise is recommended to achieve a clinically meaningful training effect. The minimum time to make the long-term physiological and behavioral adaptations to exercise varies from person to person. In general, 8 weeks of aerobic exercise is considered the minimum for these adaptive responses to occur. Structured aerobic exercise should be conducted a minimum of 3 d/wk. Aerobic exercise sessions of >20 minutes are recommended, depending on exercise frequency and intensity (Hornnes, 2021) . Although healthy lifestyle practices mitigate recurrent stroke risk and mortality, few stroke survivors adhere to them, particularly among socioeconomically disadvantaged communities (Ali et al., 2021).

Medication adherence is a key self-management behavior for recurrent stroke patients (MacKay-Lyons et al., 2020). Elevated blood pressure is the single most important risk factor for stroke, and is also regarded as the most important modifiable risk factor (Towfighi et al., 2020). Numerous population-based studies have found that elevated blood pressure is a significant risk factor for first and recurrent stroke (Wein et al., 2018). Some studies show that effective strategies to prevent recurrent ischemic stroke in the long term include antiplatelet therapy, anticoagulation (Ruksakulpiwat, Liu, Yue, & Fan, 2020). However, stroke persons do not typically maintain regular medicine habits. Many factors contribute to regular medicine habits, such as financial constraint, family support, several doses, knowledge about the medicine, perception of illness, and medication beliefs (Kuijpers et al., 2018; Wajngarten & Silva, 2019) . External factors such as limited information resources, low perceived severity, poor social environment, and poor communication add to the challenges of post-stroke persons to improve their self-efficacy of managing their medications (Cheiloudaki & Alexopoulos, 2019).

Besides, keeping a positive mood is an integral part of the self-management behavior of recurrent stroke persons. Post-stroke depression (PSD) (Bartoli, Di Brita, Crocamo, Clerici, & Carrà, 2018) is the most common mental health issue, afflicting around 33% of stroke survivors. PSD has a negative impact on the rehabilitation, recuperation of motor and cognitive deficits following stroke and significantly

increases the chances of relapsing neurovascular events (Jia Zhang et al., 2021). Early detection and proper management are critical to obtain better outcomes in individuals with PSD (Appalasamy et al., 2019).

Obviously, performing self-management behaviors among stroke persons still be problematic. Similarly, recurrent stroke persons have the same problem. Compared with patients with first stroke, patients with recurrent stroke have higher mortality and disability rates (Das & Rajanikant, 2018). Therefore, it is necessary to increase the comprehensive understanding of the self-management behavior of patients with recurrent stroke.

In China, recurrent stroke control and prevention has become a great challenge for China (Z. Li, Jiang, Li, Xian, & Wang, 2019) , data showed that the pooled stroke recurrence rate was 7.7% at 3 months, 9.5% at 6 months, 10.4% at 1 year, 16.1% at 2 years, 16.7% at 3 years, 14.8% at 5 years, 12.9% at 10 years, and 39.7% at 12 years after the initial stroke (B. Lin et al., 2021). Because of its high disability rate and fatality rate (Medeiros, Roy, Kontos, & Beach, 2020), it not only brings great burden to individuals, families, and even (Chen et al., 2020).

Although there are a large number of recurrent stroke persons in China, but there is a lack of treatment and management of stroke persons. Xing et al. (2020) shows that participants with first-ever stroke tended to ignore or are unaware of recurrence risk, while recurrent events led to awareness of the severity of recurrence, but made them feel powerless. Moreover, survivors with multiple relapses showed a triple attitude toward recurrence risk. It also found that the unmet need for medical information was a general problem among most participants in this study, especially in terms of warning signs and the treatment time window. However, in these interviews, it was found that almost all survivors had only recently heard of the risk of recurrence and had limited knowledge about the likelihood of recurrence. Still, they rarely considered the possibility of susceptibility to recurrence; this result could be related to the Chinese cultural context, as people prefer to adopt an optimistic attitude and discuss positive outcomes (Lin, Wang, Rong, Huang, & Peng, 2021).

Some studies in China show that the level of self-management behavior in stroke persons is low and needs to be strengthened (Guan, Wang, & Lian, 2018; Mu, Li, Liu, & ZHENG, 2016). Studies consistently show medication adherence to be

suboptimal within the stroke population (Beilei Lin et al., 2021). In addition to, the utilization rate of stroke rehabilitation clinics in the United States was 35.5% (Liao, Wu, Ni, & Mao, 2019), while it was less than 20% in China (Laver et al., 2020), especially in economically underdeveloped rural areas, where the recurrence rate of ischemic stroke is higher (Ayala et al., 2018). Previous studies have shown that only very few stroke persons (16.9%) recognize the initial signs of stroke (Z. Qiu et al., 2017). Therefore, it is of great practical significance to take targeted prevention and intervention measures to improve recurrent stroke persons' self-management behaviors, reduce the risk of stroke recurrence, reduce the recurrence rate and disability rate of patients, and improve the quality of life of patients.

The Chinese concept holds the family to be inseparable from individual behavior, under the influence of this traditional culture, the family is very important to the individual in China (X. Qiu, Sit, & Koo, 2018). When an individual is in the stage of illness, the role of the family will be particularly important in China. Family members will consciously assume the responsibility of taking care of patients and provide support to patients (Han et al., 2020).

As a chronic disease, recurrent stroke has a high incidence and disability rate. Although it is preventable and controllable, it will affect all aspects of personal and family life, thus complicating disease management, so individuals and families are required to participate in disease management and re-establish an acceptable lifestyle (Jiang et al., 2016).

In Wenzhou, China, family mainly refers to the patient's partner, children, parents and other relatives. Under the influence of this traditional culture, the family is a very important individual in China. The family affects every stage of the individual. When an individual is in the stage of illness, the role of the family will be particularly influential, and family members will consciously assume the responsibility (X. Qiu et al., 2018) of taking care of the patient and provide support to the patient, including providing information about the disease, taking care of their dietary needs, arranging to see a doctor, and drug support, and supervising normal lifestyle management (taking medicine on time, exercising, quitting smoking and eating a healthy diet).

Therefore, this study is based on the theoretical model of individual and family self-management. To explore the influence between stroke prevention knowledge, illness representation, hope, and short-term outcome (personal and family self-management behavior) among recurrent stroke persons.

The Individual and family self-management theory (IFSMT)

Individual and family self-management theory (IFSMT) is a new mid-range descriptive theory by Ryan and Sawin (2009). Individual and family SM (Ryan & Sawin, 2009) includes the purposeful incorporation of health-related behaviors into an individual or family's daily functioning. The family unit is not limited to biological families. Individual and family SM prevents or attenuates illness or facilitates the management of complex health regimens in ways that reflect individual and family values and beliefs in personally meaningful ways. The individual or family assumes responsibility for individual and family SM and it may occur in collaboration with healthcare professionals.

The IFSMT proposes that SM is a complex dynamic phenomenon consisting of 3 dimensions: context, process, and outcomes. Factors in the contextual dimension influence individual and family engagement in the process of SM as well as directly impact outcomes. Enhancing the individual's and families' SM processes results in more positive outcomes. The third dimension of the theory relates specifically to outcomes. Outcomes are proximal or distal. While the outcomes of concern are those related to individuals and families, improvement of individual and family outcomes translate to improved outcomes for healthcare practitioners and systems (Ryan & Sawin, 2009).

Context (Risk and protective factors)

Condition-specific is defined as a physiological, structural, or functional characteristic of the conditions, its treatment, or prevention of the conditions that impact the amount, type, and critical nature of behaviors needed to manage the conditions (i.e., complexity of conditions or treatment, trajectory, physiological stability, or physiological transitions). The physical and social environment is defined as physical or environmental factors that enhance or hinder the self-management of individuals and families, and include factors such as access to health care, transition in health care providers or setting, transportation, neighborhoods, school, work, culture, and social capital. Individual and family factors are those characteristics of individual and family directly, such as developmental stages, learning ability, literacy, family structure or functioning, and self-manage capacity.

Process (The self-management process)

The process dimension of IFSMT is based on the dynamic interaction among condition-specific knowledge and beliefs, acquisition and use of self-regulation skills and abilities, and social facilitation and negotiation. And it has three main categories.

Knowledge and beliefs are defined as factual information and perceptions about a health condition or health behavior, and the knowledge and beliefs impact behavior-specific self-efficacy, outcome expectancy, and goal congruence. In this study, stroke prevention knowledge, Illness representation, hope belong to the concepts of knowledge and belief.

Self-regulation is the process used to change health behavior and includes activities such as goal setting; self-monitoring and reflective thinking; decision-making; planning for and engaging in specific behaviors; self-evaluation; and management of physical, emotional and cognitive responses associated with health behavior change.

Social facilitation includes the concepts of social influence, social support, and negotiated collaboration between individuals and families and healthcare professionals.

Proximal and distal outcome

This dimension includes proximal or short-term outcomes that lead to the attainment of the distal outcomes. Proximal outcomes include individual and family self-management behaviors (engagement in activities and treatment regimens, recommended pharmacological therapies, and symptom management), and cost of health care services. Distal outcomes include health status, quality of life, and cost of health.

According to Ryan and Sawin (2009), which explain that the context, risk, and protective affect each other. Together, factors in the context dimension affect an individual's and family's ability to engage in the process dimension and have direct impact on outcomes. Social facilitation is inter-related with knowledge and beliefs and self-regulation. Constructs in the process dimension are linked to constructs in the context dimension, are internally related, and affect the outcome dimension. Constructs of the outcome dimensions are affected by both context and process dimensions. Outcomes are proximal and distal, with achievement of proximal outcomes causing, at least in part, distal outcomes.

According to the thought of Ryan and Sawin (2009), individual and family-centered interventions impact SM by addressing either the context or the SM process. Interventions aimed at the context can reduce risk or foster conditions that support SM. Interventions aimed at the SM process can enhance knowledge and beliefs, increase an individual's use of self-regulation behaviors and foster social facilitation.

In IFSMT, many factors are related to self-management behavior, and these factors may directly or indirectly relate to self-management behavior. On this basis, some factors are selected as independent variables. The researchers summarized the influence between these factors and recurrent stroke self-management behavior, including stroke prevention knowledge, illness representation, and hope.

Illness representation, stroke prevention knowledge and hope were all belong to the process in IFSMT. The person's illness representation reflects a person's behavior in various ways in response to a threat or disease (Jingjun Zhang & Lee, 2019). When combined with action plans, illness representations direct decisions and behaviors related to threat self-management behaviors. Ryan and Sawin (2009) propose that the improvement of knowledge can increase the understanding of self-

management behavior and increase self-efficacy. Knowledge were mentioned as critical to the success of a person's ability to self-management. In patients with chronic illness, hope is a prerequisite to effective coping and decision-making, and it has a protective function against stress (Park et al., 2020), performing better self-management behaviors, which will make them more likely to achieve better patient outcomes (Yıldırım & Arslan, 2020).

IFSMT shows that the above three factors may have an influence with self-management behavior. Previous studies have shown an influence between that stroke prevention knowledge, illness representation, hope and self-management behavior (Leventhal et al., 2016; Lu, Mårtensson, Zhao, & Johansson, 2019).

Some studies have concluded that if patients do not know about the disease, the effects of drugs and treatment, they will have no ideas to promote self-management behaviors (Brouwer-Goossensen et al., 2018; Irani et al., 2019). If the persons realize illness representation, they will take the right behavior to prevent the disease (Dong et al., 2020). As knowledge improves, self-management behavior will be further understood and self-efficacy will be increased (Ryan & Sawin, 2009). And hope is motivation, which is a prerequisite to effective coping and decision-making, and it has a protective function against stress (Park et al., 2020).

Therefore, guiding by the IFSMT, in this study, stroke prevention knowledge, illness representation, hope is presented as the independent variables and may influence the self-management behavior among recurrent stroke persons.

Factors influencing self-management behaviors

Many studies have explored or verified factors influencing self-management behaviors among stroke persons. For example, stroke prevention knowledge, education level, financial status, social support, post-stroke depression, self-efficacy, hope, illness representation .

However, these studies did not focus solely on recurrent stroke persons. The above findings are difficult to be directly popularized in recurrent stroke persons. The independent variables of interest in this study were selected based on Individual and family self-management theory and combined with literature review. Meanwhile, given the characteristics of recurrent stroke persons, this study finally chose stroke

prevention knowledge, illness representation and hope as the influencing factors of inquiry.

Stroke prevention knowledge

Stroke prevention knowledge refers to the information and understanding of a patient about stroke care, signs and risk factors, medication (L.-N. Kong et al., 2021). For example, Hypertension (HTN) is an independent risk factor for ischemic stroke. Over 60% of acute stroke patients have elevated blood pressure. Large-scale cohort studies have also shown that effective blood pressure control can reduce the occurrence of ischemic stroke (McAndrew et al., 2018). Hypertension control is an important part of stroke patients' self-management (). Efforts to increase medication adherence, diet and stress management should be enhanced to control blood pressure for preventing recurrence of stroke.

Ryan and Sawin (2009) expressed the opinion that improvement of knowledge will increase the understanding of self-management behavior of persons. Studies reported that self-management in patients who had a stroke is positively related to knowledge on stroke (Soto-Cámara et al., 2020; Wei et al., 2021). One study showed that In the present study, stroke self-management knowledge has direct, indirect, and total effects on stroke self-management (Qu et al., 2019). The study found that stroke knowledge can affect the self-management behavior, and the higher the knowledge of stroke, the higher the level of self-management behavior of patients ($r = 0.369$, $p < .001$) (Mu et al., 2016). And the stroke knowledge is positively correlated with the self-management behavior of stroke persons, that is, stroke persons with high self-management level can better monitor the disease and exercise rehabilitation (Choi & Lee, 2017). Awareness is the key factor in determining the behavior of the sufferer, the more knowledge you have about the disease, the more positive and healthy behaviors you can adopt. It means that may be stroke knowledge influencing self-management behavior of recurrence stroke persons.

Illness representation

Illness representation is patients' beliefs and expectations about an illness or somatic symptom, including its effect on their life and their treatment, which comprise several dimensions, including perceptions of the disease's symptoms, its

cause, its duration, its consequences, and the level of control the individual has over the disease (H. Kim et al., 2017).

