PREDICTIVE FACTORS OF FAMILY CAREGIVER BURDEN IN ELDERLY STROKE PATIENTS IN WENZHOU, CHINA

YUANYUAN CAI

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

-

YUANYUAN CAI

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรพยาบาลศาสตรมหาบัณฑิต (หลักสูตรนานาชาติ)
คณะพยาบาลศาสตร์ มหาวิทยาลัยบูรพา
2568

PREDICTIVE FACTORS OF FAMILY CAREGIVER BURDEN IN ELDERLY STROKE PATIENTS IN WENZHOU, CHINA

YUANYUAN CAI

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

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

Advisory Committee	Examining Committee
Principal advisor	
....	.... Principal examiner
(Associate Professor Dr. Pornchai Jullamate)	(Associate Professor Dr. Wanpen Pinyopasakul)
	.... Member
Co-advisor	(Associate Professor Dr. Pornchai Jullamate)
....	.... Member
(Associate Professor Dr. Chanandchidadussadee Toonsiri)	(Associate Professor Dr. Chanandchidadussadee Toonsiri)
	.... Member
	(Assistant Professor Dr. Pornpat Hengudomsub)

.... Dean of the Faculty of Nursing
(Associate Professor Dr. Pornchai Jullamate)
....

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

.... Dean of Graduate School
(Associate Professor Dr. Witawat Jangiam)
....

63910140: MAJOR: ADULT NURSING PATHWAY; M.N.S. (ADULT NURSING PATHWAY)
KEYWORDS: FAMILY CAREGIVER BURDEN, OLDER ADULTS WITH STROKE, ACTIVITIES OF DAILY LIVING, SOCIAL SUPPORT, POST-STROKE DEPRESSION, CAREGIVER-PATIENT RELATIONSHIP

YUANYUAN CAI : PREDICTIVE FACTORS OF FAMILY CAREGIVER BURDEN IN ELDERLY STROKE PATIENTS IN WENZHOU, CHINA. ADVISORY COMMITTEE: PORNCHAI JULLAMATE, Ph.D. CHANANDCHIDADUSSADEE TOONSIRI, Ph.D. 2025.

This cross-sectional study aimed to characterize the burden level experienced by family caregivers and to investigate the predictive influence of activities of daily living, post-stroke depression, social support, and the caregiver-patient relationship on caregiver burden in older adults with stroke in Wenzhou. A predictive correlational study was conducted. The study involved 101 stroke patients aged 60 and older and primary family caregivers aged 18 and older, all rehabilitation inpatients at The Second Affiliated Hospital of Wenzhou Medical University. Data collection was conducted using validated instruments from September 2024 to October 2024. Data were analyzed using descriptive statistics and stepwise multiple regression analysis.

The results revealed that family caregiver's burden was at a moderate level (Mean = 44.97, SD = 18.43). The significant predictors of family caregivers burden among older adults with stroke patients were activities of daily living ($\beta = -0.400$, $p < 0.001$), social support ($\beta = -0.353$, $p < 0.001$), caregivers-patients relationship: cousin ($\beta = -.177$, $p < 0.05$), and post-stroke depression ($\beta = 0.188$, $p < 0.05$). These predictors could together explain 49.7% ($R^2 = .497$, $p < .001$) of the variance in family caregivers burden among older adults with stroke patients. This study's results serve as a reference for health professionals and clinical nurses to develop reasonable intervention strategies to alleviate the load on family caregivers and enhance their quality of life.

ACKNOWLEDGEMENTS

In the whole process of study and scientific research, I have gained a lot of things, which will be of great help to my future nursing work and also improve my study and scientific research ability.

Over the course of my researching and writing this paper, I would like to express my thanks to all those who have helped me. First, I would like express my gratitude to all those who helped me during the writing of this thesis. A special acknowledgement should be shown to my major advisor Associate Professor Dr. Pornchai Jullamate and co-advisor Associate Professor Dr. Chanandchidadussadee Toonsiri, from whose lectures I benefited greatly, I am particularly indebted to them who gave me kind encouragement and useful instruction all through my writing. Without their endless work and inspiring discussion on my study, it would have not been possible.

I want to express gratitude to Faculty of Nursing Burapha University for giving me support and motivation to keep on learning and help me in achieving my goal during my stay in the university. I would also like to show my sincere appreciation for the help rendered to me from the Research Institutional Board of Burapha University and Research Ethics Board of the Second Affiliated Hospital of Wenzhou Medical University to ensure the ethical soundness of my thesis. I would like to express my best thankfulness to the committee members for their valuable questions, comments and suggestions which help my thesis clearer.

And my warm gratitude also goes to my friends and family who gave me much encouragement and financial support respectively.

Lastly, I would like to thank all the participants of this study for kindly giving me their time and cooperating with me in successfully completing this study.

Yuanyuan Cai

TABLE OF CONTENTS

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER 1
INTRODUCTION

Statements and significance of the problems

Stroke is one of the chronic diseases that seriously threaten human life and health. It not only has a high incidence but also has many sequelae. It has the characteristics of high disability rate, high mortality rate, and high recurrence rate. According to the World Stroke Organization (WSO) Global Stroke Fact Sheet 2022 (Feigin et al., 2022), stroke remains the second leading cause of death and third leading cause of disability in the world, with more than 13 million new cases globally each year. Epidemiological studies show that the global prevalence of stroke is expected to gradually increase to as high as 21.9% by 2030 (Martini et al., 2022). Global population aging is the most important medical and socio-demographic problem worldwide. Projections show that by 2050, seniors aged 60 or over will outnumber teenagers aged 10-24 (Rudnicka et al., 2020). With the aggravation of population aging, it brings a great challenge to all countries in the world. Age is an unchangeable risk factor for stroke, with the increase of age, the prevalence of stroke increases significantly (Donkor, 2018). About three-quarters of strokes occur in people over 65 years of age (Yousufuddin & Young, 2019).

For decades, stroke has been listed as the leading cause of death in China (Wu et al., 2019). Stroke is estimated to cause at least one in every five deaths in China (Cheng et al., 2022). The burden of stroke in China continues to increase due to population aging, socioeconomic development, urbanization, and the resulting lifestyle changes and increasing prevalence of certain risk factors (Wang et al., 2020). Each year there are 2.4 million new strokes, 1.1 million stroke-related deaths, and more than 11.1 million stroke survivors (Ru et al., 2019). From 2013 to 2019, the prevalence of stroke in China was significantly increased from 2.28% to 2.58%. The prevalence of stroke in Chinese elderly aged ≥60 years ranged from 4.68% (2013) to 5.56% (2019) (Tu et al., 2022). An analysis of the disease spectrum of pre-hospital emergency care in Wenzhou City, a total of 65916 cases of pre-hospital emergency care patients were investigated, 8157 cases (12.37%) of cerebrovascular diseases. A survey of 50455 people in Lucheng District of Wenzhou City showed that the incidence of stroke was 194/100000, and the incidence of stroke was significantly higher in people aged 50-80 years than in other groups.

With the continuous improvement of the global medical level, the mortality of stroke patients has been decreasing year by year, but most survivors still have different degrees of physical, language and cognitive impairments (Hou & Yang, 2022). Studies have shown, that 70%~80% of stroke patients cannot live independently because of disability (Olver et al., 2021), which seriously affects the quality of family life. Due to the lag in the development of community health care and related service institutions in China, most patients return to their families and society after passing the acute phase of stroke in hospitals (Chen et al., 2021), without continuous standardized rehabilitation training. The patient's family members are the main caregiver and also the main helpers and supporters of the patient's rehabilitation practice (Lou et al., 2021), the average duration of continuous care was more than 2 years (King et al., 2010). The occurrence of stroke not only brings pain to the patient, but also to the main caregiver and family. Family caregiver of stroke patients suffer from great mental, social, health and economic stress for a long time in order to care for stroke patients (National Academies of Sciences & Medicine, 2016). This requires medical staff to pay more attention to the main family caregiver of patients with chronic diseases while paying attention to stroke patients.

A family caregiver is an informal form of care. Informal caregiver can be defined as people who provide unpaid help to people who are not feeling well. Most informal caregiver are family members, such as spouses and adult children of caregiver. Under the influence of Chinese traditional culture, family members become the main informal caregiver of patients (Zeng et al., 2017). For this reason, informal caregiver are often referred to as family caregivers(Eifert et al., 2015). Caregiver roles typically include transportation, household chores, house maintenance and outdoor work, scheduling and coordinating appointments, managing finances, helping with medical care, and providing personal care (Swartz & Collins, 2019). Family caregiver play a vital role in providing various aspects of support to patients. The injury of stroke may be permanent, resulting in a decrease in the patient's permanent daily self-care ability, long-term dependence, reduced social interaction, and emotional and economic problems. Therefore, family caregiver need to take long-term care of the patient and meet the patient's needs for care and physical and mental rehabilitation (Caro et al., 2018). Caring for someone with long-term needs reduces family caregivers' leisure time, socializing, sleep, etc. (Watanabe et al., 2015), and may affect their physical and mental health. According to the study, 58.6% of stroke family caregiver had a chronic medical condition (Sambasivam et al., 2019), the prevalence of depressive symptoms was 40.2%, the prevalence of anxiety symptoms was 21.4% (Hu et al., 2018).

At the beginning of the 21st century, research on family caregiver burden in Western countries tends to mature and analyze the concept of caregiver burden, which can be defined as the stress or burden borne by people caring for chronically ill, disabled or elderly family members (Liu et al., 2020). Collins et al. (Collins et al., 1994) defined caregiver burden as the physical, psychological, social and economic burdens encountered by family members caring for patients when they undertake their care obligations. In recent years, on the basis of the caregiver burden evaluation scale, scholars have conducted various discussions on the level and predictive factors of caregiver burden, and provided intervention to the predictive factors with high caregiver burden score, so as to reduce the burden level of family caregiver and improve the quality of life of stroke patients and family caregiver.