Illness representation is a subjective view that focuses on one's experience and condition due to an illness, and it offers insight into how health behaviors of chronic patients can be sustained (Leventhal, Leventhal, & Cameron, 2001). It is influenced by cognitive and emotional aspects, such as the expected timeline of the illness, life consequences due to the illness, how the illness is controlled or treated, the identity and cause of the illness, and emotions, such as fear or anxiety related to the illness (Leventhal, Diefenbach, & Leventhal, 1992). Individual illness perception acts as a driving force and starting point for coping with and action plans for illness(Cameron & Leventhal, 2003).

It helps persons take the right behavior to prevent stroke recurrence (McAndrew et al., 2018). (Leventhal et al., 2016) proposed a self-management framework that discusses a person's illness representation reflects a person's behavior in various ways in response to a threat or disease. Some studies found that the persons always had normal drug-taking behavior when they realized that the disease could be treated with drugs (Ruksakulpiwat et al., 2020). When the patient realizes that the disease is a chronic disease, he or she will be given continuous medical care (Kongkaew et al., 2020). When patients realize that the impact of stroke is very serious and have a high degree of anxiety and fear, they decide to receive early treatment (Dhand et al., 2019; Soto-Cámara et al., 2019).

For example, a person with sore throat. An individual might identify the sore throat as the beginning symptoms of a cold (label). The initial cold label determines that it is an acute condition (timeline), with minor consequences, potentially caused by a number of factors. It can usually be cured (control/cure). Taken together, these attributes of the illness representation making up the "cold profile" will lead the individual to engage in common-sense health behaviors, such as drinking lots of fluid, getting some rest, and combating the cold symptoms with over-the-counter remedies. The emotional reactions during these cognitive processes, as conceptualized in the parallel processing model, are likely to be muted, maybe ranging from annoyance about the potential impact on work to worrying that the cold is a precursor to something more serious (illness coherence) (Diefenbach, 2007).

A study of elderly stroke patients showed that stroke illness representation was at a moderate level (M = 3.58, SD = .28), and preventive recurrence behavior was at a moderate level. The total recurrence rate of stroke was high (M= 3.16, SD= .39), and there was a moderate positive correlation between illness representation and prevention behavior (r = .33, p < .001) (Kongkaew et al., 2020). Therefore, the illness representation may be an important influencing factor for self-management behaviors. However, if persons with recurrent stroke think they have recovered and don't realize that the disease will recur, they will stop taking the medication and do not receive treatment at a specified time (Suangpo, Srisangpang, & Sangsuwan, 2014).

Hope

Hope refers to a kind of belief that made individuals think they could achieve a desired goal in the near future and also referred to a sense of cognition that could guide people's behavior (Henh & Cutcliffe, 2002). Moreover, hope is a thought process that almost all people use throughout their life, especially when they are facing illness and/or losses (DuFault & Martocchio, 1985). In patients with chronic illness, hope is a prerequisite to effective coping and decision-making, and it has a protective function against stress (Park et al., 2020). Stress is reduced because hope encourages the strength needed to solve problems and to face losses and suffering, and this improves quality of life (Kim, Kim, Kim, & Cho, 2022). Although the mechanism is not yet clear, hope is believed to effectuate a positive effect on neurotransmission, which helps to promote neur recovery in stroke patients (Jørgensen & Rendtorff, 2018). Moreover, hope was found to be one of the predictors of positive rehabilitation outcomes (Morris et al., 2019). A previous study found that if patients had hope, they were more likely to overcome their stress and obstacles, perform better health behaviors, which made them more likely to achieve better patient outcomes (Yıldırım & Arslan, 2020). For instance, patients with a higher level of hope were likely to perform better health behaviors (Sullivan & Waugh, 2007). Moreover, Hope was also found to have a positive relationship with Internal Health Locus of Control (IHLC) (β = .278, p < .01), self-management (β = .249, p < .01) in one study. It means that hope may influence self-management behavior among recurrent stroke persons.

Summary

Recurrent stroke has become a health problem that cannot be ignored all over the world, including in China. Stroke recurrence rate, fatality rate, disability rate is very high, although it cannot be cured, but it can be prevented, effective treatment and behavior changes are very important in the early stage of the disease. Adhere to self-management behavior, prevent symptoms, prevent the risk of deterioration, slow down the disease process, and maintain a normal life and work. But at present, in China, many recurrent stroke persons do not know that they will have a recurrence again, and even patients with multiple relapses do not know what measures they should take to prevent it again, even take a negative attitude in the face of illness. However, in China most studies about the relationship between these variables are focused on first ever stroke person or mix all condition of stroke persons. Even if the evident in China show that the stroke persons had low self-management behaviors. Also, there are no studies on the self-management behaviors and the relationship between these three factors in recurrent stroke persons in China, including Wenzhou. Therefore, it is urgent to identify the factors influencing with self-management behavior among recurrent stroke persons.

Accordingly, guided by the individual and family self-management theory (IFSMT), the researcher conducts this study to describe self-management behaviors among recurrent stroke persons in Wenzhou China and determine whether the stroke prevention knowledge, Illness representation, hope can predict self-management behaviors among recurrent stroke persons in Wenzhou China.

CHAPTER 3
RESEARCH METHODOLOGY

This chapter presented the research methodology including research design, population and sample, setting of the study, instruments, ethical consideration, data collection procedures, and data analysis procedures.

Research design

A predictive correlational research design was used for this study to describe self-management behaviors among recurrent stroke persons and to determine whether stroke prevention knowledge, illness representation, hope can influence self-management behaviors among recurrent stroke persons.

Population and sample

Population

The target population of this study was the persons diagnosed with recurrent ischemic stroke and discharged from hospital more than 1 month. Moreover, they receiving care and follow-up visits at Neurology the out-patient department of the Second Affiliated Hospital of Wenzhou Medical University in Wenzhou, China. The information collected from Neurology out-patient department shows that approximately 40 to 60 stroke survivors, 10 to 15 belong to recurrent stroke persons every week.

Sample

The samples of this study were persons with recurrent ischemic stroke who came to visit the Neurology out-patient department of the Second Affiliated Hospital of Wenzhou Medical University in Wenzhou China for follow up their health. The recruit samples follow inclusion criteria as follows:

1. Age: >18 years old

2. History of ischemic stroke ≥ 2 time

3. Conscious, the Glasgow Coma scores (GCS) = 15 by Glasgow Coma Scale

4. The activities of daily living (ADL) scores > 60 by Barthel Index

5. Be able to communication and writing in mandarin of China

6. There is no mental illness in medical history

Sample size

The sample sizes in this study were calculated by using the G*Power 3.1.9.7 program for predictive correlational design. The researcher tests the influence between the self-management behavior and each independent variable. In this study, the researcher estimates a medium effect size .15 and wants to achieve a power of .90 and $\alpha = .05$ was used for computing the sample size, which leads to at least 99 participants needed. 100 participants were included in the study.

Sampling technique

In this study, a simple random sampling method was used to recruit participants, and each participant had an equal chance to be selected. The researcher explained the data collection procedures to Neurology out-patient department staffs and get their cooperation. The researcher asked the nurses in all Neurology out-patient departments for the basic information of recurrent stroke persons who make follow-up appointments, and then the researcher recorded the patients who met the inclusion criteria.

After that, Microsoft Excel was used to number them and randomly selected 50% of these patients as participants through the generated random numbers. Then the outpatient nurse given the recurrent stroke persons the information about this research and asked them if they were interested in this study. If they were interested in this study, the nurse in the neurology clinic contacted the researcher, and then the researcher introduced herself to the recurrent stroke persons, informed them about the study, its purposes, data collection process, and human right protection.

In addition, data collection can only be carried out after persons' consent is signed. Approximately 20 to 30 persons could be recruited every month. When the number of participants reached the required sample size, the recruitment was stopped, and the next phase of this study proceeded.

Study Setting

The study was conducted by the Neurology out-patient department of the Second affiliated Hospital of Wenzhou Medical University, in Wenzhou, China. The Second Affiliated Hospital of Wenzhou Medical University has a total of five districts, two of which have neurology outpatient department. Each Neurology out-patient department with four rooms in this hospital, which are open five days a week (Monday to Friday) from 08:00 to 12:00 am and from 01:00 to 04:30 pm. The all Neurology out-patient department with eight rooms serve about 10 to 15 recurrent stroke persons every week. The Neurology out-patient department are managed by 8 neurologist and 4 registered nurses without other health care providers.

In the out-patient department, the doctor mainly asks the patient whether there is any discomfort recently, whether the recent treatment is effective, whether the medication is on schedule. The patient's health is then assessed, and a checklist is issued. The doctor then answers questions to patients and their families based on the results of the examination and adjusts the treatment plan. The registered nurse will tell the patient the details of the exam, such as the location of the exam and what to do during the exam. And the nurse will cooperate with the doctor to give the patient a physical examination. For the prevention of stroke recurrence, nurses should do health education, including health management behavior, emotional management and so on. Appropriate behaviors include proper diets (i.e., avoiding foods with high sodium, sugar, and fat), weight control, exercise, stress management, blood pressure control, blood sugar control, lipid control, and heart disease control. Moreover, nurses will tell patients and their family members how to do it in detail, such as what kind of exercise to do, when to do it, and for how long. Finally, the nurse will inform the persons when the next follow-up visit. But sometimes the nurses don't give the recurrent stroke persons so much details because of their busy duty. Moreover, some recurrent stroke persons think that their stroke happened a long time ago, that they are cured and don't need to know that much.

The recurrent stroke persons usually were accompanied with family members and considering of the research main body, the family members' opinion were not referred to recurrent stroke persons' decisions.

Research Instruments

The five questionnaires were used for collecting data: a demographic questionnaire, Stroke Self-management Scale (SSMS), Stroke Prevention Knowledge Questionnaire (SPKQ), Brief Illness Perceptions Questionnaire (BIPQ), Herth Hope Index (HHI).

The Demographic Questionnaire

The demographic questionnaire was developed by the researcher, specific for this study. It includes 1) General information: gender, age, religion, education level, marital status, occupation, how many family member, main caregiver, family income, residence, and healthcare payment scheme; 2) Health information: BMI, type of stroke, site of stroke, duration of disease, number of recurrent stroke, family history of stroke, the scores of NIHSS, GCS, ADL and modified Rankin Scale (mRS) (both the scores on admission, the day of discharge and the data collected day), types of disability, number of comorbidities, source of stroke education, participated in exercise. The information from the first part of the demographic questionnaire was obtained by participants' self-report, and the second part was obtained from the medical record.

Physicians followed the scoring criteria of the NIHSS and its classification of the degree of stroke. That is, a score of 0 represents normal, 1-4 represents a mild stroke and a score of 5-15 means a moderate score, which are the grading criteria used in this study (Hoffman, 2017).

The GCS indicates three different levels of severity of head injury depending on the scores, with 3-8 indicating severe head injury, 9-12 representing moderate, and 13-15 being mild. A score of 15 often suggests conscious (Teasdale & Jennett, 1976).

In terms of ADL, it was measured by nurses according to the Barthel Index (BI) in the research setting of this study. Regarding the description of different ADL levels, this study used the grading criteria provided by the hospital, which is widely used in China. Specifically, a score of 0-40 refers to severe dependence, 41-60 indicates moderate dependence, 61-99 represents mild dependence, and 100 means independence (B. Liu, Tan, Wang, & Liu, 2016).

Besides, the mRS is a scale of six levels, with each point representing a level

of disability. A score of 0 means no symptoms, a score of 1 means no significant disability despite symptoms. A score of 2 to 5 represents mild disability, moderate disability, moderately severe disability, and severe disability, respectively (Broderick, Adeoye, & Elm, 2017).

Stroke Self-management Scale（SSMS）

The SSMS was used to measure the ability of self-management behaviors among recurrent stroke persons. The SSMS was designed by Chinese researcher Rivera et al. (2018). It was developed based on the scale contents of four previous studies . The scale contains 30 items, and is divided into 3 parts, namely, medical management (13 items), role management (12 items), and emotional management (5 items). A five-point Likert scale was used for scoring, and the mean score of each scale dimension was 30–150 points. The higher score indicate the stronger the self-management ability of stroke patients. For explanation the level of self-management behavior, score indicator is used for grading, score indicator = (the actual score of the dimension/the highest score of this dimension) × 100%, score indicator below 60% is low, 60% - 80% is moderate, more than 80% is considered high (Kuo, Lin, & Chen, 2021).

The quality of this instrument showed content validity index (CVI) value was .96, while the surface validity (dichotomy) was .95. Moreover, the Cronbach's α value of the overall self-management scale was .93. In particular, the Cronbach's α value of the medical self-management was .91, that of the role of self-management was .90, and that of the emotional self-management was .68.

Stroke Prevention knowledge questionnaire (SPKQ)

The SPKQ was used to measure the level of stroke knowledge among recurrent stroke persons. Based on a comprehensive review of previous studies on patients' stroke knowledge , the Chinese professor Fukuhara et al. (2019) designed and developed the SPKQ. The initial draft was tested on 20 patients, followed by the refinement of ambiguous questions or the deletion of redundant questions before the preparation of the final questionnaire.

It composed of 25 items, covers 10 main areas using close-ended questions and assesses patient knowledge in each area. These areas of knowledge include physical activity, nutrition, a low-salt diet, smoking abstinence, unhealthy use of

alcohol, medication adherence, BP check-ups, stroke warning symptoms, stroke risk factors, and prehospital delay knowledge. The participants was asked to respond to whether they have knowledge of each topic in the questionnaire. One point was given for each question that "correct" answer and zero for each "incorrect" answer or unsure answer.

The final score was converted into a percentage system. In other words, the standard score = the sum of the scores of each area × 4. The score of 60 was a passing score, and participants with a score below 60 indicated poor knowledge of stroke. The higher the score, the higher the level of stroke knowledge. In this scale, Cronbach's alpha was .89 that was good reliability and validity.

Brief Illness Perceptions Questionnaire (BIPQ)

The BIPQ was used to measure the level of illness representation among recurrent stroke persons. It was developed by Berg, Ritschel, Swan, An, and Ahluwalia (2011), and translated to Chinese by Kuo, Lin, and Chen (2021), the scale has 9 items in total and 3 dimensions, namely disease cognition, emotion and disease understanding dimensions. Five of the items assess cognitive illness representations: consequences (Item 1), timeline (Item 2), personal control (Item 3), treatment control (Item 4), and identity (Item 5). Two of the items assess emotional representations: concern (Item 6) and emotions (Item 8). One item assesses illness comprehensibility (Item 7). Moreover, there is 1 open question, which asks patients to list the three most important causal factors in their illness (Item 9). Responses to the causal item can be grouped into categories such as stress, lifestyle, hereditary, etc., determined by the particular illness studied, and categorical analysis can then be performed. To compute the score, reverse score items 3, 4, and 7 and add these to items 1, 2, 5, 6, and 8. A higher score reflects a more threatening view of the illness.