Recent studies have shown that nearly 37% of post-stroke patients (PSD) exhibit clinically relevant depressive symptoms (Lenzi et al., 2008). Post-stroke depression is common in stroke patients (Suh et al., 2005). The results of one study suggest that PSD is a significant independent predictor of caregiver burden for stroke patients in China (Dou et al., 2018). Post-stroke depression not only has a negative impact on social interaction and overall quality of life, but also has a negative impact on the recovery of motor function and cognitive function of patients, thus aggravating the burden of caregiver (Lenzi et al., 2008). The emotional distress and burden of caregiver may be part of the cause of PDS. A study by Suh et al in South Korea found that emotional distress of caregiver had a negative impact on PSD in the perceived burden of caregiver (Suh et al., 2005).

The dependence of stroke patients on their ability to perform activities of daily living places a burden on family caregiver. The degree of burden borne by informal caregiver was associated with the severity of functional disability in stroke patients, with informal caregiver of stroke patients with moderate to severe functional disability in a study 3.7 times more likely to have mild to moderate caregiver burden than caregivers of stroke patients with non-functional disability (Achilike et al., 2020). In A Meta-analytic Study, caregiver caring for stroke patients with severe dysfunction felt three times more burdened than they did not (Fadilah & Rahariyani, 2019). Roopchand-Martin demonstrated that depressive symptoms and functional status in stroke patients are an important factor in caregiver burden (Roopchand-Martin & Creary-Yan, 2014). The changes in the physical and mental conditions of stroke patients lead to the difficulty of achieving ADL independently in stroke patients.

Studies have shown that the burden of caring for older patients is greater than that of younger patients, that long-term care is a greater burden for caregiver, and that socio-cultural differences also contribute to caregiver burden (Choi-Kwon et al., 2005). In a Korean multivariate analysis, the caregiver was a significant factor in the daughter-in-law's level of stroke caregiver burden (Choi-Kwon et al., 2005). Studies have shown that caregiver burden is mainly borne by female caregiver (Menon et al., 2017). Studies have shown that caregiver burden has a mediating effect on caregiver quality of life, and the relationship with patients has been identified as a direct predictor of quality of life (Jeong et al., 2015). Previous research has shown that spouse caregiver face the greatest risk of health problems and role overload (Barnes et al., 1992). Spouse is the informal caregiver for most stroke patients (49.3%), The study of in Chinese families shows that non-spouse caregiver feel more pressure than spouse caregiver (Tang & Chen, 2002). This is different from the results of previous studies.

The role of social support in reducing the burden on caregiver is widely recognized. This pressure may be amplified in household systems in rural areas due to limited access to resources in rural areas (Peng et al., 2019). One study found that increased stress levels for caregiver, living in extended families with no one to support primary care, increased the burden on caregiver. However, as the caregiver's level of social support increased, the caregiving burden decreased. Social support status of caregiver ($\beta=0.08$; $p=0.050$) was an important predictor of caregiver burden (Chien et al., 2007). It was reported that the family domain in the Multidimensional Scale of perceived Social support was significantly correlated with burden ($r = -0.295$), and the burden was heavier when the caregiver had a lower level of social support. Physical, emotional, and financial help from family and friends can ease the negative effects of caregiving (Akosile et al., 2018).

Many foreign scholars have not only studied the predictive factors of informal family caregiver burden in stroke patients. At the same time, active intervention on controllable factors can reduce the family caregiver burden of stroke patients. For example Araujo (Araújo et al., 2018), through the training of nursing skills and stroke knowledge for family caregiver, the nursing skills and stroke knowledge can be significantly improved, so as to reduce the family caregiver burden . For example Day (Day et al., 2018) after discharge, nurses carried out three home follow-up visits within 1 month. Through periodic visits of health service personnel to patients' homes, caregiver were trained in face-to-face nursing skills and stroke knowledge, and on-site counseling was provided for intervention. Steiner et al (Pierce et al., 2009) and Davis and Mahoney (Davis et al., 2004; Mahoney et al., 2003) found acted reduction in burden and distress for caregiver receiving friendly, socially supportive phone calls that provided some respite from caregiving, even without in-home caregiver skills training.

At present, the domestic research on family caregiver burden of stroke patients started relatively late, and the research and analysis of the predictive factors of the family caregiver burden of elderly stroke patients are not in-depth enough, and the research results are insufficient to provide reasonable and effective information support and decision-making basis for further intervention measures. Further research is needed to understand these predictors. The empirical evidence from this study will provide health professionals and nurses with a better basis for interventions. This can help them develop rational interventions to reduce the family caregiver burden and improve the quality of life for family caregiver. Therefore, it is of great significance to study the predictors of family caregiver burden in elderly stroke patients.

Research objectives

The objectives of the study are to:

1. To describe the level of family caregiver burden of elderly stroke patients in Wenzhou, China.

2. To explore the predictive effects of patient’s activity of daily living, post-

stroke depression, caregiver-patient relationship, and social support on family caregiver burden of elderly stroke patients in WenZhou, China.

Research hypotheses

Patient's activity of daily living, post-stroke depression, caregiver-patient relationship and social support can predict family caregiver burden of elderly stroke patients in Wenzhou, China.

Scope of the study

The objective of this study was to investigate the level and predictive factors of family caregiver burden in elderly stroke patients. The participants were 101older adults with stroke patients and family caregivers at the rehabilitation department of the Second Affiliated Hospital of Wenzhou Medical University. The data was collected during September to October, 2024.

The Independent variables consist of the patients' activity of daily living, post-stroke depression, caregiver-patient relationship and social support.

The dependent variable is family caregiver burden.

Conceptual framework

The conceptual framework of this study is based on A Middle-Range Theory of Caregiver Stress (Tsai, 2003) from Roy Adaptation model theory (Roy, 1976), and a comprehensive literature review. According to the A Middle-Range Theory of Caregiver Stress model, three stimuli were included in the input. The family caregiver’s objective burden is a focal stimulus. Stressful life events, social support, and social roles are contextual stimuli, while race, age, gender, and type of relationship are residual stimuli.

Objective burden is the duties or tasks associated with caregiving of a person with chronic disease (Liu et al., 2020), such as hours of care and care arrangements, which activate the coping mechanism and prompt caregivers to seek available physical and psychological resources to cope with caregiving. Contextual stimuli include stressful life events other than caregiving as well as social support and social roles. Stressful life events are changes in life conditions that challenge the individual and result in distress (Tsai, 2003). Many stroke patients experience long-term impairments in physical, psychosocial, and cognitive function, that are formidable challenges to family caregiver (Haley et al., 2009). Social support is broadly defined as the perceived resources available to the caregiver for meeting the demands of caregiving and enhancing the caregiver's well-being (Hupcey, 1998). Social support from family, relatives, or friends may reduce the stress experienced by the caregiver. Social role is defined as the caregiver's function or responsibility toward other people in other aspects of life (for example, worker, parent, volunteer). Residual stimuli, such as the caregiver's race, age, gender, and relationship with the care recipient, also contribute to the effects of the focal stimulus-that is, objective burden in caregiving.

Family caregiver burden is a multi-dimensional and complex concept. Based on the references, selected factors included the patient's activity of daily living, post-stroke depression, caregiver-patient relationship, and social support to predict family caregiver burden of elderly stroke patients. The conceptual framework of this study is shown in Figure 1.

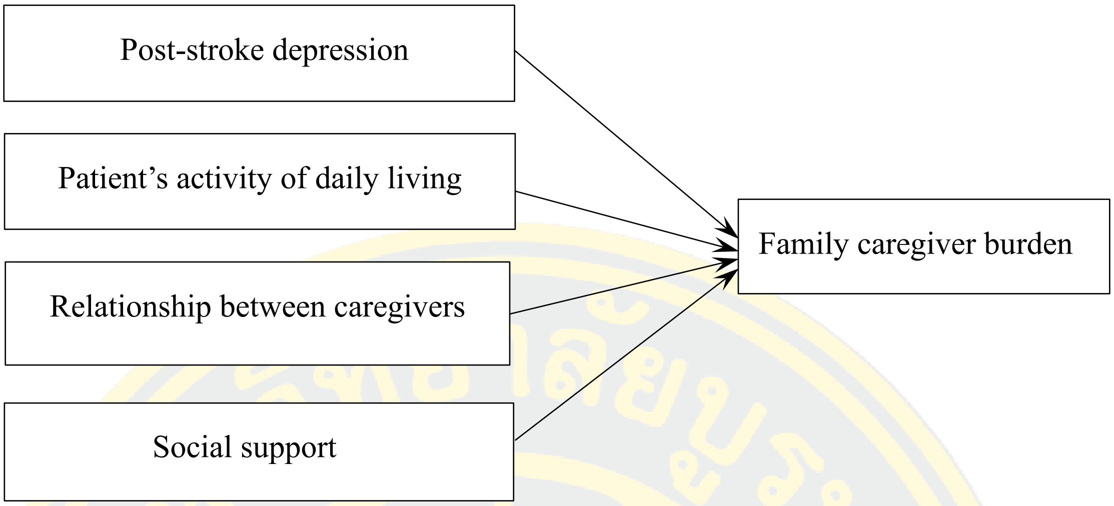


Figure 1 Conceptual framework

Definition of terms

The definitions of variables in this study are as follows:

Family caregiver: The academic community currently defines this concept differently, and specific definitions should be made according to the characteristics of each country's healthcare system. Caregivers are categorized into formal caregivers and informal caregivers based on their level of professional expertise and whether they charge fees. A family caregiver is an informal form of care. Informal caregiver can be defined as people who provide unpaid help to people who are not feeling well. Most informal caregiver are family members, such as spouses, daughter or son, patents, sister and brother, and cousin of family caregiver. For this reason, informal caregiver are often referred to as family caregiver (Eifert et al., 2015). The caregivers in this study are classified as informal caregivers.

Family caregiver burden: The family caregiver burden is a multidimensional concept (Tamizi et al., 2019). The concept of caregiver burden is often replaced by the term stress, which is the most common synonym used by researchers in the literature to represent caregiver burden. Caregiver burden can be defined as the stress or burden on people caring for chronically ill, disabled, or elderly family members (Liu et al., 2020). Platt et al (Platt & Hirsch, 1981) categorized caregiving burden into subjective and objective burdens. In 1986, Zarit (Zarit et al., 1986) defined caregiving burden as the distress experienced by caregivers in psychological, physiological, economic, and social life aspects during the care of patients. The Chinese version of Zarit Burden Interview (ZBI) developed by Wang Lie (2005) will use for measurement in this study (Lie et al., 2006). The scale consists of 22 items to assess the burden of caregivers from health, mental state, economic, social life and other aspects.

Post-stroke depression: Depression is a distressing illness linked to an increased risk of suicide (Saarni et al., 2007). Post-stroke depression (PSD) is among the most frequent neuropsychiatric consequence of stroke. It has negative influence on the prognosis of stroke patients and effect their quality of life. PSD occurs in at least one third of patients within the first year of stroke onset (Hackett & Anderson, 2005).

Psychomotor retardation, fatigue, sleep, and appetite disturbance, may be a consequence of the stroke event and not necessarily indicative of depression. In order to accurately evaluate post-stroke depression, Yingyingyue (Yue et al., 2015) launched a new stroke depression scale (PSDS) in Chinese population, which is used to evaluate patients with post-stroke depression scale. The Cronbach's α of PSDS was 0.797 (95% CI) indicted a good reliability. The Spearman correlation coefficient between PSDS and HDRS was 0.822 ($p<0.001$) showed an excellent congruent validity. The discriminate validity displayed significant difference between patients with and without depression ($p<0.001$).

Patient's activity of daily living: The ability to perform basic activity of daily living (ADL) independently is a marker of functional recovery after a stroke (Kong & Lee, 2014).The activity of daily living (ADLs) is a term used to collectively describe fundamental skills required to independently care for oneself, such as eating, bathing, and mobility. The term activity of daily living was first coined by Sidney Katz in 1950 (Katz, 1983). ADL is used as an indicator of a person's functional status. The inability to perform ADLs results in the dependence of other individuals and or mechanical devices (Edemekong et al., 2021). The Chinese version of modified bather index (MBI-C) published in 2007 by Leung, Chan and Shah from Hong Kong, China will be used for measurement in this study (Leung et al., 2007). The scale consists of 10 items that assess activity of daily living items such as eating, bathing, grooming, dressing, stool control, urination control, going to the toilet, walking on the bed, walking on the ground, and going up and down stairs.

Social support: Social support can be defined as any support given outside formal settings, it is not by health professionals or social services (Kruithof et al., 2013). Social support in four types: (1) emotional support, involving the provision of caring, empathy, love and trust. (2) instrumental support, including the provision of tangible goods and services (e.g. getting help to get to and from the hospital). (3) informational support, providing information (e.g. receiving advice). (4) appraisal support (e.g. involving information in the form of affirmation, feedback and social comparison) (Langford et al., 1997). This study will use the Chinese version of Social Support Rating Scale (SSRS) designed by Xiao Shuiyuan to measure (Hu et al., 2016), a 10-item scale with three subscales. The total score ranges from zero to 66, and higher scores indicate better support.

Caregiver-patient relationship:

Informal caregivers are usually family members, friends, and acquaintances who are close to the patient. Informal care for patients is primarily provided by family members, which include spouses, children, children's spouses, grandchildren, and the patient's parents and siblings (Wanglaihua et al., 2000). In this study, children's spouses, grandchildren, the patient's parents, siblings, and distant relatives are collectively referred to as 'cousins'.

CHAPTER 2

LITERATURE REVIEWS

This chapter presents the literature review including overview of stroke, family caregiver burden in elderly stroke patient, and its predicting factors of family caregivers' burden.

Overview of stroke

1. Definition of stroke

The World Health Organization defined stroke as 'rapidly developed clinical signs of focal (or global) disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than of vascular origin'. Although this definition is still widely used, the content of the definition is too dependent on the clinical symptoms of the patient (Coupland et al., 2017). The American Heart Association and the American Stroke Association updated the definition of stroke to "the nature, timing, clinical recognition of stroke and its analogous symptoms, and imaging findings that warrant an updated definition (Sacco et al., 2013)."

A stroke, cerebrovascular accident (CVA), or brain attack is the sudden disruption of O2 supply to the brain. This can be due to rupture in one or more of the blood vessels that supply the brain or loss of cerebral perfusion often resulting from hypoperfusion or reduction of O2 supply (Swearingen & Wright, 2019). Stroke is classically characterized as a neurological deficit attributed to an acute focal injury of the central nervous system (CNS) by a vascular cause, including cerebral infarction, intracerebral hemorrhage (ICH), and subarachnoid hemorrhage (SAH), and is a major cause of disability and death worldwide (Sacco et al., 2013).

2. Classification of stroke

Cerebrovascular diseases are a very diverse group of disorders that are further classified according to etiology, location, and duration of symptoms (Good, 2011). According to the pathological nature, it is divided into ischemic stroke (IS), hemorrhagic stroke (HE), and transient ischemic attack (TIA) (Amarenco et al., 2009a; Govindarajan et al., 2020), the former is collectively referred to as cerebral infarction, hemorrhagic stroke (HE) includes cerebral hemorrhage and subarachnoid hemorrhage (Govindarajan et al., 2020).

Ischemic stroke is the most common type of stroke. The American Heart Association (AHA) has predicted that 87% of strokes are ischemic stroke (Association, 2012). Regarding the 5 main categories of ischemic stroke, it is atherothrombotic, cardioembolic, small vessel disease, other causes, and undetermined (Amarenco et al., 2009b).

Only 10–15% of strokes are predicted to be a hemorrhagic stroke, but the rate of mortality is high when compared with ischemic stroke (Rebouças et al., 2019). Hemorrhagic strokes are divided into hypertension-related small vessel disease, Cerebral amyloid angiopathy, Bleeding diathesis, Vascular malformation, Other causes (Tumor related, Toxic, Trauma, Arteritis, angiitis, endocarditis, infections, Rare entities) (Amarenco et al., 2009a).

Transient ischemic attack is described as a “mini-stroke,” which is due to a clot. TIA is a temporary blockage relative to other types of stroke, and it lasts only for a short period of time (an average of 1 min), and symptoms disappear within 24 h (Rebouças et al., 2019). TIA is taken as a warning for the occurrence of an additional stroke in the near future.

3. Pathophysiology and complications of stroke the elderly

Data from the Nordic countries show an incidence rate of 1250 to 1796/100000 in the age group 75-84, and 1628 to 2234 in those above 85 years. The incidence rates are higher among men. Within the next few decades, the proportion of stroke patients aged 80 and older could reach 50% (Engstad et al., 2012).

A stroke occurs when the blood flow to an area of the brain is interrupted, resulting in some degree of permanent neurological damage and brain injury (Almutairi et al., 2019). Pathogenetically, stroke integrates a heterogeneous group of diseases. The two major categories of stroke are ischaemic (lack of blood and hence oxygen to an area of the brain) and haemorrhagic (bleeding from a burst or leaking blood vessel in the brain) stroke (Strandgaard & Paulson, 1990). Vessel occlusions account for 85% of all strokes, while primary intracerebral bleeding has a relatively low incidence of approximately 15% (Mergenthaler et al., 2004).

The current pathophysiological understanding of stroke is substantially based on experimental studies. Brain damage in stroke is the result of a plethora of highly complex mechanisms leading to infarct maturation. As the brain has a very high demand for oxygen and glucose, a disruption of the circulation in the areas affected by vascular occlusion leads to a depletion of substrates within minutes (Mrozek et al., 2012). This leads to an energy deficit within the affected cells. The result is functional or even structural damage to the cells, depending on the degree and duration of the energy deficit (Mergenthaler et al., 2004). The recent studies have shown that the innate immune system plays a significant role in hemorrhagic stroke. Microglia, as major components in innate immune system, are activated and then can release cytokines and chemokines in response to hemorrhagic stroke, and ultimately led to neuroinflammation and brain injury (Luo et al., 2019).

Stroke is among the top leading causes of disability and reduced quality of life (Lipton et al., 2016). Elderly patients are at high risk of complications after stroke, Stroke patients often leave physical dysfunction (sequelae), motor dysfunction, Sensory disorders, Speech difficulties or obstacles, Dysphagia, Depression and anxiety, Cognitive dysfunction (attention, memory, orientation, creativity, planning and organization, problem solving, brain flexibility and abstract thinking) (Lui & Nguyen, 2018). Elderly stroke patients have the highest degree of disability, with 62.9% suffering from moderate or severe disability, and patients cannot live independently due to their disability (Kisoli et al., 2015). Sensory disorders can be divided into somatic sensation (touch, pain, temperature, pressure, vibration, proprioception, physical sensation and figure sensation), visual and hearing disorders, etc; The most common type of sensory disorder is somatosensory disorder(60%) (Sullivan & Hedman, 2008). Speech disorders include dysarthria and aphasia; The incidence of dysarthria after acute stroke is 42% (Flowers et al., 2013), the incidence of aphasia was 31% (Ghoreyshi et al., 2021).

4. Epidemiological status and Economic burden of Stroke in China

Stroke is a leading cause of adult mortality and disability, and there are approximately 2-3 million new stroke cases every year in China (Wu et al., 2019). In recent years, the economic climate in China has changed considerably, the epidemiologic features of stroke in China have likely changed substantially in the last decades (Liu et al., 2011). The China National Stroke Screening Survey (CNSSS) is one community-based stroke surveillance program in China (Longde et al., 2015). The results of CNSSS in part showed that the adjusted stroke prevalence was 2.06% in adults aged ≥40 years, the incidence of stroke in China increased rapidly in 2002 to 2013 in China (Guan et al., 2017).

In China, the incidence of stroke varies in different regions and between urban and rural areas (Wu et al., 2019). Between 2003 and 2013, the prevalence of stroke increased sharply in rural areas, while it remained stable in urban areas during the same period. There is a significant geographical gradient of stroke prevalence, morbidity and mortality in the north and south, with the lowest in the south and the highest in the northeast (W. Wang et al., 2017). A recent study also showed a significant north-south gradient in stroke prevalence in China (1097.1 in the north, 917.7 in the central and 619.4 in the south, respectively), with the prevalence of stroke in rural areas higher than in urban areas (945.4 versus 797.5) (Ru et al., 2019). However, the incidence of stroke death was highest in the southwest and lowest in the eastern and southern coastal regions (W. Wang et al., 2017). These regional variations in mortality/morbidity suggest significant variations in access to and quality of stroke care across the country.