All of the items except the causal question are rated using a 0-to-10 response scale. For example, "How much does your illness affect your life: 0 [not at all] – 10 [severely affects my life]", the score ranges from 0 to 80, and the higher the score, the more cognitive representations of illness, which means that the persons have a higher perception of the harm of the disease, and thus make better self-management behaviors. And the Cronbach's α reliability coefficient of chinese version is .77.

Herth Hope Index (HHI)

The HHI was used to measure the level of hope among recurrent stroke persons. The HHI was developed by Kaye Herth (1991) and translated into Chinese by Zhao (2000). The scale has 12 items, and each item is rated on a four-point Likert-type scale ranging from 1= strongly disagree to 4 = strongly agree. The total score ranges from 12 to 48. A higher score indicate a greater hope level. Moreover, for describe scores of 12 to 23 were defined as low level of hope, a score of 24 to 35 was defined as moderate level of hope , a score of 36 to 48 was defined as high level of hope . The Chinese version of the HHI was tested in the Chinese population with a Cronbach's alpha of .85.

Psychometric properties of the instruments

The Chinese version of all the instruments which used in this study, they were tested and validated by the experts in some previous studies, which means all instruments have good validated. The Cronbach's alpha can be found in previous studies to show that the reliability of all instruments applied in this study is ideal. For this study, the reliability of each instrument was tested with 30 participants as a tryout prior to the formal data collection, and the Cronbach's α coefficients of the Stroke Self-Management Scale (SSMS) was .84, the Stroke Prevention knowledge questionnaire (SPKQ) was .81, the Brief Illness Perceptions Questionnaire (BIPQ) was .81, and the Herth Hope Index (HHI) was .84.

Protection of human rights

This research was not carried out until the research proposal was approved by the Institutional Review Board (IRB) of Burapha University in Thailand (Protocal code: G-HS016/2565) and the Ethics Committee in Clinical Research (ECCR) of the Second Affiliated Hospital of Wenzhou Medical University in China (2022-K-52-01). Before the data collection process started, the researcher obtained the approval of the manager of the research setting to enter and conduct the investigation. The use of the research instruments was authorized by the developer of the original version and the translator of the Chinese version.

Before collecting data, the subjects was introduced to the purpose and process of the research, and the participants were voluntary in this study. During the study, they had the right not to answer questions, and they also had the right to change their minds and refused to participate in the project at any time, and the refusal would not affect the medical services they received. After obtaining informed consent from the participants, the informed consent was issued to the patient and signed. The survey was conducted anonymously, and the personal information of the participants was kept confidential.

In the process of data collection, questionnaires were numbered to protect the privacy of research objects. The information collected was stored in a specific and secure location. The data was used only for research purposes and will be destroyed after the study results are publish 1 year, and patients can contact the researchers if they need the data.

Data collection procedures

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

1. After being approved by Graduate school of BUU, the researcher submitted recommendations for ethical review to IRB of BUU and IRB of the Second Affiliated Hospital of Wenzhou Medical University in China.

2. The researcher asked Graduate school of BUU and the Second Affiliated Hospital of Wenzhou Medical University in China for permission to collect data on the objectives and procedures of the research information.

3. After the researcher obtained the permission of the Second affiliated Hospital of Wenzhou Medical University, China. The researcher explained the data collection procedures to Neurology out-patient department staffs and get their cooperation.

4. Because the clinic opened on weekdays, for out-patient persons, the researcher went to the Neurology out-patient department from 8:00 am to 12:00 am and from 1:00 pm to 4:30 pm every weekday (Monday to Friday) for collecting data.

5. The researcher cooperated with the nurse in the neurology clinic to search the registration records to find the clients who meet the inclusion criteria, then

Microsoft excel program was used to number them and randomly selected 50% of these patients as target participants through the generated random numbers. Then the outpatient nurse given the recurrent stroke persons the information about this research and asked them if they were interested in this study.

6. If they were interested in this study, the nurse in the neurology clinic contacted the researcher, and then the researcher introduced herself to the recurrent stroke persons, informed them about the study, its purposes, data collection process, and human right protection. If the recurrent stroke persons voluntarily participate in the study, the researcher asked them to sign the consent forms for signature verification.

7. Every participant maintained one-meter social distancing from other participants and researchers. These data was collected through a self-reporting questionnaires in a special private room. The room was routinely disinfected daily.

8. Before patients met doctors, the researcher was collected data through questionnaires. The participants start answered with the demographic questionnaire, the second was the Stroke Self-management Scale (SSMS). The third was Stroke prevention knowledge questionnaire (SPKQ), the fourth was the Brief Illness Perceptions Questionnaire (BIPQ). Finally, participants completed the Herth Hope Index (HHI). It took about 30 minutes for each participant to complete these questionnaires. The researcher ensured that participants could see the doctor in time after the questionnaire was completed.

9. The researcher told the recurrent stroke persons that if it was the time to see the doctor but the questionnaire hadn't finished yet, the questionnaire would be suspended, they would see a doctor first, and then continue to answer the questionnaire after seeing the doctor. Answering the questionnaire would not affect the length of their visits.

10. If the recurrent stroke person felt discomfort and/ or had any symptoms of recurrent stroke, the researcher would stop collecting data immediately, taking care them and seek help from other medical staffs, and help them to receive the standard medical care.

11. After completing the questionnaire, check whether all the questionnaires were filled in completely, remind the patients to take their belongings with them, help them left the hospital or continue to take them to the doctor for consultation.

12. This process was repeated until the required sample size was reached.

13. Considering the situation about the corona virus in 2022 (COVID-19), the guidelines for preventing COVID-19 during data collection process was concern by:

13.1 Before entering the hospital, the all persons was required to go through temperature screening and show a health QR code (an official way to declare residents' health status). Those persons who display a green code and temperature below 37.3 would be allowed entry into the outpatient department.

13.2 The researcher and the participants wore masks correctly throughout the data collection process.

13.3 Participants needed to wash their hands with alcohol before and after data collection.

13.4 Items touched by participants were cleaned and disinfected before being given to the next participant.

13.5 Completed questionnaires were kept in a separate archive bag. These data was collected through a self-reporting questionnaire in a special private room. The room will be routinely disinfected daily.

Data analysis

In this study, IBM SPSS 26.0 software was used for statistical analysis of the data. The significance level is set at .05. The following statistical functions were used for data analysis:

1. Descriptive statistics were used to describe the demographic characteristics among recurrent stroke persons in this study and the results of each variable. Mean and standard deviation were used to describe the measurement data, and the counting data were described by frequency percentage, etc.

2. The data were tested for normality of the variables, linearity, homoscedasticity, outliers, autocorrelaion and multicollinearity to verify the assumptions of the standard multiple regression model.

3. Standard multiple linear regression applying enter method was performed to determine the factors influencing self-management behaviors among recurrent stroke persons in Wenzhou, China.

CHAPTER 4
RESULTS

This chapter presents the results of the study about self-management behaviors and factors predict self-management behaviors among recurrent stroke persons in Wenzhou, China. The results of the data analysis are described under three sections: description of demographic characteristics and health information of the participants, description of self-management behaviors and the influencing factors of self-management behaviors.

Description of demographic characteristics and health information

Description of demographic characteristics of the participants

A total number of 100 recurrent stroke persons visiting the Neurology out-patient department of the Second Affiliated Hospital of Wenzhou Medical University in Wenzhou, China. Table 1 describes the details about the demographic characteristics of the participants.

Table 1 Frequency, percentage, mean, and standard deviation of demographic characteristics of the recurrent stroke persons ($n = 100$)

Characteristics	Number (n)	Percentage (%)
Gender		
Male	68	68
Female	32	32
Age		
45-59 years	18	18
60-74 years	56	56
≥ 75 years	26	26
($M = 68.32$, $SD = 9.09$, $Min = 48$, $Max = 88$)		

Table 1 (Continued)

Characteristics	Number (n)	Percentage (%)
Religion		
None	58	58
Buddhism	33	33
Christian	7	7
Others	2	2
Education		
Never go to school	23	23
Primary School	49	49
Junior to senior high school	22	22
Bachelor degree and higher	6	6
Marital status		
Single	1	1
Married	80	80
Divorced	3	3
Widowed	16	16
Occupation		
Employed	67	67
Civil servants / government staff	5	5
Commercial staff	5	5
Labor (eg. builder, factory worker, sanitation worker)	57	57
No occupation	11	11
Retired	22	22

Table 1 (Continued)

Characteristics	Number (n)	Percentage (%)
Annual family income (1 CNY = 0.14 USD)		
Less than CNY 25,000	17	17
CNY 25,000 - CNY50,000	22	22
CNY 50,000 - CNY100,000	28	28
More than CNY 100,000	33	33
Place of residence		
Urban	56	56
Rural	44	44
Healthcare payment scheme		
Urban residents under the medical insurance system	27	27
New rural cooperative medical care system	60	60
Out-of-pocket medical	12	12
Commercial insurance	1	1
Number of family caregivers		
None	10	10
1-2	78	78
$\geqq 3$	12	12
($M = 1.27$, $SD = 0.85$, $Min = 0$, $Max = 4$)		
Main caregiver		
Spouse	63	63
Child	25	25
Care worker	2	2
None	10	10

Table 1 showed that 68% of the participants were male (n = 68), while 32% of the participants were female (n = 32). The age of the participants ranged from 48 to 88 years with a mean age of 68.32 years. Among all age brackets, the proportion of younger elderly aged 60-74 was the highest, accounting for 56%, while the middle-aged adults aged 45-59 (18%) are the least. In terms of religion, more than half of those who have no religious belief occupy (58%). In terms of educational attainment, students with low educational background were the most educated, with primary school education being the highest (49%), followed by those who had never been to school (23%), with only 6% of them had completed college-level education. Most of the participants were married (80%). In terms of annual family income, more than CNY 100,000 (1 CNY = 0.14 USD) occupied the largest percentage (33%), followed by CNY 50,000 - CNY100,000 yuan (28%). Nearly one-third of the participants were unemployed, and labor made up the largest majority of those who were employed (57%). More than half (56%) of the participants lived in urban areas, and their healthcare payment scheme was mainly new rural cooperative medical care system. Participants who had 1-2 family members to provide daily care for them after discharge from the hospital accounted for 78%, caregivers are dominated by their spouses (63%).

Health information of the participants

Health information of the participants containing BMI, the NIHSS score, GCS score, ADL score, mRS score on the day of admission, discharge and the present, the accompanying impairments, the number of recurrent ischemic stroke, duration of disease since the first stroke and the last stroke, family history of stroke, frequency of exercise, source of stroke education, comorbidities, smoking status and alcohol drinking status in Table 2.

Table 2 Frequency, percentage, mean and stand deviation of health information of the
recurrent stroke persons ($n = 100$)

Characteristics	Number (n)	Percentage (%)
BMI		
Underweight (< 18.5)	3	3
Normal weight (18.5 – 23.9)	57	57
Overweight (24-27.9)	32	32
Obese (≧28)	8	8
($M = 23.9$, $SD = 3.2$, $Min = 16.9$, $Max = 34.05$)		
NIHSS scores (Admission day)		
0 (Normal)	3	3
1-4 ((Mild stroke)	48	48
5-15 (Moderate stroke)	49	49
($M = 4.25$, $SD = 2.19$, $Min = 0$, $Max = 10$)		
NIHSS scores (Discharge day)		
0 (Normal)	5	5
1-4 (Mild stroke)	87	87
5-15 (Moderate stroke)	8	8
($M = 2.61$, $SD = 1.33$, $Min = 0$, $Max = 5$)		
NIHSS scores (The data collected day)		
0 (Normal)	8	8
1-4 (Mild stroke)	91	91
5-15 (Moderate stroke)	1	1
($M = 1.91$, $SD = 1.07$, $Min = 0$, $Max = 5$)		

Table 2 (Continued)

Characteristics	Number (n)	Percentage (%)
GCS scores (Admission day)		
15 (Conscious)	97	97
13-14 (Mild)	2	2
9-12 (Moderate)	1	1
($M = 14.93$, $SD = 0.46$, $Min = 11$, $Max = 15$)		
GCS scores (Discharge day)		
15 (Conscious)	99	99
13-14 (Mild)	1	1
($M = 14.99$, $SD = 0.1$, $Min = 14$, $Max = 15$)		
GCS scores (The data collected day)		
15 (Conscious)	100	100
($M = 15$, $SD = 0$, $Min = 15$, $Max = 15$)		
ADL scores (Admission day)		
0-40 (severe dependence)	5	5
41-60 (moderate dependence)	21	21
61-99 (slight dependence)	60	60
100 (Independent)	14	14
($M = 74.25$, $SD = 18.27$, $Min = 30$, $Max = 100$)		
ADL scores (Discharge day)		
41-60 (moderate dependence)	12	12
61-99 (slight dependence)	69	69
100 (Independent)	19	19
($M = 81.85$, $SD = 14.1$, $Min = 50$, $Max = 100$)		

Table 2 (Continued)

Characteristics	Number (n)	Percentage (%)
ADL scores (The data collected day)		
61-99 (slight dependence)	70	70
100 (Independent)	30	30
(M = 87.75, SD = 11.9, Min = 65, Max = 100)		
mRS scores (Admission day)		
1 (No significant disability)	17	17
2 (Slight disability)	16	16
3 (Moderate disability)	41	41
4 (Moderately severe disability)	25	25
5 (Severe disability)	1	1
(M = 2.77, SD = 1.04, Min = 1, Max = 5)		
mRS scores (Discharge day)		
1 (No significant disability)	28	28
2 (Slight disability)	36	36
3 (Moderate disability)	30	30
4 (Moderately severe disability)	6	6
(M = 2.14, SD = 0.9, Min = 1, Max = 4)		
mRS scores (The data collected day)		
0 (No symptoms)	1	1
1 (No significant disability)	48	48
2 (Slight disability)	32	32
3 (Moderate disability)	18	18
4 (Moderately severe disability)	1	1
(M = 1.7, SD = 0.81, Min = 0, Max = 4)		

Table 2 (Continued)

Characteristics	Number (n)	Percentage (%)
Accompanying impairments		
None	14	14
1 accompanying impairment	68	68
More than 1 accompanying impairment	18	18
Number of recurrent ischemic stroke		
2 times	78	78
3 times	20	20
4 times	1	1
5 times	1	1
Duration of present stroke since the first stroke		
Within 1 month	2	2
1~3 months	3	3
4~12 months	6	6
>1 year	89	89
Duration of present stroke since the last stroke		
Within 1 month	16	16
1~3 months	31	31
4~12 months	13	13
>1 year	40	40
Family history of stroke		
Yes	23	23
No	77	77
Frequency of exercise (per week)		
Never	22	22
1-2 times	22	22
3-4 times	25	25
$\geq$ 5times	31	31

Table 2 (Continued)

Characteristics	Number (n)	Percentage (%)
Source of stroke education		
Outpatient nurse in hospital	53	53
Family members or friends	24	24
Television or social media	11	11
None	8	8
Health promoters in community	4	4
Comorbidities		
None	2	2
Yes** (n=161)	98	98
Hypertension	75	46.6
Diabetes	37	23.0
Hyperlipidemia	37	23.0
Heart diseases	12	7.4
Smoking status		
Current tobacco smoker	13	13
Former tobacco smoker	44	44
Never smoked	43	43
Alcohol drinking status		
Current alcohol drinking	10	10
Former alcohol drinking	44	44
No alcohol use	46	46

**One participant can have more than one comorbidity

The results in table 2 showed that that 57% of the participants were normal weight (BMI 18.5 – 23.9) and 32% were overweight, 8% were obese. Most of them had moderately severity of ischemic stroke (NIHSS score 5-15) on admission (49%), while the proportion of mild ischemic stroke reached to 87% on the day of discharge, 91% at the present time. 97% of participants had a GCS score of 15 (conscious) at

admission, while 99% of the participants achieved a GCS score of 15 at discharge. At present, the participants all were conscious. 60% of participants had ADL scores between 61-99 (slight dependence) on admission day, followed by 69% at discharge. And all of them were slightly dependent, especially 30% were independent (ADL scores 100) at present time. The scores of mRS ranged from 1 to 5, with 41% of the participants scoring 3 (moderate disability) and 17% of the participants scoring 1 (no significant disability) at admission. On the day of discharge, with a score of 1 accounted for 28% of them. And at present, the mRS scores ranged from 0 to 4, with a score of 1 (No significant disability) were nearly half (48%) of them. 68% of participants had one accompanying impairment and 98% of them had comorbidities, with hypertension accounting for the highest percentage (46.6%), followed by diabetes (37%) and Hyperlipidemia (37%). 13% of the samples were current smoker, compared 44% of whom had quitted smoking. Current alcohol drinkers account for 10%, while 44% drank in the past. 78% of the participants had two ischemic strokes. The largest proportion of participants (89%) had a duration of more than one year since the first ischemic stroke, while the proportion since the last ischemic stroke was 40%. Among the participants, most (77%) had no family history of stroke, 35% of participants exercised five times or more, and their stroke education mainly came from the outpatient nurse in hospital (53%).

Description of self-management behaviors

Self-management behaviors consists of medical management, role management, emotional management. Table 3 presents the details of the different levels of self-management behavior. Table 4 presents self-management behaviors and its subscales reported by the participants.

Table 3 Mean, frequency, percentage and interpreting of self-management behaviors
among recurrent stroke persons (n = 100)

Self-management behaviors	Number (n)	Percentage (%)	Mean	SD	Level
> 120	20	20	128.5	6.29	High
90 -120	70	70	103.5	8.84	Moderate
< 90	10	10	81.6	3.2	Low

As illustrated in table 3, 20% of the participants reported a score of 120 or higher,
which indicated they had good self-management behaviors. However, majority of the
participants (70%) just had moderate self-management behaviors, even there were
still 10% of the participants who had low self-management behaviors.

Table 4 Range, mean, standard deviation of self-management behaviors and its
subscales among recurrent stroke persons (n = 100)

Self-management behaviors	Range		M	SD	Score Indicator (%)	Level
	Possible score	Actual score				
Self-management behaviors	30-150	77-139	106.32	15.15	70.9	Moderate
Medical management	13-65	31-64	50.39	6.93	77.5	Moderate
Role management	12-60	22-56	39.34	7.66	65.6	Moderate
Emotional management	5-25	8-25	16.59	3.38	66.4	Moderate

Table 4 illustrates that the overall score of self-management behaviors
ranged from 77 to 139 (out of possible score is 30 to150). The mean score of self-
management behaviors among participants was 106.32 (SD = 15.15). The mean score

of medical management subscale was 50.39 (*SD* = 6.93), role management (*M* = 39.34, *SD* = 7.66), and emotional management (*M* = 16.59, *SD* = 3.38). The score indicator of the total scale was 70.9 %, the score indicator of medical management subscale was 77.5%, role management was 65.6%, and emotional management was 66.4%. The overall score indicator and the score indicator of each SSMS subscale were between 60% - 80%, which means the level of self-management behaviors was in moderate level.

Description of illness representation

Cognitive illness representations were evaluated from seven aspects: consequences, time, personal control, treatment control, and so on. Moreover, there is 1 open question, which asks patients to list the three most important causal factors in their illness. Table 5 presents the details of the open question in illness representation.

Table 5 Frequency, percentage of the open question in illness representation among recurrent stroke persons (n = 100)

The important factors caused recurrent stroke	Number (n)	Percentage (%)
Don't know	68	68
Know** (n=96)	32	32
Poor lifestyle	37	38.5
Multiple complications	24	25
Hereditary	14	14.6
History of stroke	12	12.5
Stress	9	9.4

**One participant list the three most important causal factors for recurrent stroke.

Table 5 illustrated that 68% of the participants did not know the factors what caused their disease. Of the factors known to cause the disease, 38.5% of participants named a bad lifestyle, followed by multiple complications(25%).

Influencing factors of self-management behaviors

      The influencing factors of self-management behaviors selected to be examined in this study consisted of stroke prevention knowledge, illness representation, hope, which are presented in table 6.

Table 6 Range, mean, standard deviation and interpreting of stroke prevention knowledge, illness representation and hope among recurrent stroke persons (n = 100)

Independent variables	Range		M	SD	Level
	Possible score	Actual score			
Stroke prevention knowledge	0-100	12-96	64.36	17.59	-
Illness representation	0-80	27-69	47.95	9.30	-
Hope	12-48	19-48	36.42	6.44	High

      Table 6 illustrates that stroke prevention knowledge score ranged from 12 to 96, with mean of 64.36 (SD = 17.59). Illness representation level of the participants ranged from 27 to 69, with mean score of 47.95 (SD = 9.30). The overall score of hope ranged from 19 to 48 with a mean of 36.42 (SD = 6.44), which indicated high level of hope.

      The Pearson's correlation test was performed to examine the relationship between self-management behaviors, stroke prevention knowledge, illness representation, and hope. Table 7 demonstrates the correlation matrix among the studied variables.

Table 7 Correlation matrix among the independent and dependent variables (n = 100)

	Self-management behaviors	Stroke prevention knowledge	Illness representation	Hope
Self-management behaviors	1.000			
Stroke prevention knowledge	.627***	1.000		
Illness representation	.273***	0.265***	1.000	
Hope	.518***	0.467***	0.230*	1.000

***p < .001 *p < .05

From the correlation matrix, self-management behaviors was significantly and positively correlated with stroke prevention knowledge (r = .627, p < .001), illness representation (r = .273, p < .001) and the hope (r = .518, p < .001).

A standard multiple linear regression with the method of "enter" was applied to determine whether stroke prevention knowledge, illness representation and the hope were influenced self-management behaviors. All assumptions of standard multiple regression were implemented, such as normality of the study variables, linearity and homoscedasticity, multivariate outliers, autocorrelation and multicollinearity. The normality of the study variables were determined by skewness coefficients, kurtosis coefficients, histograms and Q-Q plots. The all data of variables met the assumption of normal distribution.

Durbin-Watson test was used to test for autocorrelation and the result showed a statistic value of 1.99, which was between the normal value of 0-4 and close to 2, indicating that the observations were independent of each other without autocorrelation. F-test yielded the p-value less than .001, showing that the fitted regression model was statistically significant and that there was a linear correlation between the dependent and independent variables. Moreover, Variance Inflation Factors (VIF) were all below 2, showing that the fitted model did not suffer from multicollinearity. The results of regression analysis are shown in table 6.

Table 8 Influencing factors of self-management behaviors among recurrent stroke
persons (n = 100)

Predicting variables	B	SE	β	T	p-value
Stroke prevention knowledge	.410	.074	.476	5.537	< .001
Illness representation	.137	.127	.084	1.073	.286
Hope	.650	.200	.276	3.243	.002

Constant = 49.73 R ^{2} = 46.4%, R^2(adj) =44.7%, F (3,96) = 27.72 p < .001

Results from the standard multiple linear regression analysis indicated that stroke prevention knowledge, illness representation, hope explained 46.4% of the variance in self-management behaviors among recurrent stroke persons (F $_{3,96}$ = 27.72, p < .001). Among the three factors, stroke prevention knowledge (β = .476, p < .001) was the best predictor, followed by the hope (β = .276, p =.002). Both of them could significantly affect self-management behaviors, while illness representation had no influence on self-management behaviors (β = .084, p = .286).

CHAPTER 5
CONCLUSION AND DISCUSSION

This chapter summarizes the results of this study and provides a discussion of the study. This chapter also discuss the implications of the findings in nursing practice, nursing administration, nursing education. In addition, recommendations for future research are presented at the end of this chapter.

Summary of the study

This study was carried out to describe the current status of self-management behaviors and to examine whether stroke prevention knowledge, Illness representation, hope can predict self-management behaviors among recurrent stroke persons in Wenzhou China. The study was guided by the Individual and family self-management theory (IFSMT) by Ryan and Sawin (2009). A total of 100 participants were recruited through a simple random sampling method from Neurology out-patient department of the Second Affiliated Hospital of Wenzhou Medical University. Data were collected by using self-reported questionnaires, including the Demographic Data Questionnaire, the Chinese Version of Stroke Self-management Scale (Wan et al., 2014), Stroke Prevention Knowledge Questionnaire (Broadbent et al., 2006), Brief Illness Perceptions Questionnaire (Mei Yaqi, 2015), Herth Hope Index (Kaye Herth PhD, 1991). The Cronbach's α for these four instruments were .84, .81, .81 and .84, respectively.

The analysis revealed that majority of participants were male (68%). The age of the participants ranged from 48 to 88 years with a mean age of 68.32 years. The proportion of younger elderly aged 60-74 was the highest, accounting for 56%, while the middle-aged adults aged 45-59 (18%) are the least. More than half of them have no religious belief occupy (58%). More than two thirds of participants (72%) have education level of primary school or less than primary school. Most participants were married (80%). The highest percentage (33%) of participants with annual family income of more than CNY 100,000 (1 CNY = 0.14 USD). Nearly one-third of the participants were unemployed, and labor made up the largest majority of those who

were employed (57%). Participants from urban areas accounted for 56%, and their healthcare payment scheme was mainly new rural cooperative medical care system (60%). Participants who had 1-2 family members to provide daily care for them after discharge from the hospital accounted for 78%, caregivers are dominated by their spouses (63%).

The results also showed that 57% of the participants had normal body weight (BMI 18.5 – 23.9). The mean score of participants' NIHSS was 4.25 ($SD = 2.2$) on admission, while it decreased to 2.61 ($SD = 1.33$) on the day of discharge and 1.91($SD = 1.07$) at present time. In terms of GCS, 99% of the participants had GCS scores of 13-15 at admission, however, all of them achieved a score of 15 (conscious) at present. The mean ADL score of the participants was 74.25 ($SD = 18.27$) on the day of admission, while it increased to 81.85 ($SD = 14.1$) on the day of discharge, 87.75 ($SD = 11.9$) at present. The highest percentage of participants with an mRS score of 3 was 36% (at admission), when discharged from the hospital, most of the participants (36%) had mRS scores of 2. At present, the largest proportion of the participants (48%) had no significant disability. Respectively, 86% of the participants were accompanied by functional impairment. Majority of them (98%) had comorbidities, with hypertension, diabetes and hyperlipidemia having the highest proportions of 46.6%, 23% and 23%. 78% of the participants had two ischemic strokes, the highest percentage of participants with a duration of more than one year was 89% (since the first stroke) and 40% (since the last stroke). There were still participants who didn't stop smoking and drinking, 13% of them were current smoker and 10% of them were still drinking. Among the participants, most (77%) had no family history of stroke, nearly a third (22%) never exercised and their stroke education mainly came from the outpatient nurse in hospital (53%).

The mean score of self-management behaviors among participants was 106.32 out of 150 ($SD = 15.15$). The mean score of medical management subscale was 50.39 ($SD = 6.93$), role management ($M = 39.34$, $SD = 7.66$), and emotional management ($M = 16.59$, $SD = 3.38$). Majority of the participants (70%) just had moderate self-management behaviors.

The mean score of stroke prevention knowledge was 64.36 out of 100 ($SD = 17.59$). Illness representation level of the participants had a mean score of 47.95 out

of 80 (SD = 9.30). In addition, the results also indicated that the participants had high level of hope with the mean score 36.42 (SD = 6.44).

Pearson's correlation analysis revealed that stroke prevention knowledge, illness representation, hope all significantly correlated with self-management behaviors. Results from the standard multiple linear regression analysis showed that stroke prevention knowledge (β = .476, p < .001) and the hope (β =.276, p < .01) were influencing factors of self-management behaviors in this study. Illness representation could not significantly affect self-management behaviors. All the factors can explain 46.4% of the variance in self-management behaviors (R^2 = 46.4%, $F3,96$= 27.72, p < .001)

Discussion

The discussions of the results were presented based on the objectives and hypotheses of this study, including to describe self-management behaviors and to determine the factors influencing self-management behaviors among recurrent stroke persons in Wenzhou, China.