In 2015, stroke was the second leading cause of death after coronary artery disease, accounting for 6.3 million deaths (11% of all deaths) (H. Wang et al., 2017). Stroke is the number one cause of death in China. Stroke is also a major cause of long-term disability. Among stroke survivors aged 65 and above, more than half of them have decreased mobility (Roger et al., 2011).

Stroke brings huge economic burden to patients, families and society. In the United States, the cost of stroke includes health care, stroke medication and absenteeism estimated at $34 billion a year (Roger et al., 2011). The total annual cost of stroke, including indirect and direct costs, is estimated at 27 billion euros in the 27 EU countries. In China, the direct cost of stroke exceeded 10 billion yuan in 2014. Together with other indirect costs, the total cost is nearly 20 billion yuan, accounting for 0.57% of the total health care expenditur.

In conclusion, with the increasing burden of stroke patients in China, stroke in elderly patients poses a major public health concern, due to its strong association with multiple medical complications, poorer functional outcomes, and substantial healthcare cost.

Family caregiver burden in stroke patients

The concept of family caregiver and family caregiver burden in stroke patients

1. Family caregiver

Definitions vary within academia and should be tailored according to the characteristics of national healthcare systems. In China, researchers define caregivers as individuals providing care to others, where 'others' include those unable to care for themselves, young children, or frail adults, and 'individuals' encompass both paid and unpaid family members, as well as professional service providers (Weifenmei et al., 2016). Caregivers are categorized based on their level of professionalism and whether they are paid: formal caregivers are professionally trained and provide paid care services, such as nurses and nursing aides; informal caregivers are unpaid and untrained family members or friends who provide care, such as spouses, children, or colleagues. The family caregivers in this study fall under the category of informal caregivers.

Roles and responsibilities are an important factor associated with the development of a family caregiver identity. Providing care for people with chronic diseases can include a wide range of activities. Responsibilities can include assisting with activity of daily living, such as bathing, dressing and eating, as well as instrumental activity of daily living, such as transportation, housework, grocery shopping, meal preparation, managing finances or coordinating outside services (Swartz & Collins, 2019).

A family caregiver is an informal form of care. Informal caregiver can be defined as people who provide unpaid help to people who are not feeling well. Most informal caregiver are family members, such as spouses, son or daughter, parents, sister or brother and cousin of family caregiver. For this reason, informal caregiver are often referred to as family caregiver (Eifert et al., 2015). In their study (Tsai et al., 2015), set the inclusion criteria of caregiver as follows: there are family caregiver who are at least 18 years old (average age 44 years). Average years of education is 13.7 years. There were 60 family caregiver of the stroke patients, with 25 males and 35 females. There were 48 (80%) caregivers who lived with the patients before hospitalization. Most of the caregiver were sons (n=19), followed by daughters or spouses. They are the primary caregiver of patients and spend the longest hours caring for them each day. There is no unified concept definition of family caregiver. This role is the family member who provides the main care for stroke patients in the home environment. The main family caregiver in stroke patients are mainly their spouses and children, and the caregiver are older (Average age 52), and the educational level of the main family caregiver in China is generally lower than that in foreign countries (Peng et al., 2019; Zhang & Lee, 2019).

2. Family caregiver burden

The family caregiver burden is a multidimensional concept (Tamizi et al., 2019). Is an important part of family caregiver research. The concept of caregiver burden is often replaced by the term stress, which is the most common synonym used by researchers in the literature to represent caregiver burden. Caregiver burden can be defined as the stress or burden on people caring for chronically ill, disabled, or elderly family members (Liu et al., 2020). Collins et al. (Collins et al., 1994) defined caregiver burden as the physical, psychological, social and economic burdens encountered by family members caring for patients when they undertake their care obligations. Montgomery et al. (Montgomery et al., 1985) further divided caregiver burdeng into objective buren and subjective burden. The objective burden of caregivers mainly refers to the burden brought to caregivers by the related negative events encountered in the process of caring for patients, such as the reduction of discretionary time, the cost of care and the change of family lifestyle. The subjective burden of caregivers mainly refers to the influence of the objective burden on the psychological, emotional and social life of caregivers due to the excessive requirements of caregivers themselves or unreasonable requirements of caregivers (Llanque et al., 2016). Suksatan et al. (Suksatan et al., 2021) divided caregiver burden into physical burden, psychological burden, social burden and economic burden in their study. The main physiological burden "sleep affected" and "fatigue" and etc, the main psychological burden "strained" and "temper times increase" (Zhu & Jiang, 2018). The social burden of main show is "to reduce their own entertainment time" and "can't take care of the rest of the family" and etc, financial burden, different degrees of economic problems faced by family caregiver, such as medical expenses, etc (Liu et al., 2020; Oni et al., 2019).

3. A middle-range theory of caregiver stress

This conceptual framework is based on A Middle-Range Theory of Caregiver Stress (Tsai, 2003) from Roy Adaptation model theory (Roy, 1976), and a comprehensive literature review. According to the A Middle-Range Theory of Caregiver Stress model, three stimuli were included in the input. The family caregiver's objective burden is a focal stimulus. Stressful life events, social support, and social roles are contextual stimuli, while race, age, gender, and type of relationship are residual stimuli. A Middle-Range Theory of Caregiver Stress was showed in figure 2.

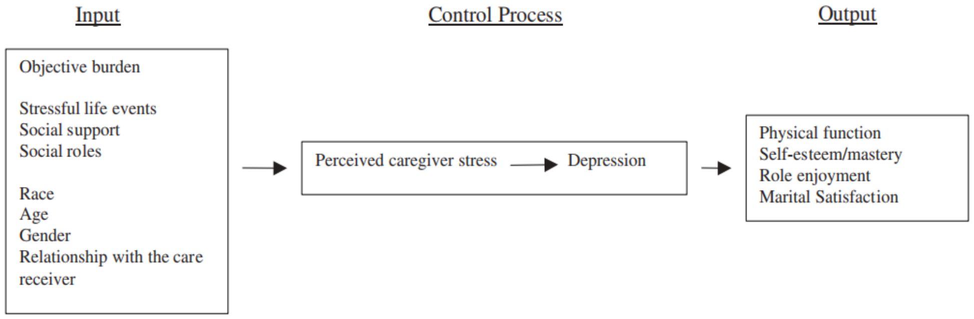


Figure 2 A middle-range theory of caregiver stress

Objective burden is the duties or tasks associated with caregiving of a person with chronic disease (Liu et al., 2020), such as hours of care and care arrangements, which activate the coping mechanism and prompt caregivers to seek available physical and psychological resources to cope with caregiving. Contextual stimuli include stressful life events other than caregiving as well as social support and social roles. Stressful life events are changes in life conditions that challenge the individual and result in distress (Tsai, 2003). Many stroke patients experience long-term impairments in physical, psychosocial, and cognitive function, that are formidable challenges to family caregiver (Haley et al., 2009). Social support is broadly defined as the perceived resources available to the caregiver for meeting the demands of caregiving and enhancing the caregiver’s well-being (Hupcey, 1998). Social support from family, relatives, or friends may reduce the stress experienced by the caregiver. Social role is defined as the caregiver’s function or responsibility toward other people in other aspects of life (for example, worker, parent, and volunteer). Residual stimuli, such as the caregiver’s race, age, gender, and relationship with the care recipient, also contribute to the effects of the focal stimulus-that is, objective burden in caregiving.

4. Common family caregiver burden in stroke patients

Stroke is a disease with acute onset, long course and high mortality and disability. Family caregiver of stroke patients not only have to undertake most of their life care work and assist them in functional exercise, but also bear tremendous psychological, social and economic pressures. long-term heavy care brings a variety of heavy burdens to family caregiver. Many family caregiver are adversely affecting their physical and mental health as a result of long-term care for patients. The incidence of anxiety and depression symptoms in caregivers in the Hu etal study was 40% to 63.7% (Hu et al., 2018). The degree of anxiety and depression is related to the severity of the patient's dysfunction and the financial burden caused by the disease. A study showed that as caregivers’ age, the burden increases, but their quality of life decreases (Muller-Kluits & Slabbert, 2018). It was noted that caregivers' age, health problems, role load, financial vulnerability, educational status, economical status, degree of kinship, living with the patient at the same household affected their quality of life. Murphy et al. (Murphy et al., 2007) found that the caregivers who participated in their study tended to rank their own health needs as the lowest priority and indicated that most of their time and effort was vested in caring for other family members. Almost all family caregivers in their study had experienced chronic fatigue and sleep deprivation. Most caregivers described one or more chronic physical ailments that they attributed directly to the long-term effects of caregiving. Kuptniratsaikul et al. (Kuptniratsaikul et al., 2018) study showed that 30% of the primary caregivers of stroke patients one year after discharge had no burden, 20% had a slight burden, 30% had a bit of burden, and 20% felt moderate to extreme. Physical and economic dimensions are the main influencing factors of caregivers' burden. Haley et al. (Haley et al., 2015) showed that stroke caregiving was associated with persistent psychological distress, but life satisfaction, depression, and mental health QOL became comparable to noncaregivers by 3 years after stroke. Caregiver leisure satisfaction was chronically lower than in noncaregivers. Caregiver leisure satisfaction is mainly reflected in reduced leisure activities, no time for themselves, and less time spent with other family members.

Predicting factors of family caregivers' burden

1. Characteristics of stroke patients

Costa et al. (Costa et al., 2015) in analyzing the characteristics of individuals with stroke sequelae related to caregiver burden they found higher overloads with individuals aged from 65 to 80 years old, male, single and with low level of education. An early Korean study showed (Kim et al., 1998), caregiver felt more of a burden when caring for the patient group in their sixties than in any other age group and female patients created more of a burden than male patients.