Self-management behaviors among recurrent stroke persons

In this study, the mean score of self-management behaviors among recurrent stroke persons was 106.32 out of 150 (SD = 15.15), the score indicator was 70.9, When looking at the subscale of SSMS, it was found that the score indicator of medical management subscale was 77.5, role management was 65.6 , and emotional management was 66.4. The overall score indicator and the score indicator of each SSMS subscale were between 60% - 80%, which was at a moderate level. This result is consistent with previous studies in mainland China and Taiwan (Kuo et al., 2021; Ma Guifen, 2015). The study in Taiwan showed that the score indicator of self-management behaviors, medical management, role management, and emotional management were 73.7, 79.6, 70.97 and 64.7 respectively.

The finding of this study can be explained by several perspectives. In the Individual and family self-management theory (IFSMT) of Ryan and Sawin (Ryan & Sawin, 2009), physical and individual factors have influence directly on the self-management outcome, which is self-management behaviors in this study. In the current study, 91% of participants were assessed as mild ischemic stroke according to

the NIHSS prior at present, which was increased a lot compared to 48% at admission, which means that after treatment, the patients recovered so that the NIHSS scores decreased. With a lower severity in the NIHSS are more willing to engage in disease self-management (Damush et al., 2018).

In this study, the ADL scores at present improved compared with those at admission. Meanwhile, no participant's ADL was at the level of severe dependence, indicating that they were more capable of self-care, which affects patients' self-management ability (Davies, Wood, Bullock, Wallace, & Edwards, 2018). Moreover, at present time, all of participants in this study were able to perform basic self-care of daily living (ADL score > 60). Besides, all of them were conscious with a GCS score of 15. Previous studies have found that the higher ADL scores, the better the patient's medical, emotional, and role management behaviors (L. Chen, Chen, & Sit, 2018; Spoorenberg, Wynia, Uittenbroek, Kremer, & Reijneveld, 2018).

The degree of disability corresponds to the level of self-management ability. Related studies also found that the disability of stroke patients is negatively correlated with self-management, which implies that there is poorer self-management among patients whose score was higher in the overall functional disability (Damush et al., 2018; Spoorenberg et al., 2018). In the current study, most of the participants had a mRS score of less than 2, accompanying only one impairment, indicating that they had no significant disability, and were able to perform daily activities independently or with minimal assistance, which means they could performed good self-management behaviors.

In addition, the duration of diagnosis with stroke should also be taken into account. A study found that as the duration of disease increase, level of self-management decreases, because adherence to self-management activities reduces (Hartuida, 2021). On the contrary, longer duration of diagnosis reflect that patients had long time to understand the disease, and get more information and medical support from medical experts regarding recovery due to disease progression (Abubakari, Cousins, Thomas, Sharma, & Naderali, 2016). Furthermore, one study suggested that the information provided by medical teams to patients who suffered from stroke within 6–12 months could bridge gaps and meet their needs in proactively managing diseases (Ruksakulpiwat & Zhou, 2021a). Majority of the participants

(60%) in the study had been diagnosed with ischemic stroke for less than one year since last stroke. This shows that the participants could gained enough experience to self-manage their diseases effectively.

According to the IFSMT, Ryan and Sawin (2009) suggested family factors were important part which would influence self-management. Most of the participants in this study are married (80%) and living with family (81%). This could be one possible reason for moderate level of self-management behaviors ($M = 106.32$, $SD = 15.15$) among participants in this study. Spouses can play a role in supervising and providing a sense of security for people who need assistance with day to day activities, supporting social interactions, coordinating and managing formal care services and advocating on their behalf (Masters et al., 2013). At the same time, persons who lived with spouse were found to perform self-management better than those who are single, widowed or divorced (Gunggu, Thon, & Whye Lian, 2016). The ability of stroke patients to perform self-manage often requires family support, family is a natural support system, which plays an important role in promoting and protecting individual health. The quality of family functions can directly affect the behavior and emotional experience of family members. Patients with good family functions are more likely to get emotional support from family members. Adequate emotional support can make patients face diseases and difficulties positively and optimistically, promote physical and mental health, and engage in healthy self-management behaviors (Shu Meichun, 2019).

In addition, a few studies with stroke patients have shown that increase income can affect self-management positively (Estrin, 2010; Kuo et al., 2021). High cost of medications, or rehabilitation associated with stroke management makes it difficult for patients with low income to self-manage their disease (Mu Xin, 2016). The data of this study shows that 33% of them earned more CNY 10,0000 in a year and 87% of the participants had healthcare payment scheme, the state reimburses the part cost of stroke treatment. Furthermore, in the current study, most of the participants (56%) lived in the urban, where the health care system is much better, the level of self-management might be relatively higher (Kidd, Booth, Lawrence, & Rowat, 2020; Meng et al., 2009).

However, even though majority of participants had moderate and above levels of self-management behavior, the results also revealed that 10% of participants had uncontrolled self-management behaviors.

In the study, 23% of the participants had never go to school. Compared with people with high education level, they could not fully understand and learn the knowledge and information of disease self-management in depth (Harris et al., 2018). Patients with higher education can make full use of medical information resources and have a stronger sense of self-care. In addition, patients with higher education have less communication barriers with doctors, and are more willing to adopt the advice of doctors and take the initiative to take self-care measures(Houle, Bohannon, Frigon, Maljanian, & Nieszczezewski, 2002).

In the study, despite having more than two recurrent strokes, some participants did not quit smoking or alcohol, 13% of the participants were current smokers and 10% of them were current drinkers. Smoking and drinking were bad behaviors of stroke patients themselves. Such patients have relatively low health beliefs, so they are not willing to self-management, so they are less likely to change the bad behavior and positive self-management (Y. Li et al., 2021). As a result, in the current study, the overall level of self-management behavior was moderate.

Factors influencing self-management behaviors among recurrent stroke persons

Results from the standard multiple linear regression analysis indicated that stroke prevention knowledge, illness representation, hope explained 44.7% of the variance in self-management behaviors among recurrent stroke persons (adjust R^2 =44.7%, $F_{3,96} = 27.72$, $p < .001$). Among the three factors, stroke prevention knowledge ($\beta = .476$, $p < .001$) was the best predictor, followed by the hope ($\beta =.276$, $p =.002$). Both of them could significantly affect self-management behaviors. However, in contrast to the study hypothesis, the illness representation had no influence on self-management behaviors in the current study ($\beta = .084$, $p = .286$).

Consistent with our hypothesis, stroke prevention knowledge had a significant effect on self-management behaviors among recurrent stroke persons. The results of the current study showed that participants with more stroke prevention knowledge had higher scores of stroke self-management scores. As one study results

showed, stroke self-management knowledge had significant direct effects on stroke self-management (β = .134, P = .003; 95% CI, 0.037–0.239), indirect effects on stroke self-management (β = .066, P = .001; 95% CI, 0.023–0.125), and total effects on stroke self-management (β = .200, P = .001; 95% CI, 0.082–0.310) (S. R. Kim, Kim, Kim, & Cho, 2022). These findings are consistent with previous literature that stroke-related knowledge is related to health behavior for stroke and knowledge of stroke risk factors and coping behavior in case of recurrence is related to health promotion behavior in patients who had a stroke (Choi & Lee, 2017; M. K. Kim, Lee, Kwon, & Oh, 2013). This result is also similar to many other studies which show that stroke prevention knowledge is a strong influencing factor of self-management behaviors in many countries (S. R. Kim et al., 2022; Rahman, Peng, Adams, & Sibbritt, 2022)(Kuo et al., 2021; Zhao, 2000).

The relationship between stroke prevention knowledge and self-management behaviors can be explained by the IFSMT (Ryan & Sawin, 2009) which suggest that improvement of knowledge will increase the understanding of self-management behavior of persons. Most of the participants were urban residents and the health guidance work was better, they had received the stroke education from many ways.

All of the above served as the reasons of their increased stroke prevention knowledge. Meanwhile, high percentage (40%) of participants in this study have been diagnosed with last stroke for more than 1 year, which can be imply that they had time to learn and develop their self-management behaviors. At the same time, it has been confirmed that self-management interventions aim to empower patients with the knowledge and skills that they need to adjust to and manage the consequences of living with a long-term condition (Wray, Clarke, Cruice, & Forster, 2021). Therefore, the improved stroke prevention knowledge can predict that individuals have better self-management behaviors.

Similarly, consistent with the hypothesis of this study, the hope was another factor that can significantly predict self-management behaviors. Hope refers to a kind of belief that made individuals think they could achieve a desired goal in the near future and also referred to a sense of cognition that could guide people's behavior (Henh & Cutcliffe, 2002). Hope was usually considered as a positive attitude and was significantly associated with positive emotion (NovoviÄ, ToviloviÄ, & IvanÄ eviÄ,

2015). Emotion was central to the quality and range of everyday human experience, which could regulate human behaviors (Dolan, 2002).

Post-stroke patients have prominent negative emotions, and high hope levels can help patients cope positively with life changes during the long recovery process (Kapoor et al., 2019).The previous studies and hope theory revealed that the high hope level could make individuals to better use social support, and on the contrary, the sense of self-worth and hope level could be also enhanced by social support (Snyder, 2002), which was conducive to showing stronger willpower and resolution to take relevant measures to persist in self-management.

The finding in the current study is similar to those of previous studies. One study for stroke survivors' self-management showed that building hope would increase their confidence in their abilities and skills, build independence to live their life (Johnson et al., 2022). Some quantitative studies have provided evidence that hope could improve the ability of self-management and was positively associated with rehabilitation outcomes of stroke survivors(Barker, Gill, & Brauer, 2007; Kortte, Stevenson, Hosey, Castillo, & Wegener, 2012). Another study of liver transplant recipients, which indicated that the hope was positively correlated with self-management ($r = .39$, $p < .01$) (D. Zhang et al., 2022). Overall, the hope was at a high level in current study, which means that it predicted good self-management behaviors.

In the current study, the illness representation of participants had a positive correlation with self-management behaviors ($r = .273$, $p < .001$). However, it could not predict self-management behaviors among recurrent stroke persons which was inconsistent with our research hypothesis and previous literature (Cooper, Lloyd, Weinman, & Jackson, 1999; Griva, Myers, & Newman, 2000). A study on diabetic patients in China showed that illness representation was positively correlated with self-management ($r = . 526$, $P < . 001$), that is, the higher the illness representation of diabetic patients, the better their self-management, and regression analysis showed that illness representation has a predictive effect on self-management (Fan Runping, 2017).

Illness representation were one's beliefs about their illness, including its effect on their life and their treatment, which comprise several dimensions, including

perceptions of the disease's symptoms, its cause, its duration, its consequences, and the level of control the individual has over the disease (Rivera et al., 2018).

Illness representation did not have a significant effect on self-management behaviors, possibly because the participants themselves did not have clear illness representation of the disease and thus did not make correct self-management behaviors. The mean score of illness representation in the current study was only higher little than the half of the full mark ($M = 47.95$, $SD = 9.30$). Moreover, by the Brief Illness Perceptions Questionnaire (BIPQ), 68% of participants did not know what important factors caused their recurrent stroke, it can be seen that the persons' illness representation is not clear.

In the study, 91% of participants were assessed as mild ischemic stroke according to the NIHSS prior at present, no participant's ADL was at the level of severe dependence, indicating that they were more capable of self-care. Meanwhile, most of the participants (49%) had a mRS score of less than 2, accompanying only one impairment, indicating that they had no significant disability, and were able to perform daily activities independently. The recurrent stroke persons thought stroke was a small disease, which did not have a great impact on life, their own life.

Another possible reason is that participants tended to have homogeneous illness representation. When a person has a recurrent stroke, he / she often has multiple complications. Persons have a myriad of combinations of illnesses that develop in a variety of orders over differential lengths of time including but not limited to hypertension, heart disease, diabetes, stroke (Parekh & Barton, 2010; Tinetti, Fried, & Boyd, 2012). Or it may be that the representations an individual has about one specific illness (i.e., stroke) drive the self-management strategies employed for all illnesses. Moreover, the cause dimension acknowledges that patients may have their own ideas regarding the possible causes of the illness that may or may not conform to medical opinion. Thus, in this study, illness representation had no significant effect on self-management behaviors.

Conclusion

This study revealed that most participants had only a moderate level of self-management behaviors. Stroke prevention knowledge and the hope were the two

influencing factors of self-management behaviors. Combined with the IFSMT , this study also confirmed that individual and family factors can affect the self-management behaviors. Specifically, the results of this study showed that high level of stroke prevention knowledge and hope can promote the self-management behaviors among recurrent stroke persons.

Implications of the findings

The findings of this study might have implications in the following areas:

Nursing practice

The current findings showed that although most participants engaged in self-management of the disease, the degree of self-management behavior was moderate. In view of this, the nurses should strengthen the assessment of the recurrent stroke persons with poor self-management behavior, identify the reasons for low self-management ability, and carry out targeted intervention measures during outpatient follow-up.

In addition, stroke prevention knowledge and hope has proved to be the influencing factors of self-management behavior. We suggest that nurses should pay more attention to the individual characteristics of patients and give patients more individualized care. Strengthening health knowledge education for patients with recurrent stroke. According to the different acceptance levels of the recurrent stroke persons, various forms of education should be adopted, such as video, text, or WeChat mini program, so that the recurrent stroke persons can learn to correctly manage the disease in their daily life. On the other hand, at the same time of intervention should strengthen the psychological support for patients, improve their hope in disease, life, in order to improve the level of self-management of patients, promote disease rehabilitation, prevent the recurrence of stroke again and again.

Nursing education

It can be applied in nursing education to help nursing students understand the characteristics of recurrent stroke persons and the factors influencing self-management behaviors among them.

Nursing Research

For this current study, the variables studied could explain only 44.7% of the variance in self-management behaviors in this study, which indicates that there are other factors that may have influence on self-management behaviors among recurrent stroke persons, as discussed by the IFSMT of Ryan and Sawin (2009). Future research should focus on studying those variables such as physical and social environment.

Nursing administration

In recent years, stroke self-management programs have gradually highlighted their unique advantages, which can promote the lifestyle changes of stroke patients, conducive to patients' rehabilitation and prevention of disease recurrence. At present, there are still many shortcomings in domestic self-management projects, such as imperfect intervention process and different intervention effects.