It is evidenced in studies that impaired patient's autonomy is directly linked to the type of disabling chronic diseases that they afflict them. The degree of dependence of patients is a contributing factor to the generation of physical and mental stress, and the independence of patients is proportional to the degree of dependence (Caro et al., 2017), because the more impaired their autonomy, the more dependent they are on their caregivers, and the heavier the burden on their caregivers (Costa et al., 2015).

According to research, with the time of illness, stroke patients need fewer care items in their life (Tsai et al., 2015), and the burden of caregivers decreases accordingly. In the early stage of stroke patients, the illness is urgent, and the family caregivers are not fully prepared for hospitalization, lack of nursing knowledge for stroke patients, and at the same time, the dependence degree of patients in the early stage of stroke is high, and the demand for family caregivers is high (Farahani et al., 2020), which aggravates the psychological burden of caregivers. However, with the extension of the course of the disease, the caregivers have a correct understanding of the relevant knowledge of stroke disease, and master the life care skills of stroke patients, so that the burden of caregivers is relatively reduced.

2. Characteristics of family caregiver

The age of family caregiver, according to the study, that adult caregiver are associated with larger levels of overload than younger caregiver. This refers to the fact that often caregiver at that age have to adjust their daily activities, which are also within their competence, such as work, housework and children, with the care provided to the dependent family member, thus causing an accumulation of roles (Costa et al., 2015). Zhao et al. (Zhao et al., 2021) study show that the caregivers' age is related to depression, the older the caregiver, the higher the risk of depression, this may be because that elder caregiver had limited energy, which may be more likely to lead to fatigue.

Studies have shown that the burden of caring for older patients is greater than that of younger patients, that long-term care is a greater burden for family caregiver, and that socio-cultural differences also contribute to family caregiver burden (Choi-Kwon et al., 2005). In a Korean multivariate analysis, the caregiver was a significant factor in the daughter-in-law's level of stroke caregiver burden (Choi-Kwon et al., 2005). Studies have shown that caregiver burden is mainly borne by female caregivers (Menon et al., 2017). Studies have shown that caregiver burden has a mediating effect on caregiver quality of life, and the relationship with patients has been identified as a direct predictor of quality of life (Jeong et al., 2015). Previous research has shown that spouse caregivers face the greatest risk of health problems and role overload (Barnes et al., 1992). Spouse is the informal caregiver for most stroke patients (49.3%), The study of in Chinese families shows that non-spouse caregivers feel more pressure than spouse caregivers (Tang & Chen, 2002). This is different from the results of previous studies.

According to the research (Graf et al., 2017), that the depression score of the caregivers with care time of more than 13 hours/day was obviously higher than that of the caregivers with care time of less than 8 hours/day ($P<.05$). Both anxiety and depression were positively correlated with total care burden score ($P<.01$) (Hu et al., 2018). The length of care time is a risk factor for development of anxiety and depression in main family caregiver. In a study (Zhao et al., 2021), duration of care time and care time per day > 8 h were positively correlated with Hamilton Anxiety Rating Scale (HARS)and Hamilton Depression Rating Scale (HDRS) scores. This could be because the care time are too long every day, occupied too much of the caregivers' personal time and reducing their work, social and entertainment time in largest degree.

3. Patient’s activity of daily living

With the continuous improvement of the global medical level, the mortality of stroke patients has been decreasing year by year, but most stroke patients still have different degrees of physical, language and cognitive impairments (Hou & Yang, 2022). Studies have shown, that 70%~80% of stroke patients cannot live independently because of disability (Olver et al., 2021), which seriously affects the quality of family life.

Stroke patients’ reliance on their ability to perform activities daily living places a significant burden on their family caregivers. The degree of burden experienced by family caregiver was linked to the severity of functional disability in stroke patients. Family caregivers of stroke patients with moderate to severe functional disability were found to be 3.7 times more likely to experience mild to moderate caregiver burden compared to those caring for stroke patients with non-functional disability (Achilike et al., 2020). In A Meta-analytic Study, family caregiver of stroke patients with severe dysfunction reported feeling three times more burdened compared to those caring for patients with less severe dysfunction (Fadilah & Rahariyani, 2019). Roopchand-Martin demonstrated that depressive symptoms and functional status in stroke patients are an important factor in family caregiver burden (Roopchand-Martin & Creary-Yan, 2014). The changes in the physical and mental conditions of stroke patients lead to the difficulty of achieving ADL independently in stroke patients.

4. Post-stroke depression

Depression is a frustrating illness associated with a substantial decline in quality of life and an increased risk of suicide (Saarni et al., 2007). Post-stroke depression can cause psychomotor disorders, fatigue, sleep and appetite disturbances. The etiology of PSD development is complex and still not fully understood. One of the major issues that remains controversial is the relationship between lesion location and the development of post-stroke depression (Neau et al., 1998). PSD is considered to be most common when the lesion is located in the left frontal lobe or adjacent basal nucleus. The role of the right subcortical ganglion has been confirmed. The occurrence of post-stroke depression is related to the history of depression, the degree of dysfunction, age, education, family status, gender and stroke history.

Recent studies have shown that nearly 37% of post-stroke patients (PSD) exhibit clinically relevant depressive symptoms (Lenzi et al., 2008). Post-stroke depression is common in stroke patients (Suh et al., 2005). The results of one study suggest that PSD is a significant independent predictor of caregiver burden for stroke patients in China (Dou et al., 2018). Post-stroke depression not only has a negative impact on social interaction and overall quality of life, but also has a negative impact on the recovery of motor function and cognitive function of patients, thus aggravating the burden of caregivers (Lenzi et al., 2008). The emotional distress and burden of caregivers may be part of the cause of PDS. A study by Suh et al in South Korea found that emotional distress of caregivers had a negative impact on PSD in the perceived burden of caregivers (Suh et al., 2005).

5. Social support

Social support is broadly defined as the perceived resources available to the caregiver for meeting the demands of caregiving and enhancing the caregiver’s well-being (Hupcey, 1998). In a narrow sense, Social support is the interpersonal resources accessed and mobilized when individuals attempt to deal with the everyday stresses and strains of life. Commonly, social support is provided by networks of family, friends, neighbors and community members.

The role of social support in reducing the burden on caregivers is widely recognized (Pohl et al., 1994). It is reported that social support has a buffer effect on the burden of caregivers (Edwards & Scheetz, 2002). A study showed that social support was negatively associated with depressive symptoms, while caregiver burden was positively associated with depressive symptoms (Zhong et al., 2020). Higher social support predicted a lower caregiver burden.

Ergh et al divided social support into two categories: perceived and received social support. Perceived social support refers to a person’s appraisal of the available social support, whereas received social support refers to actual and substantial social support (Ergh et al., 2002). Both perceived and received social support have been reported to have a positive impact on caregiver burden. Tool support, emotional support, and informational support are the most frequently cited social support functions (CHAK, 1996).

This pressure may be amplified in household systems in rural areas due to limited access to resources in rural areas (Peng et al., 2019). One study found that increased stress levels for caregivers, living in extended families with no one to support primary care, increased the burden on caregivers. However, as the caregiver's level of social support increased, the caregiving burden decreased. Social support status of caregivers ($\beta=0.08$; $p=0.050$) was an important predictor of caregiver burden (Chien et al., 2007). It was reported that the family domain in the Multidimensional Scale of perceived Social support was significantly correlated with burden ($r =-0.295$), and the burden was heavier when the caregiver had a lower level of social support. Physical, emotional, and financial help from family and friends can ease the negative effects of caregiving (Akosile et al., 2018).

6. Caregiver-patient relationship:

In the past 20 years, the concept of identity has received widespread attention. Literature on the definition and development of race, religion, gender, ethnicity and other identities has been added in many disciplines and sub-areas. Identity is particularly interesting because of its impact on behavior (Stets & Burke, 2003).As the population ages, the prevalence of people with chronic diseases or disabilities requiring intermittent or long-term care will also increase. Most of the responsibility for care will fall on relatives, such as spouses, daughter or son, parents, sister or brother, cousin, and profoundly change their daily lives. Family members are no longer just husbands, wives, partners, important people, sons and daughters, but also "caregiver" (Eifert et al., 2015).

Informal caregivers differ from formal caregivers, who receive some level of training and are paid for their services. Informal caregivers are usually family members, friends, and acquaintances who are close to the patient. China is a country that "does not grow old until it is rich", and the pension mechanism and medical and health security system are still under construction. Informal carers therefore play an important role in providing support to stroke survivors.

One study showed (Huang et al., 2023), that the caregiver/patient relationship also affects caregiver burden, with spouses of patients significantly more stressed than non-spouses. Spouses may play multiple roles in the family, and any physical problems with one partner can cause serious mental and psychological problems for the other. The less social support caregivers of stroke patients receive and the fewer resources they have at their disposal, the more powerless they feel, the more stressed they are to care for them, and the more likely they are to develop negative emotions such as anxiety and depression.

Home care for patients is primarily provided by family members, which include spouses, children, children's spouses, grandchildren, and the patient's parents and siblings (Wanlaifang et al., 2000). In this study, children's spouses, grandchildren, the patient's parents, siblings, and distant relatives are collectively referred to as 'cousins'.

Summary

In summary, Stroke patients need to go through a long rehabilitation process, and their family caregiver have to bear a heavy burden from physical, mental, emotional, social and economic aspects. Although the burden of stroke family caregiver has been deeply studied, caregiving is a complex and multidimensional behavioral activity, and its nature and determinants develop and change over time. Therefore, we should always care for these family caregiver while paying attention to stroke patients.

In addition, literature review shows that there is a positive correlation between patients' activity of daily living dependence and caregivers' burden. There may be a negative correlation between social support, post-stroke depression and caregiver burden. Although the burden of family caregiver of stroke patients has been widely studied all over the world, there are few reports in Wenzhou, China. In order to better help caregiver reduce their burden, this study further studied the still controversial predictive factors, so as to carry out targeted intervention to provide better services for stroke patients and their family caregiver.

CHAPTER 3

RESEARCH METHODOLOGY

This chapter introduces the research methods, including research design, research settings, population and samples, research instruments, quality of instruments, protection of human subject , data collection procedures and data analysis.

Research design

A predictive correlation study design was used to describe family caregiver burden, and to examine the predictive ability of patients' activities to daily living, post-stroke depression, caregiver-patient relationship, and social support on family caregiver burden in elderly stroke patients.

Research setting

The study was be carried out in the Rehabilitation Department (in the rehabilitation department, which has 2 wards and a total of 110 beds) of the Second Affiliated Hospital of Wenzhou Medical University , and the study participant was family caregiver and elderly patients with stroke. The data was collection from September to October 2024.The hospital is a provincial level III general hospital with 3,401 beds. The rehabilitation department is open 24 hours a day. Check medical records from Monday to Sunday to screen eligible patients.

Population and sample

Population

The participant in this study was elderly patients with stroke and family caregiver in Wenzhou, China.

Sample

In this study, are elderly patients with stroke and their family caregiver in Wenzhou, China. The sample will be selected based on the inclusion criteria:

1. Stroke patients

1.1 The patient was ⩾60 years old;

1.2 Patients diagnosed with stroke through doctor's diagnosis.

1.3 Rehabilitation department stroke patients.

Exclusion criteria

1.1 Patients with serious heart, liver, kidney and other diseases;

1.2 People with mental illness;

1.3 Patients with malignant tumors;

1.4 Patients who have been ill for less than two weeks (Ammann et al., 2014).

2. Family caregiver

2.1 Age⩾18 years old;

2.2 Perform primary care responsibilities during patient care;

2.3 The parents, spouses, offspring, and siblings of the patients, or share other blood or legal relationships with the parents;

2.4 Caregiver who have good communication and understand the questionnaire contents properly;

2.5 In the case of multiple caregivers for one patient, the one who takes care of the patient for the longest time is selected;

2.6 Willing to participate in the study.

Exclusion criteria

1. Caregivers with a previous history of mental disease and severe cognitive impairment;

2. Paid caregiver such as paramedics;

Sample size

The sample size calculation for the study was conducted by G*Power 3.1.9.2 version prior to study commencement. Given the researcher aimed to examine the four predictors of family caregivers burden of elderly patients with stroke, thus the linear multiple regression was chosen as type of statistical test in G*Power program with an alpha of 0.05, statisical power of 0.8, and an estimated moderate effect size of 0.3.The required sample size is 84 participants. In this study, 20% of sample size will be added in case incomplete data collection Therefore, 101 participants will be needed in total.

Sampling technique

In this study, a simple random sampling technique will be used to recruit participants. Stroke patients and family caregiver will select from the rehabilitation department of the Second Affiliated Hospital of Wenzhou Medical University. The recruitment method is as follows:

1. After screening family caregiver and stroke patients who meet the inclusion criteria, the researchers register those who meet the inclusion criteria in order to obtain a sampling framework.

2. The researcher assigned a numerical lable to each family caregiver and stroke patient.

3. The researchers sought consent from both family caregiver and stroke patient to participate in the study and sign the consent form.

Research instruments

The research instruments use in this study include chronic disease patients and family caregivers demographic, The Chinese version of Zarit Burden Interview (ZBI-C), The Chinese version of Modified Barthel Index (MBI-C), A New Post-Stroke

Depression Scale (PSDS) and Social Support Rating Scale (SSRS). Details of the questionnaire are as follows:

1. Chronic disease patients and family caregiver demographic

This section was developed by the researcher. A questionnaire was used to investigate the patients, including demographic information such as age, gender, education, marital status and payment, as well as disease-related information such as the number of strokes, course of disease. The caregiver questionnaire included demographic information such as age, gender, relationship with the patient, education, marital status, work status, and household monthly per capita income, as well as nursing information such as ease of access to the hospital and nursing experience.

2. The Chinese version of Zarit Burden Interview (ZBI-C)

The ZBI scale was designed by Zarit in the early 20th century on the basis of the theory of nursing burden measurement. According to the Likert5 scoring method: 0 means no, 1 means occasionally, 2 means sometimes, 3 means often, and 4 means always. The total score is 0 to 88, with higher scores indicating greater caregiver burden. The total score of the scale is less than 20, indicating no caregiver burden, 21~40 as mild caregiver burden, 41~60 as moderate caregiver burden, and above 61 as severe caregiver burden. The Chinese version is developed by Wang Lie (Lu et al., 2009), and the Cronbach's a coefficient of the Chinese version of the scale is 0.88, and the test-retest reliability is 0.87.

ZBI is the most widely used scale to measure caregiver burden at present, which is highly recognized and has been applied to the investigation and study of caregiver burden in different stages of various diseases. In order to improve the measurement validity of the scale, it is necessary to avoid patients when using it.

3. The Chinese version of Modified Barthel Index (MBI-C)

In 1989, Canadian scholars Shah and Vanchay et al. subdivided the BI level into 5 levels and made a modified Barthel index scale. The Chinese version of MBI scale was used in this study, compiled by Chetwyn CH Chan (Leung et al., 2007) . The Chinese version of modified barthel index scale is used to evaluate the patient's Activity of daily living (ADL), including 10 items such as eating, dressing and toileting, with a total score of 100. A total score of 1-24 indicates complete dependence; 25-49 indicates heavy dependence; 50 to 74 is classified as moderate dependence; 75-99 is classified as mildly dependent; A score of 100 indicates no dependence. The scale has high reliability and sensitivity, with test-retest reliability of 0.87 and interrater reliability of 0.95. It is one of the most widely used and studied methods of daily living ability in clinical practice.

4. A NEW Post-Stroke Depression Scale, PSDS

Psychomotor retardation, fatigue, sleep, and appetite disturbance, may be a consequence of the stroke event and not necessarily indicative of depression. In order to accurately evaluate post-stroke depression, Yingyingyue (Yue et al., 2015) launched a new stroke depression scale (PSDS) in Chinese population, which is used to evaluate patients with post-stroke depression scale. The Cronbach α of PSDS was 0.797 (95% CI) indicted a good reliability. The Spearman correlation coeffificient between PSDS and HDRS was 0.822 ($P<0.001$) showed an excellent congruent validity. The discriminate validity displayed signifificant difference between patients with and without depression ($P<0.001$).

PSDS is a self rating scale, the subjects were asked to read each of the 8 items and carefully decided how often the statement describes according their feeling during the last 7 days in the following four quantitative terms: absent, some of the time, part of the time, or most of the time. A value of 0, 1, 2, and 3 is assigned to a response depending upon whether the item was positive or negative. The PSDS is constructed so that the more depressed subjects and his complaint will have a higher score on the scale. Add up the score of each item for a total score and the highest possible score is 24. A total score of > 6 was classified as mild post-stroke depression, and a total score of > 15 was classified as moderate to severe post-stroke depression.

5. Social Support Rating Scale, SSRS

The SSRS was originally developed by Xiao Shuiyuan in 1986 for the Chinese population (xiaoshuiyuan, 1994; Li et al., 2019) . It has already been widely used in various studies in different Chinese communities and shown to have good validity and reliability (Duan et al., 2019; Su & Wei, 2009). SSRS is a self-assessment scale with a total of 3 dimensions and ten items. It include objective support (3 items include living conditions in the past year, problem-solving channels in emergency situations, and sources of psychological comfort in the event of stress or resistance), subjective support (4 items about relationship with colleagues, relationship with neighbours, number of friends who can offer assistance, and level of support from family members), and utilization degree of social support (3 items include the way one talks when in trouble, the way one asks for help when in trouble, and participation in group activities). Objective support mainly refers to tangible, practical or objective support, such as direct material assistance and social networks. Subjective support refers to the emotional feelings and satisfaction of individuals who are supported, respected and understood in society.The degree of utilization of social support refers to the degree of individual utilization of social support. Items were mostly rated by 4-point Likert scales. Item scores were added up, generating a final score ranging from 12 to 66. Items 1–4 and 8–10 in SSRS are multiple-choice questions. Items 1, 2, 3, and 4 represent 1, 2, 3, and 4 points, respectively. The 5th item provides five options, and each item is scored as 1, 2, 3, and 4 from none, very little, general, and full support. Points are scored according to the number of sources in items 6 and 7. If there are no sources, the score will be 0. The highest score is 66 points, the lowest score is 12 points, 22 points and below are low levels, 23 to 44 points are medium levels, and 45 to 66 points are high levels. A higher score indicates a higher social support level of the caregiver. The Cronbach's α coefficient of this scale is 0.8 (Sun et al., 2020), which proves good reliability.

Quality of instruments

In terms of validity, because all the scales used in this study have been verified. The researchers used all these instruments and did not modify them. Therefore, there is no content validity test again.

In terms of reliability, all questionnaires will test the internal consistency reliability of 30 person with similar characteristics to the sample. The Cronbach's alpha coefficient was used to determine the reliability for Chinese version of Zarit Burden Interview (ZBI-C), the Chinese version of Modified Barthel Index (MBI-C), A New Post-Stroke Depression Scale (PSDS), and Social Support Rating Scale (SSRS). The results of Cronbach's alpha test for Chinese version of Zarit Burden Interview (ZBI-C) was 0.875, the Chinese version of Modified Barthel Index was 0.930, A New Post-Stroke Depression Scale was 0.797 and Social Support Rating Scale was 0.920.

Protection of human subjects

This study was approved by the Ethical Approval Committee of Burapha University, Thailand, and the Second Affiliated Hospital of Wenzhou Medical University, China. The researchers could not start collecting data until they had obtained permission from the relevant authorities. All participants were aware of the study details and the data collection process. The subjects in this study were voluntary patients and their family members. Informed consent was obtained from the patients and their families before the study began. The researchers explained the details of each part of the questionnaire and asked the patients and their family members to fill out the questionnaire themselves in the ward of the Second Affiliated Hospital of Wenzhou Medical University. The contents of this study are confidential, and the names and other information of patients and family members are not disclosed. Participants were coded only, and data collected were used only for the purpose of the study. All data collected is stored in a secure place using a password.

Data collection procedure

The data collection procedure of this study carried out by the researchers. The procedures for collecting information are as follows：

1. The study protocol was approved by the review board of Burapha University and the Second Affiliated Hospital of Wenzhou Medical University.

2. The researchers got the cooperation of the head nurses and their nurses from the rehabilitation department of the second affiliated Hospital of Wenzhou Medical University.