Nursing management personnel can learn from overseas relevant experience to further improve, establish the intervention process suitable for our national condition. In addition, cooperation with health authorities should be strengthened through internet platforms. The realization of multi-point connection between hospitals, communities and families, urban and rural areas, the clarification of intervention responsibilities of each point, and the avoidance of repeated or ineffective intervention can also increase the popularity of stroke self-management. Hospitals are encouraged to cooperate with rural health service institutions to carry out relevant health education activities, or to provide them with disease and health knowledge through the distribution of paper materials, phone calls, text messages, etc., so as to improve their disease awareness.

Recommendations for future research

Since this study has confirmed that stroke prevention knowledge and hope are influencing factors of self-management behavior among recurrent stroke persons, further interventional studies are needed to explore appropriate intervention programs or develop standardized practice programs to improve stroke prevention knowledge and hope of recurrent stroke persons and improve their self-management behavior. In

addition, the reasons for recurrent stroke persons with poor self-management behavior need to be explored in the future. In this study, 47% of patients with stroke face with recurrence stroke at the first 3 months, so that it need to concern to hurry promote self-management behavior after discharge.

Due to the limitations of the conditions, this study only selected recurrent stroke persons from the Second Affiliated Hospital of Wenzhou Medical University for investigation. The sample size has certain limitations, which has certain influence on the results. In the future, multi-center investigation can be carried out for further discussion.

The influencing factors included in this study together explained 44.7% of the variation in self-management behavior among recurrent stroke persons, with a low explanatory degree of variation. It is suggested to expand the range of influencing factors and further explore controllable factors related to self-management behavior.

This study only investigated the influencing factors of self-management behaviors among recurrent stroke persons, and the effectiveness of self-management behavior of stroke was discussed as the next step of the study, in order to provide reference for self-management intervention of stroke.

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APPENDICES

APPENDIX A

Questionnaires in English

QUESTIONNAIRES

FACTORS INFLUENCING SELF-MANAGEMENT BEHAVIORS AMONG RECURRENT STROKE PERSONS IN WENZHOU, CHINA

The questionnaires include fiveparts as follows:

1. The Demographic Data Questionnaire with 33 items

2. The Stroke Self‐management Scale with 30 items

3. The Stroke Prevention knowledge questionnaire with 25 items

4. The Chinese version of Brief Illness Perceptions Questionnaire with 9 items

5. The Chinese version of Herth Hope Index with 12 items

Please read each question carefully and choose the most appropriate answer.

1. The Demographic Data Questionnaire

Direction: Please read the questions carefully and kindly give your honest answer.

Please choose the answer as follow by ticking ☑ or write down your answers in the blank (…………)

Part 1: General information (To be completed by the participant)

1. Gender:

☐ Male ☐ Female

2. Age: ………... years old

3. Religion ………...

4.Your education level:

☐ Never go to school

☐ Primary School

☐ Junior to senior high school

☐ Bachelor degree and higher

5. ………...………...………..………...………...………...………...………...………... 10

11. Your Main caregiver

☐ Spouse

☐ Child

☐ Care worker

☐ None

Part 2: Health information (To be collected by the researcher)

1. BMI:

2. NIHSS score: Admission day: ………… points

              Discharge day: ………… points

              On the data collected day: ………… points

3. NIHSS score: Admission day: ………… points

              Discharge day: ………… points

              On the data collected day: ………… points

4…………..……....……....……....……....……....……....……....……... 20

21. Smoking status:

☐ Current tobacco smoker (Duration …... years; Quantity …... cigarettes/day)

☐ Former tobacco smoker (Duration …… years; Quantity …… (in the past) cigarettes/day)

☐ Never smoked

22. Alcohol drinking status:

☐ Current alcohol drinking (Duration …… years; Quantity …… ml/day)

☐ Former alcohol drinking (Duration …… years; Quantity …… (in the past) ml/day)

☐ No history of alcohol drinking

2. The Stroke Self-management Scale (SSMS)

Direction: We would like to know the current status of your self-management behaviors. Read each statement carefully. Indicate how you feel about each statement according to your actual situation. The numbers from 1 to 5 after each statement represent different meanings.

Circle the "1" if you **Strongly Disagree**

Circle the "2" if you **Disagree**

Circle the "3" if you are **Neutral**

Circle the "4" if you **Agree**

Circle the "5" if you **Strongly Agree**

Item Number and Description	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I. Medical Management					
1. I had good knowledge of my disease (such as symptom management, diets, medication, rehabilitation)	1	2	3	4	5
2. I was well aware of the method to treat my disease	1	2	3	4	5
3…....………..……...................	1	2	3	4	5
4. …....………..……...................	1	2	3	4	5
5. …....………..……...................	1	2	3	4	5
6. …....………..……...................	1	2	3	4	5
7. …....………..……...................	1	2	3	4	5
8. …....………..……...................	1	2	3	4	5
9. …....………..……...................	1	2	3	4	5
10. …....………..……...................	1	2	3	4	5
11. …....………..……...................	1	2	3	4	5
12. …....………..……...................	1	2	3	4	5

Item Number and Description	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
13. I was full of confidence in the discussion with the physician for any suggestions related to the disease	1	2	3	4	5
II.Role Management					
14. When stroke-related symptoms appeared, I could actually make observation, measurement and recording of the severity of the symptoms	1	2	3	4	5
15. …...………...…………..........	1	2	3	4	5
16. …...………...…………..........	1	2	3	4	5
17. …...………...…………..........	1	2	3	4	5
18. …...………...…………..........	1	2	3	4	5
19. …...………...…………..........	1	2	3	4	5
20. …...………...…………..........	1	2	3	4	5
21. …...………...…………..........	1	2	3	4	5
22. …...………...…………..........	1	2	3	4	5
23. …...………...…………..........	1	2	3	4	5
24. …...………...…………..........	1	2	3	4	5
25. I believe that if I get the help from medical professionals, my stroke condition will get better	1	2	3	4	5
III. Emotional Management					
26. If things did not go well, it was hard for me to keep positive, and I would be pessimistic and feel frustrated	1	2	3	4	5

Item Number and Description	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
27. …...………...……...............	1	2	3	4	5
28. …...………...……...............	1	2	3	4	5
29. …...………...……...............	1	2	3	4	5
30. I was worried that if there was no guidance from a medical professional, I could not effectively control the condition of my stroke	1	2	3	4	5
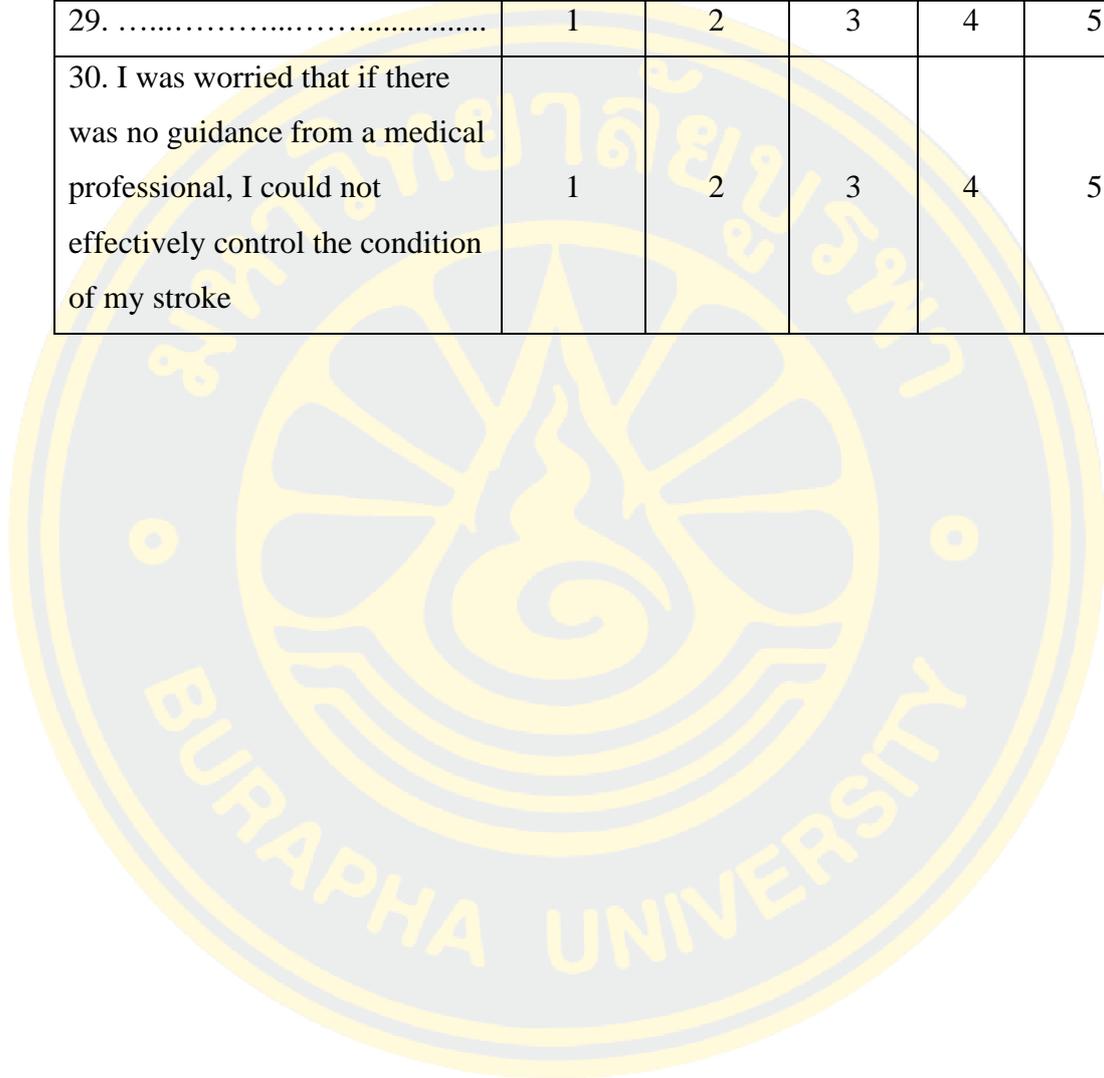
3.Stroke Prevention knowledge questionnaire (SPKQ)

Direction: We would like to know if you have any knowledge of stroke. Read each statement carefully. Indicate how you feel about each statement according to your actual situation.

1. Keeping a moderate amount of exercise can help to prevent stroke	Incorrect	Unsure	Correct
2.	Incorrect	Unsure	Correct
3.	Incorrect	Unsure	Correct
4.	Unsure	12g (about 2 mineral water bottle caps)	6g (about 1 mineral water bottle caps)
5.	Unsure	Test once a month or every quarter	Test at least once a week
6.	150/90mmHg	140/90mmHg	130/80mmHg
7.	Incorrect	Unsure	Correct
8.	Incorrect	Unsure	Correct
9.	Incorrect	Unsure	Correct
10.	Incorrect	Unsure	Correct
11.	Incorrect	Unsure	Correct
12.	Incorrect	Unsure	Correct
13.	Incorrect	Unsure	Correct
14.	Incorrect	Unsure	Correct
15.	Incorrect	Unsure	Correct
16.	Incorrect	Unsure	Correct
17.	Incorrect	Unsure	Correct
18.	Incorrect	Unsure	Correct
19.	Incorrect	Unsure	Correct
20.	Incorrect	Unsure	Correct
21.	Incorrect	Unsure	Correct

22.	Incorrect	Unsure	Correct
23.	Incorrect	Unsure	Correct
24.	Incorrect	Unsure	Correct
25. How soon should you get to the hospital in the event of any symptoms of a stroke?	Unsure	Within 12 hours	Within 3 hours
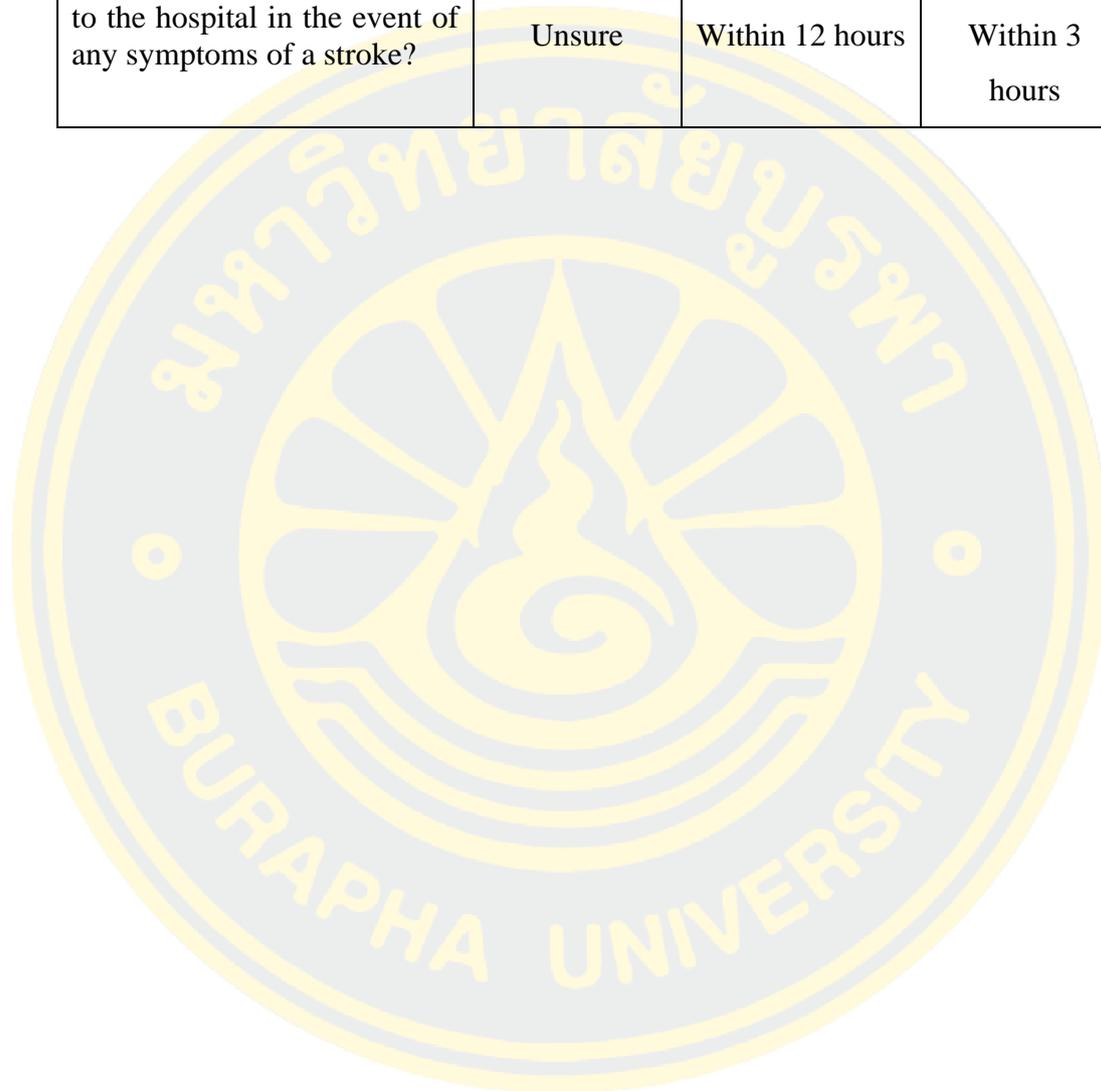
4.**Brief Illness Perceptions Questionnaire (BIPQ)**

Direction: The following is about your level of illness representation. Please read each question carefully and circle the number, items were assessed according to a 11-point rating scale. For example, "How much does your illness affect your life: 0 [not at all] – 10 [severely affects my life], for the following questions, please choose the number that best corresponds to your views.