3. Medical records in the ward were screened weekly and participants who met the inclusion criteria were recruited using random sampling. Elderly patients with stroke and their family caregiver were informed of the purpose of the study and signed an informed consent form.

4. Elderly patients with stroke and their family caregiver filled in the self-report in the waiting area of the ward. Researchers collected demographic questionnaires, MBI-C, ZBI-C, PDSD, and SSRS.

5. Data collection every working day (Monday to Friday) from 8:00 am to 12:00 am and 2:00 PM to 4:30 PM. Each time to complete the questionnaire is 30-60 minutes.

6. After obtaining all the information, the data are encoded and entered into a computer spreadsheet, and the researcher prepares the data analysis program.

7. This process is repeated until the sample size is met.

Data analysis

Statistical software was used for data entry and statistical analysis. The significance level is set as α =.05. The analysis results are as follows:

1. Import the data into SPSS 26 software for statistical analysis.

2. Descriptive statistics include frequency, percentage, mean, and standard deviation was used to describe demographic data.

3. Variable description was analyzed by range, mean, and standard deviation.

4. Stepwise multiple regression analysis was used to analyze the predictors of family caregiver burden in elderly stroke patients.

CHAPTER 4

RESULTS

This chapter presents the results of the study about the current situation and predictive factors of family caregiver burden of elderly stroke patients in Wenzhou, China. The results of the data analysis are divided into three sections: describe the demographic characteristics of elderly stroke patients and family caregiver, describe the burden level of family caregiver in elderly patients with stroke, examine the predictive effects of patient's activity of daily living, post-stroke depression, caregiver-patient relationship, and social support on the burden of family caregiver of elderly stroke patients.

Part 1 Describe the demographic characteristics of elderly stroke patients and family caregivers

1. Demographic characteristics of elderly stroke patients

The demographic profile of elderly stroke patients indicates a higher proportion of male individuals compared to female individuals, with 73 (72.28%) males and 28 (27.72%) females. The age range of elderly stroke patents was 60 to 90 years, with an average age of 70.93 years, the majority of participants fell within the age bracket of 60 to 79, constituting approximately 80.20%. In terms of educational attainment, the majority of elderly stroke patients had a low level of education, with 76.24% having completed junior high school or below. High school graduates accounted for 14.85%, while only 6.93% of the participants had received a university education. Merely 1.98% reported no formal education. The majority of the elderly stroke patients were married, accounting for 93.07%. In terms of annual family income, the majority of families fall into the middle and higher income brackets. Specifically, 16.83% of families have an annual income between CNY 30,000-

50,000/year, 24.75% have an annual income between CNY 50,000-100,000/year, and 23.76% have an annual income exceeding CNY 100,000/year. The majority of elderly stroke patient were retired, accounting for 64.36%. They all live with their relatives, of which 96.03% live with their children and spouses. The number of family members living with stroke patients ranged from 2 to 9, with an average of 2.84. Among payment methods for medical expenses incurred by stroke patient, 63 cases (62.38%) were covered by labor insurance payment, while 35 cases (34.65%) were covered under free medical payment schemes. All patients received treatment in a clinical environment at the hospital. In terms of hospitalization expenses, most of the patients' hospitalization expenses are between 10000 and 30000, accounting for 81.19%. The proportion of medical expenses paid out-of-pocket ranged primarily from 40% to 50%, with a total of 62 cases (61.39%). The course of stroke patients was mostly within 6 months（including 6 months), accounting for 81.19%. Among the 101 subjects surveyed, 54 participants knew nothing about the disease, 44 participants knew something about the disease, and 3 participants knew a lot about the disease. The demographic characteristics of elderly stroke patients are described in table 1

Table 1 Description of demographic characteristics of elderly stroke patients (n= 101)

Characteristics	**Number (*n*)**	**Percentage (%)**
Gender		
Males	73	72.28
Females	28	27.72
Age (*M* =70.93, *SD*=8.447, Min=60, Max=90)		
60-79	81	80.20
80-90	20	19.80

Table 1 (Continued)

Characteristics	**Number (*n*)**	**Percentage (%)**
Education background		
Junior high school and below	77	76.24
Senior high school	15	14.85
College and above	7	6.93
Other(illiteracy)	2	1.98
Marital status		
Single	2	1.98
Married	94	93.07
Other (Bereaved a spouse)	5	4.95
Annual family income		
CNY 10,000 and below	9	8.91
CNY 10,000-30,000	26	25.74
CNY 30,000-50,000	17	16.83
CNY 50,000-100,000	25	24.75
More than CNY 100,00	24	23.76
Employment situation		
Part-time employment	1	0.99
Do not work	35	34.65
Other(retired)	65	64.36
Medical expenses payment methods		
Labor insurance medical care	63	62.38
Free medical care	35	34.65

Table 1 (Continued)

Characteristics	**Number (*n*)**	**Percentage (%)**
Cooperative and Commercial medical insurance	2	1.98
Fully self-funded	1	0.99
Hospitalization expenses (M=19820.78, SD=21469.698, Min=3000, Max=200,000)		
Less than 10,000	10	9.90
CNY 10,000-30,000	82	81.19
CNY >30,000-100,000	8	7.92
More than CNY 100,00	1	0.99
Course of stroke (M=11.53, SD=28.473, Min=0.5, Max=120)		
≤ 1 Month	30	29.70
≤ 6 Months	52	51.49
≤ 12 Months	6	5.94
More than 12 Months	13	12.87
Disease cognition		
Don't know	54	53.47
Know some	44	43.56
Know a lot	3	2.97

2. Demographic characteristics of family caregiver

This survey involved a total of 101 family caregiver for elderly stroke patients, with 23 being male family caregivers, accounting for 22.77%, and 78 being female family caregivers, accounting for 77.23%. No missing data were included in this study. The majority of the family caregivers were female. The age range of caregivers spanned from 18 to 82 years, with an average age of 61.18 years. The majority of family caregiver were aged over 40 years, accounting for 85.15% of the total, with nearly two-thirds being over the age of 60 years. The education attainment of family caregiver is generally low, with 72 cases having completed junior high school or below, accounting for 71.29%. Additionally, there are 15 cases with a senior high school education, accounting for 14.85%, and 13 cases with at least a junior college education or above, accounting for 12.87%. Only one case reported illiteracy, accounted for 0.99% of the total. There were 96 married family caregivers, accounting for 95.05% of the total.

Among the 101 subjects, 67 family caregiver were spouses of elderly stroke patients, accounting for 66.34%, followed by the children of elderly stroke patients, accounting for 27.72%. The remaining caregivers were cousin, included parents, siblings and relatives by blood, accounting for 5.94%. In terms of employment, family caregiver are predominantly do not work and retire, accounting for 81.19%. Based on the survey, 91 family caregivers co-reside with patients, accounting for 90.10% of the total. There were 46 family caregiver who said that they took care of patients alone, accounting for 45.54%, and 55 family caregiver said that other people were involved in taking care of patients, accounting for 54.46%, and about half of the caregivers took care of patients independently. Regarding hour of care, the average daily caring duration for family caregiver was 22.79 hours, with a total of 90 caregivers requiring round-the-clock nursing care, representing 89.11% of the overall population. In terms of the length of care, the average length of care of caregivers was 11.53 months, with the majority (81.19%) falling within the range of 0.5 to 6 months. The level of disease cognition varied among the participants, with 58 cases demonstrating partial knowledge, 5 cases exhibiting extensive knowledge, and 38 cases lacking any understanding. The demographic characteristics of the family caregivers are described in table 2.

Table 2 Description of demographic characteristics of the family caregivers (n= 101)

Characteristics	**Number (*n*)**	**Percentage (%)**
Gender		
Males	23	22.77
Females	78	77.23
Age (*M* =61.18, *SD*=11.654, Min=18, Max=82)		
18-39	5	4.95
40-59	30	29.70
≥60	66	65.35
Education background	77	76.24
Junior high school and below	72	71.29
Senior high school	15	14.85
College and above	13	12.87
Other(illiteracy)	1	0.99
Marital status		
Single	5	4.95
Married	96	95.05
Caregiver-patient relationship		
Spouse	67	66.34
Sons or daughters	28	27.72
cousin	6	5.94
Employment situation		
Full-time employment	5	4.95
Part-time employment	14	13.86

Table 3 (Continued)

Characteristics	**Number (*n*)**	**Percentage (%)**
Do not work	29	28.71
Other(retired)	53	52.48
Take care of alone		
No	55	54.46
Yes	46	45.54
Living with the patient		
Yes	91	90.10
No	10	9.90
Hour of care (day) (M=22.79, SD=3.83, Min=5, Max=24)		
≤ 12hr	5	4.95
12-23hr	6	5.94
24 hr	90	89.11
Month of care		
≤ 1 Month	30	29.70
≤ 6 Months	52	51.49
≤ 12 Months	6	5.94
More than 12 Months	13	12.87
Disease cognition		
Don't know	38	37.62
Know some	58	57.43
Fully understand	5	4.95

Part 2 Description of the study variables

1. Description of family caregiver burden in elderly patients with stroke

In this study, the burden of family caregiver was measured by Chinese version of Zarit Burden Interview (ZBI-C), which includes five dimensions, including sacrifice, loss of control, embarrassment/angry, self-criticism and dependency. As shown in Table 3. The average score of family caregivers' burden in the study sample is in the moderate level (*M*=44.97, *SD*=18.43, Min=4, Max=86), and the possible score ranges from 0 to 88 with the higher score indicated the heavier the caregiver's burden. The average total score of family caregiver burden was 44.97 (SD=18.43). The average total score of the sacrifice scale was 17.77 (SD=7.08). The average total score of the loss of control scale was 8.22 (SD=3.91). The average total score of the embarrassment/angry scale was 6.25 (SD=3.30). The average total score of the self-criticism scale was 3.69 (SD=1.99). The average total score of the dependency scale was 5.91 (SD=2.8).