1. How much does your illness affect your life?

| no affect | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | severely affects my life |

2. ....

| a very short time | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | forever |

3. ....

| absolutely no control | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | extreme amount of control |

4. ....

| not at all | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | extremely helpful |

5..

No symptoms at all   0   1   2   3   4   5   6   7   8   9   10   many severe symptoms

6..

not at all concerned   0   1   2   3   4   5   6   7   8   9   10   extremely concerned

7..

don't understan   0   1   2   3   4   5   6   7   8   9   10   understand very clearly

8.How much does your illness affect you emotionally? (e.g. does it make you angry, scared, upset or depressed?)

not at all affected emotionally   0   1   2   3   4   5   6   7   8   9   10   extremely affected emotionally

9. Please list in rank-order the three most important factors that you believe caused your illness. The most important causes for me:

1. _____

2. _____

3. _____

5.**Herth Hope Index (HHI)**

Direction: We would like to know the current level of your hope. Read each statement carefully. Indicate how you feel about each statement according to your actual situation. The numbers from 1 to 4 after each statement represent different meanings.

Circle the "1" if you **Strongly Disagree**
Circle the "2" if you **Disagree**
Circle the "3" if you are **Agree**
Circle the "3" if you are **Strongly Agree**

	Strongly Disagree	Disagree	Agree	Strongly Agree
1. I have a positive outlook toward life.	1	2	3	4
2.	1	2	3	4
3.	1	2	3	4
4.	1	2	3	4
5.	1	2	3	4
6.	1	2	3	4
7.	1	2	3	4
8.	1	2	3	4
9.	1	2	3	4
10.	1	2	3	4
11.	1	2	3	4
12. I feel my life has value and worth.	1	2	3	4

APPENDIX B

Permission letters to use instruments

Stroke Self-management Scale（SSMS）

The original version:

« 返回 | 回复 | 回复全部 | 转发 | 删除 | 彻底删除 | 举报 | 拒收 | 标记为... ▼ | 移动到... ▼ 　　　　上一封 下一封

RE: 中风病人自我管理问卷使用的同意 ☆
发件人：**101449** <101449@cch.org.tw> 🔳
时　间：2022年4月28日 (星期四) 下午6：02
收件人：Fang He 63910128 <575799647@qq.com> 　　　　纯文本 |

OK!!

寄件者: Fang He 63910128 <575799647@qq.com>
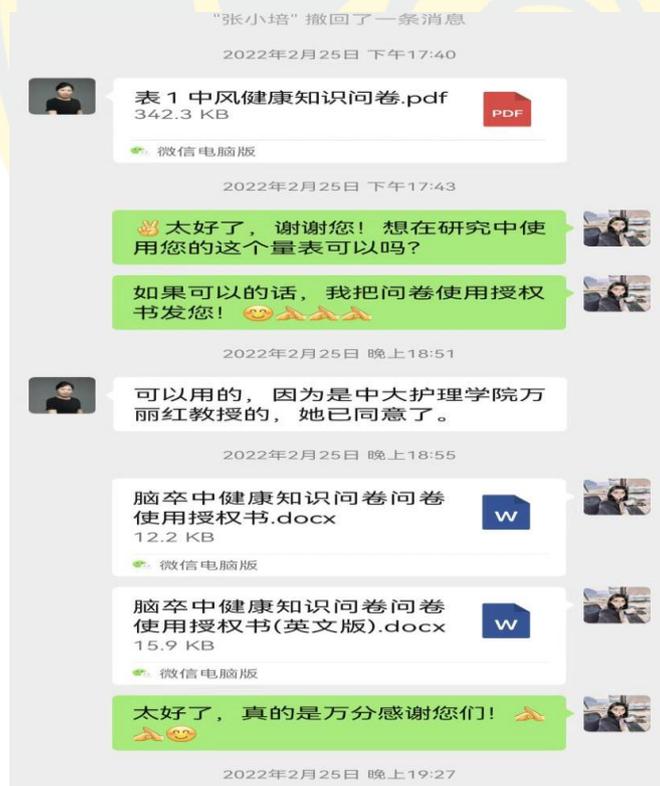寄件日期: 2022年4月28日 上午 11:31
收件者: 101449(郭乃瑜); Gracelin; fiona
主旨: 中风病人自我管理问卷使用的同意

亲爱的老师，您好，我是温州医科大学一名研究生，我叫贺芳。我目前在做一项关于脑卒中人群的自我管理行为的问卷研究，在查找文献过程中发现老师您建立关于脑卒中患者自我管理行为的调查这个问卷对我非常帮助，所以想征求老师您这边表格的使用的同意，非常感谢。希望得到老师您的回复，谢谢老师。

Stroke Prevention knowledge questionnaire (SPKQ)

The original version:

"张小培" 撤回了一条消息

2022年2月25日 下午17:40

表 1 中风健康知识问卷.pdf
342.3 KB
微信电脑版

2022年2月25日 下午17:43

太好了，谢谢您！想在研究中使用您的这个量表可以吗？

如果可以的话，我把问卷使用授权书发您！

2022年2月25日 晚上18:51

可以用的，因为是中大护理学院万丽红教授的，她已同意了。

2022年2月25日 晚上18:55

脑卒中健康知识问卷问卷使用授权书.docx
12.2 KB
微信电脑版

脑卒中健康知识问卷问卷使用授权书(英文版).docx
15.9 KB
微信电脑版

太好了，真的是万分感谢您们！

2022年2月25日 晚上19:27

Brief Illness Perceptions Questionnaire (BIPQ)

The original version:

Re: The permission of using the Brief Illness Perception Questionnaire ☆

发件人: **e.broadbent** <e.broadbent@auckland.ac.nz>
时　间: 2022年4月26日（星期二）上午9：00
收件人: Fang He 63910128 <575799647@qq.com>

纯文本 |

邮件可翻译为中文　立即翻译

Dear Fang He

You may use the Brief IPQ for your research

Regards

Elizabeth Broadbent
Professor of Health Psychology
Department of Psychological Medicine
Faculty of Medical and Health Sciences
The University of Auckland
New Zealand
e.broadbent@auckland.ac.nz
google scholar

The Chinese version:

回复：关于简易疾病认知问卷中文版本的使用同意 ☆

发件人: **安徽医科大学梅雅** <1029364785@qq.com>
时　间: 2022年4月26日（星期二）下午4：33
收件人: Fang He 63910128 <575799647@qq.com>

纯文本 |

贺芳，你好：谢谢对我文章的关注，后续会将我们课题组使用的《疾病感知问卷简化版》发给你。 祝：研究顺利！
安徽医科大学梅雅琪

---------------- 原始邮件 ----------------

发件人: " Fang He 63910128" <575799647@qq.com>;
发送时间: 2022年4月26日(星期二) 下午4:23
收件人: "1029364785"<1029364785@qq.com>;
主题: 关于简易疾病认知问卷中文版本的使用同意

亲爱的梅老师，您好，我是泰国东方大学的一名研究生，我叫贺芳。我目前在做一项关于自我管理的问卷研究，在查找文献过程中，发现在一篇梅雅琪老师您的这篇《中文版疾病感知问卷简化版在女性乳腺癌患者中的信效度检验》这篇文章中有翻译中文版的疾病感知问卷简化版，觉得老师您的这个问卷非常符合我的研究，所以想使用老师您的这个中文版简易疾病认知问卷，在此想征求老师您这边的使用同意权。希望得到老师您的回复，谢谢老师

Herth Hope Index (HHI)

The original version:

邮件可翻译为中文　立即翻译

Dear Fang He,

I appreciate your interest in the Herth Hope Scale (HHS). I have attached a copy of the HHS along with the abbreviated form, Herth Hope Index (HHI), with scoring instructions for both tools and a reference list I have compiled of published articles using either the HHS or HHI.

You have my permission to use either the HHS or HHI in your research study as described in your email message to me. I ask that you send me a summary of your study findings upon completion of your project.

Best wishes on your educational journey and important research project.

Sincerely,

Kaye Herth, PhD, RN, FAAN

Dean Emerita

Minnesota State University, Mankato USA

From: Fang He 63910128 <575799647@qq.com>
Sent: Tuesday, April 26, 2022 11:53 PM
To: Herth, Kaye A <kaye.herth@mnsu.edu>
Subject: The permission of Herth Hope Scale (HHS)

The Chinese version:

Re:中文版希望水平问卷 ☆

贺芳同学你好!

　　同意你使用中文版Herth希望量表，并祝研究顺利。

　　研究结束后，希望能把研究summary或有关研究内容发给我一份，我再转量表的创始人Herth教授，以表达对她的感谢和敬意。

　　赵海平
中国医科大学护理学院

在 2022-04-25 17:30:47，"Fang He 63910128" <575799647@qq.com> 写道:

　　亲爱的赵老师，您好，我是温州医科大学的一名研究生，我叫贺芳。我目前在做一项关于自我管理的问卷研究，在我的变量中有一个希望指数，在程中发现老师您一篇文章《血液透析患者的社会支持和希望》中有使用到中文版的希望水平问卷，关于对于衡量病人希望水平的中文问卷对我非常想征求使用中文版希望指数问卷的同意。希望得到老师您的回复，谢谢老师。

APPENDIX C
Participant information sheet and consent forms

<div align="center">

เอกสารชี้แจงผู้เข้าร่วมโครงการวิจัย

(Participant Information Sheet)

</div>

รหัสโครงการวิจัย : ....

(สำนักงานคณะกรรมการพิจารณาจริยธรรมในมนุษย์ มหาวิทยาลัยบูรพา เป็นผู้ออกรหัสโครงการวิจัย)

โครงการวิจัยเรื่อง : <u>**Factors influencing self-management behaviors among recurrent stroke persons in Wenzhou, China**</u>

เรียน ....

Dear participants

      I am Ms Fang He, a student in Master of Nursing Science (International Program) Faculty of Nursing, Burapha University Thailand. **My study is** "Factors influencing self-management behaviors among recurrent stroke persons in WenZhou China". The objectives are to describe self-management behaviors among recurrent stroke persons in Wenzhou China and to determine whether the stroke prevention knowledge, Illness representation, hope can predict self-management behaviors among recurrent stroke persons in Wenzhou China.

      This study will be a survey study. Participating in this study is voluntary. If you agree to participate in this study, you will answer the following questionnaires, which will take approximately 30-minutes. During the data collection period, the researcher will clarify any questions posed by the participants for clarity regarding the language or content. You will not get any direct benefits by participating in this study. However, the information you provide will be valuable to identify factors influencing self-management behavior and help the other recurrent stroke persons to develop self-management plans, guidance and interventions to promote persons' self-management behaviors and improve quality of life.

      Considering the situation about the corona virus in 2022 (COVID-19), the guidelines for preventing COVID-19 during data collection process was concern by:

      1. Before entering the hospital, the all persons will be required to go through temperature screening and show a health QR code (an official way to declare residents' health status). Those persons who display a green code and temperature below 37.3 will

be allowed entry into the outpatient department.

2. The researcher and the participants wore masks correctly throughout the data collection process.

3. A safe distance of at least 1 meter were maintained between the researcher and the participants.

4. Participants needed to wash their hands with alcohol before and after data collection.

5. Items touched by participants were cleaned and disinfected before being given to the next participant.

6. Completed questionnaires were kept in a separate archive bag.

7. Participant will maintain one-meter social distancing from other participants and researchers. These data will be collected through a self-reporting questionnaire in a special private room. The room will be routinely disinfected daily

During the study, you have the right not to answer questions, and you also have the right to change your minds and refuse to participate in the project at any time, and the refusal would not affect the medical services you received. Any information collected from this study, including your identity, will be kept confidential. A coding number will be assigned to you and your name will not be used. Findings from the study will be presented as a group of participants and no specific information from any individual participant will be disclosed. All data will be accessible only to the researcher which will be destroyed one year after publishing the findings. You will receive a further explanation of the nature of the study upon its completion, if you wish.

The research will be conducted by Ms. Fang He **under the supervision of my major-advisor,** Associate Professor Dr. Niphawan Samartkit**. If you have any questions, please contact me at mobile number: + 86**15057715989 **or by email** 575799647@qq.com **and/or my advisor's e-mail address** nsamartkit@gmail.com**. Or you may contact Burapha University Institutional Review** Board (BUU-IRB) telephone number 038 102 620**. Your cooperation is greatly appreciated. You will be given a copy of this consent form to keep.**

Fang He

เอกสารแสดงความยินยอม
ของผู้เข้าร่วมโครงการวิจัย (Consent Form)

รหัสโครงการวิจัย : ....

(สำนักงานคณะกรรมการพิจารณาจริยธรรมในมนุษย์ มหาวิทยาลัยบูรพา เป็นผู้ออกรหัส

โครงการวิจัย)

โครงการวิจัยเรื่อง ......Factors influencing self-management behaviors among recurrent

stroke persons in Wenzhou, China

ให้คำยินยอม วันที่ ……....…….. เดือน …………….....…………… พ.ศ. ………..……

        Before giving my signature below, I have been informed by researcher, Ms.

Fang He, about the purposes, method, procedures, benefits and possible risks associated

with participation in this study thoroughly, and I understood all of the explanations. I

consent voluntarily to participate in this study. I understand that I have the right to leave

the study any time I want, without fearing that it might affect the medical services i will

receive.

        The researcher Ms. Fang He has explained to me that all data and information

of the participants will be kept confidential and only be used for this study. I have read

and understood the information related to participation in this study clearly and I am

signing this consent form.

Signature ……………………………..…

Participant(……………………………….)

Signature ………………………………..

Withness (..)

APPENDIX D

Ethics approval letter and data collection letter

สำเนา

ที่ IRB3-043/2565

เอกสารรับรองผลการพิจารณาจริยธรรมการวิจัยในมนุษย์
มหาวิทยาลัยบูรพา

คณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์ มหาวิทยาลัยบูรพา ได้พิจารณาโครงการวิจัย

รหัสโครงการวิจัย : G-HS016/2565

โครงการวิจัยเรื่อง : Factors influencing self-management behaviors among recurrent stroke persons in Wenzhou, China

หัวหน้าโครงการวิจัย : MISSFANG HE

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 2 : 21 May 2022

2. Research Protocol Version 2 : 21 May 2022

3. Participant Information Sheet Version 2 : 21 May 2022

4. Informed Consent Form Version 1 : 21 April 2022

5. Research Instruments Version 1 : 21 April 2022

6. Others (if any) Version - : -

วันที่รับรอง : วันที่ 27 เดือน พฤษภาคม พ.ศ. 2565
วันที่หมดอายุ : วันที่ 27 เดือน พฤษภาคม พ.ศ. 2566

ลงนาม นางสาวรมร แย้มประทุม
(นางสาวรมร แย้มประทุม)
ประธานคณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์ มหาวิทยาลัยบูรพา
ชุดที่ 3 (กลุ่มคลินิก/ วิทยาศาสตร์สุขภาพ/ วิทยาศาสตร์และเทคโนโลยี)

温州医科大学附属第二医院 温州医科大学附属育英儿童医院

伦理委员会审查批件

批件号：伦审（2022-K-52-02）

科室：综合 ICU	主要研究者：贺芳		职称：主管护师
项目名称	中国温州复发性脑卒中患者自我管理行为的影响因素		
项目来源	自选课题		
审查类别	复审	审查方式	简易审查
审查日期	2022 年 5 月 30 日	审查地点	/
审查委员	王爱霞		
审查材料	1. 临床课题研究复审申请 2. 试验方案（版本号：V2.0；版本日期：2022.05.20）		
审查意见	经过我院医学伦理委员会审查，审查结果为：同意		
年度/定期跟踪审查	审查频率为该研究批准之日起每 12 月一次，首次请于 2023 年 5 月 31 日前 1 个月逾交"定期/年度研究进展报告"。 本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。		
批件有效期	2022 年 6 月 1 日——2023 年 5 月 31 日（逾期未实施，自行废止）		

主任委员签字：

日　期：2022 年 6 月 1 日

温州医科大学附属第二医院 温州医科大学附属育英儿童医院

医学伦理委员会（盖章）

声明：

本伦理委员会的职责、人员组成和工作程序均遵循 ICH-GCP、NMPA-GCP、中国相关法律和法规。

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

注意事项：

1) 修改试验方案、知情同意书、招募广告及其他提供给受试者的相关材料，请及时提交"修正案审查申请"。

2) 本中心发生的医疗器械严重不良事件或药物可疑且非预期严重不良反应及研发期间安全性更新报告须按照 NMPA/GCP 最新要求及时递交我院伦理委员会，国内外其他中心发生的严重不良事件或药物可疑且非预期严重不良反应需定期汇总后递交伦理委员会，伦理委员会有权对其评估做出新的决定。

3) 研究纳入了不符合纳入标准或符合排除标准的受试者，符合中止试验规定而未让受试者退出研究，给予错误治疗剂量，给予方案禁止的合并用药等没有遵从方案的情况；或可能对受试者的权益\健康以及研究的科学造成不良影响等偏离 GCP 原则的情况，请发现者及时提交"不依从或违背方案报告"。

4) 自批件签发之日起，请研究者在规定的跟踪审查截止日期前 1 个月提交"定期/年度研究进展报告"，本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。

5) 暂停或提前终止临床研究，请及时提交书面申请。

6) 完成试验请及时提交"结题报告"。

7) 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。

8) 凡经我院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、药审中心等的临床试验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

MHESI 8137/763

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

June 10th, 2022

Dear   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. FANG HE to collect data for testing reliability of the research instruments.

Ms. FANG HE ID 63910128, a graduate student of the Master of Nursing Science program in Adult Nursing Pathway, Faculty of Nursing, Burapha University, Thailand, was approved her thesis proposal entitled: "Factors influencing self-management behaviors among recurrent stroke persons in Wenzhou, China" under supervision of Assoc. Prof. Dr. Niphawan Samartkit as the principle advisor. She proposes to collect data from 30 participants who diagnosed with recurrent ischemic stroke and discharged from hospital more than 1 month with the inclusion criteria of Age more than 18 years old, have history of ischemic stroke $\geq$ 2 times, conscious, the Glasgow Coma score (GCS) = 15, the activities of daily living (ADL) scores > 60, be able to communication Chinese and no mental illness. The data collection will be carried out from June 15 to August 14, 2022. In this regard, you can contact Ms. FANG HE via mobile phone +86-1505-7715-989 or E-mail: 575799647@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

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

เอกสารนี้ลงนามด้วยลายเซ็นอิเล็กทรอนิกส์ ตรวจสอบได้ที่ (https://e-sign.buu.ac.th/verify)

MHESI 8137/764

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

June 10th, 2022

Dear   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. FANG HE to collect data for conducting research.

Ms. FANG HE ID 63910128, a graduate student of the Master of Nursing Science program in Adult Nursing Pathway, Faculty of Nursing, Burapha University, Thailand, was approved her thesis proposal entitled: "Factors influencing self-management behaviors among recurrent stroke persons in Wenzhou, China" under supervision of Assoc. Prof. Dr. Niphawan Samartkit as the principle advisor. She proposes to collect data from 110 participants who diagnosed with recurrent ischemic stroke and discharged from hospital more than 1 monthwith the inclusion criteria of Age more than 18 years old, have history of ischemic stroke $\geq$ 2 times, conscious, the Glasgow Coma score (GCS) = 15, the activities of daily living (ADL) scores > 60, be able to communication Chinese and no mental illness. The data collection will be carried out from August 15 to December 30, 2022. In this regard, you can contact Ms. FANG HE via mobile phone +86-1505-7715-989 or E-mail: 575799647@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

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

เอกสารนี้ลงนามด้วยลายเซ็นอิเล็กทรอนิกส์ ตรวจสอบโค้ดที่ (https://e-sign.buu.ac.th/verify)

Please type or write with readable hand writing

GRD-109 (Eng)
(Try out)

Graduate School Burapha University

Request form for issuing a requesting letter for data collection (Try out)

To Dean of Graduate School

I am (Mr./Mrs./Ms.) Miss Fang He   Student ID #.........63910128............

❑ Doctoral degree   ❑ Master degree - plan O√ A O B   Study type O√ Full-time O Part-time

Program Master of Nursing Science (International Program)   Major/Pathway   Adult Nursing

Faculty   Nursing   Telephone   +86-15057715989   E-mail   575799647@qq.com

Doctoral dissertation/ Master thesis/ IS **Title:**   Factors influencing self-management behaviors among recurrent stroke persons in Wenzhou, China

Principal advisor' name Associate Professor Dr. Niphawan Samartkit

I would like to request for issuing **a requesting letter for data collection** (**Main Study**):

By issuing to (name of the director of Institute/ University/ Organization)

The director of the Second Affiliated Hospital of Wenzhou Medical University

Institute/ University/ Organization/ Department/ Division

Neurology Out-patient Department

To collect data from (details of participants and sample size)

    Target population: The target population of this study will be the persons diagnosed with recurrent ischemic stroke and discharged from hospital more than 1 month. Moreover, they will receive care and follow-up visits at Neurology out-patient department of the Second Affiliated Hospital of Wenzhou Medical University in Wenzhou, China.

    Sample size: 30 participants.

    Sampling method: The samples of this study will be recruited by defining a collecting data period and recruit samples follow inclusion criteria.

    1.The researcher cooperates with the nurse in Neurology out-patient department to search the registration records to find the clients who meet the inclusion criteria, which are:

        1.1 Are discharged from hospital more than one month

        1.2 Age: >18 years old

        1.3 History of ischemic stroke $\geq$ 2 times

        1.4 Conscious, the Glasgow Coma scores (GCS) = 15 by Glasgow Coma Scale

        1.5 The activities of daily living (ADL) scores > 60 by Barthel Index

        1.7 Be able to communication and writing

        1.8 No mental illness

    2.Then the outpatient nurse will give the information about the objective of this research and ask them to participate if they are interested in this study.

    3. If they are interested to join in study, the nurse in Neurology out-patient department will contact the researcher, and then the researcher will introduce herself to the recurrent stroke persons, inform them about the study, its purposes, data collection process, and human right protection. If the recurrent stroke persons voluntarily participate in the study, the researcher will ask them to sign the consent forms for signature verification.

4. The researcher will go to the Neurology out-patient department from 8:00 am to 12:00 am and from 1:00 pm to 4:30 pm every weekday (Monday to Friday) for collecting data. 10-15 samples will be taken every week.

Duration of data collection: from date.........15ᵗʰ...June...2022..........to......14ᵗʰ...August 2022............

My contact information: # cellphone and E-mail ......+86-15057715989 and ....575799647@qq.com ....

With this request, I have enclosed documents...1...copies

1) A copy of proof of ethical approval from Burapha university, and

2) Research instruments

Please be informed accordingly,

Student's name ....Fang He................................

(...............Fang He ....)

Date...1... Month......June......Year......2022.....

Principal advisor acknowledged	Dean of Faculty/College acknowledged	Dean of Graduate School approved
Approved (Signed). Nipharan Saunartkit Date 6 June 2022	(Signed). Pamela Date 8 June 2022	(Assoc.Prof.Dr.Nujjaree Chaimongkol) (Signed). Dean of Graduate School Date 10 June 2022

> Please type or write with readable hand writing

GRD-109 (Eng)
(Main Study)

Graduate School Burapha University

Request form for issuing a requesting letter for data collection (Main Study)

To Dean of Graduate School

I am (Mr./Mrs./Ms.) _Miss_ Fang He .... Student ID # ....63910128............

❑ Doctoral degree   ❑ Master degree - plan ○√ A ○ B   Study type ○√ Full-time ○ Part-time

Program Master of Nursing Science (International Program)   Major/Pathway___ Adult Nursing

Faculty_____Nursing.........   Telephone____ +86-15057715989____ E-mail____575799647@qq.com

Doctoral dissertation/ Master thesis/ IS **Title:**_____ Factors influencing self-management behaviors among recurrent stroke persons in Wenzhou, China

Principal advisor' name _Associate Professor Dr. Niphawan Samartkit

I would like to request for issuing **a requesting letter for data collection (Main Study):**

By issuing to (name of the director of Institute/ University/ Organization)

The director of the Second Affiliated Hospital of Wenzhou Medical University

Institute/ University/ Organization/ Department/ Division

Neurology Out-patient Department

To collect data from (details of participants and sample size) :

Target population: The target population of this study will be the persons diagnosed with recurrent ischemic stroke and discharged from hospital more than 1 month. Moreover, they will receive care and follow-up visits at Neurology out-patient department of the Second Affiliated Hospital of Wenzhou Medical University in Wenzhou, China.

Sample size: 110 participants.

Sampling method: The samples of this study will be recruited by defining a collecting data period and recruit samples follow inclusion criteria.

1. The researcher cooperates with the nurse in Neurology out-patient department to search the registration records to find the clients who meet the inclusion criteria, which are:

1.1 Are discharged from hospital more than one month

1.2 Age: >18 years old

1.3 History of ischemic stroke ≥ 2 times

1.4 Conscious, the Glasgow Coma scores (GCS) = 15 by Glasgow Coma Scale

1.5 The activities of daily living (ADL) scores > 60 by Barthel Index

1.7 Be able to communication and writing

1.8 No mental illness

2. Then the outpatient nurse will give the information about the objective of this research and ask them to participate if they are interested in this study.

3. If they are interested to join in study, the nurse in Neurology out-patient department will contact the researcher, and then the researcher will introduce herself to the recurrent stroke persons, inform them about the study, its purposes, data collection process, and human right protection. If the recurrent stroke persons voluntarily participate in the study, the researcher will ask them to sign the consent forms for signature verification.

4. The researcher will go to the Neurology out-patient department from 8:00 am to 12:00 am and from 1:00 pm to 4:30 pm every weekday (Monday to Friday) for collecting data. 10-15 samples will be taken every week.

Duration of data collection: from date............15ᵗʰ...August ...2022....to...30ᵗʰ...December 2022
My contact information: # cellphone and E-mail ....+86-15057715989 and ....575799647@qq.com

With this request, I have enclosed documents...1...copies

1) A copy of proof of ethical approval from Burapha university, and
2) Research instruments

Please be informed accordingly,

Student's name ....Fang He..............

(...............Fang He ....)

Date...1... Month...June...Year...2022.......

Principal advisor acknowledged	Dean of Faculty/College acknowledged	Dean of Graduate School approved
Approved (Signed) Niplawan Samartkit Date 6ᵗʰ June 2022	(Signed) Poonclo Date 8 June 2022	(Assoc.Prof.Dr.Nujjaree Chaimongkol) (Signed) Dean of Graduate School Date 10 June 2022

BIOGRAPHY

NAME   Fang He

DATE OF BIRTH   8 October 1993

PLACE OF BIRTH   Jian city, Jiangxi province, China

PRESENT ADDRESS   Room 903, Building 3, Yongan Jingyuan, Longwan
                            District, Wenzhou city, Zhejiang Province, China

POSITION HELD   Full-time student

EDUCATION   2012 - 2016
                            Bachelor of Nursing,Nanchang university, Nanchang city,
                            Jiangxi province, China
                            2020 – Present
                            Master of Nursing Science (M.N.S.) in Adult Nursing ,
                            Faculty of Nursing, Burapha University, Chonburi,
                            Thailand