Table 4 Description of family caregiver burden in elderly patients with stroke (n=101)

Variables	**Possible score**	**Actual score**	***M***	***SD***	**Level**
Family caregivers burden	**0-88**	**4-86**	**44.97**	**18.43**	**moderate**
sacrifice	0-32	1-32	17.77	7.08	
loss of control	0-16	0-16	8.22	3.91	
embarrassment/angry	0-16	0-16	6.25	3.30	
self-criticism	0-8	0-8	3.69	1.99	
dependency	0-12	0-12	5.91	2.89	

2. Description of selected factors

The description of selected factors related to family caregiver burden in elderly stroke patients with activity of daily living, post-stroke depression, social support, and the caregiver-patient relationship, which are described in Table 4. The results showed that the activity of daily living was moderate level (*M* = 54.13, *SD* = 25.40). The post-stroke depression score was low level (*M* = 6.17, *SD* = 4.20). The social support was in the moderate level (*M* = 36.42, *SD* = 8.46). The relationship between the caregiver and the patient is of a nature where the greater the intimacy, the heavier the burden.

Table 5 Description of selected factors (n=101)

Variables	**Possible score**	**Actual score**	***M***	***SD***	**Level**
Patient’s activity of daily living	0-100	2-100	54.13	25.40	moderate
Post-stroke depression	0-24	0-16	6.17	4.20	low
Social support	12-66	19-51	36.42	8.46	moderate

Part 3 Factors predicting the burden of family caregiver

In this study, the burden of family caregiver was analyzed by stepwise multiple linear regression, with the activities of daily life, social support, caregiver-patient relationship, post-stroke depression as independent variables. The prediction results show that the caregiver burden conforms to the normal distribution. In this model summary table, the Durbin-Watson statistic is 1.742, the results show that the residuals are relatively independent and have no significant correlation. In the collinearity statistics, the tolerance values were 0~1, and variance Inflation Factor (VIF) values were about 1.5, indicating that the multicollinearity between independent variables is not serious. The value of standard residual was between 1.70~-2.89, it means that the model is in line with the hypothesis and the independent variable has no outlier.

Table 5 presents the results of multiple linear regression analysis. The results of multiple linear regression analysis presents that the regression equation was significant, $F_{(4, 96)} = 23.731$, $p<0.001$. Patient's activity of daily living ($\beta = -.400$, $p<.001$), Social support ($\beta=-.353$, $p<0.001$), Caregiver-patient relationship: cousin ($\beta= -.177$, $p<0.05$) significantly and negatively predicted the burden of caregivers. Post-stroke depression ($\beta=.188$, $p<0.05$) significantly and positively predicted the burden of caregivers. These variables account for 49.7% of the variance in caregiver burden ($R^2 = .497$, Adjusted $R^2= .476$, $F_{(4, 96)}=23.731$, $p< .001$). The prediction equation based on raw scores was showed as follows:

ZBI=84.393-.290(activity of daily living)-.768(social support) -13.699 (caregiver-patient relationship: cousin)+.823(post-stroke depression)

Table 6 Multiple linear regression analysis of caregiver burden (n=101)

Independent variables	***b***	***SE(b)***	**Beta**	***t***	***p*-value**
Patient's activity of daily living	-.290	.063	-.400	-4.623	<.001
Social support	-.768	.166	-.353	-4.630	<.001
Caregiver-patient relationship: Cousin	-13.699	5.659	-.177	-2.421	.017
Post-stroke depression	.823	.393	.188	2.091	.039
Constant	84.393	8.639		9.769	<.001

$R^2 = .497$, Adjusted $R^2= .476$, $F_{(4,96)}=23.731$, p-value< .001

CHAPTER 5

CONCLUSION AND DISCUSSION

The incidence of stroke is high among the elderly population, leading to various complications. Recent advancements in medical technology have resulted in decline in stroke-related mortality rates, but an increase in disability rates. Consequently, patients often experience reduced daily activity abilities and may even lose their independence, requiring assistance from others for care. Stroke is characterized by its long-term and incurable nature, causing significant suffering for patients and impacting the mental health, employment, and financial situation of family caregiver, thereby imposing a substantial burden on them.

This study raised questions about the burden on family caregiver of elderly stroke patients, and began from the perspectives of stroke patients' activity of daily living, post-stroke depression, caregiver-patient relationship, and social support. To investigate and analyze the relationship between family caregiver burden with stroke patients' activity of daily living, post-stroke depression, caregiver-patient relationship, and social support, and provide suggestions for future research.

Summary of the study

The objectives of this study was to describe the burden level of family caregiver of elderly stroke patients, and to determine the predictive relationship between the patients’ activity of daily living, post-stroke depression, caregiver-patient relationship, and social support. A simple random sampling technique was used to collect data from the department of rehabilitation of the second affiliated Hospital of Wenzhou Medical University. The data collection included demographic records for chronic disease patients and family caregiver, as well as questionnaires such as Chinese version of the Zarit Burden Interview Scale (Lu et al., 2009), Chinese version of the modified Bathel Index Scale (Leung et al., 2007), A New Post Stroke Depression Scale (Yue et al., 2015), and Social Support Rating Scale (Shao et al., 2020). The reliability coefficients (Cronbach’s alpha) for Chinese version of zarit burden interview scale, Chinese version of the modified bathel index scale, a new post stroke depression scale, social support scale were .875, .930, .797, .920 respectively.

The findings revealed that the majority of stroke patients were male (72.28%), aged between 60 to 90 years, with an average age of 70.93 years. The majority of the patients were married (93.07%), and most of them education level of junior high school or below (78.22%), including 1.98% who were illiterate. The majority of patients (97.03%) are covered by medical insurance, with most (62.38%) receiving reimbursement rates ranging from 40% to 50%. Over half of the patients had moderate and severe dependence on self-care ability defects (74.3%). The majority of the patients were already retired (64.36%).

The majority of family caregiver were female (77.23%), ranging in age from 18 to 82 years, with an average age of 61.18 years. The majority of family caregiver were married (95.05%), with most having completed junior high school or below education (72.28%), including individuals who are illiterate (0.99%). Over half of the family caregiver are spouses (66.34%). Most family caregiver are either retired or not employed (81.19%), and approximately of the family caregivers are caring for the patients alone (45.54%). In terms of the length of care, the average nursing time of nurses was 0.5 ~ 6 months (81.19%), and the average daily caring time of family caregivers was 22.79 hours.

The average score of family caregivers' burden was 44.97 (SD=18.43). The average total score of the sacrifice scale was 17.77 points (SD=7.08). The average total score of the loss of control scale was 8.22 points (SD=3.91). The average total score of the embarrassment/angry scale was 6.25 points (SD=3.30). The average total score of the self-criticism scale was 3.69 points (SD=1.99), and the average total score of the dependency scale was 5.91 points (SD=2.8).

The results of multiple linear regression analysis presents that the regression equation was significant, F=23.731, p<0.001. The patients’ activity of daily living (β=-.400, P<.001), Social support (β=-.353, p<0.001), Caregiver-patient relationship: cousin (β=-.177, p<0.05) all demonstrated significant and negatively predicted the burden of family caregivers. Post-stroke depression (β=.188, p<0.05) significantly and positively predicted the burden of family caregivers. These variables account for 49.7% of the variance in caregiver burden (R^2=.497, Adjusted R^2= .476, $F_{(4,}$

$_{96)}=23.731$, $p< .001$). The prediction equation based on raw scores was showed as follows:

ZBI=84.393-.290(activity of daily living)-.768(social support) -13.699(caregiver-patient relationship)+.823(post-stroke depression)

The finding indicate that the family caregiver of elderly stroke patients experience a moderate level of burden. Significant predictors of family caregiver burden include the patients' activity of daily living, post-stroke depression, caregiver-patient relationship, and social support.

Discussion

1. Current situation of family caregiver burden in elderly stroke patients

The present study found that the mean score for family caregiver burden of 101 elderly stroke patients was 44.97 (SD=18.43), indicating a moderate level of burden. This is consistent with the results of Linlin Fang (Fang et al., 2022) scholar's research, which shows that the average score of family caregiver burden of stroke patients was 43.8 (SD=13.4). This indicates that family caregivers of elderly stroke patients experience a moderate level of burden, highlighting the need to alleviate caregiver pressure and reduce the burden on these individuals. The finding of this study demonstrate a slight elevation compared to research conducted by Lulu Cao (Cao et al., 2022) scholars, where the average score among family caregiver of stroke patients in western China was reported as 27.2 (SD=13.8). This investigation specifically focuses on family caregiver of elderly stroke patients residing in the southeast coastal regions of China. In Wenzhou, China, the traditional Confucian education, it is responsibility of the family to take care of all the tasks of patient.Once a patient experiences a stroke, they are typically urgently transported to the neurology department of a general hospital. Following 10 to 15 days of acute treatment, survivors are transferred to a rehabilitation ward for a duration of 3 to 6 months. During this time, many survivors heavily rely on long-term care provided by their families. The primary caregiver's responsibility is to manage the dietary and physical needs of stroke survivors, while sometimes providing 24-hour companionship in the hospital, preventing them from returning home to handle other family responsibilities.

With the rapid economic development and accelerated urbanization in coastal areas, the challenge of an aging society is increasingly pronounced. At the same time, the implementation of the three-child policy has indirectly intensified societal pressures. Thus increasing the support demand of family caregivers for relatives suffering from long-term health problems. Results from a study in Greece suggest (Kavga et al., 2021), that the level of burden affecting caregivers varies from country to country, possibly due to cultural differences affecting the perception and overall experience of burden and its outcomes. In short, family caregiver of elderly stroke patients face different levels of care burden. The average daily caring time of family caregiver in this study was 22.79 hours, which was significantly higher than that of other studies (Fauziah et al., 2022; Kumar et al., 2022). Family caregivers encounter numerous challenges when providing basic care and support to their loved ones. In particularly, the traditional values in the Wenzhou region, where caregivers demonstrate a heightened willingness to offer lengthy care to elderly relatives or spouses, has a great impact on the burden of caregivers, which gave special significance of our study.

Perhaps due to the deep-rooted influence of traditional culture in Wenzhou, China, caregivers are more willing to spend more time taking care of the health of their elders or spouses, which leads to physical and mental fatigue of family caregivers and brings great physical and psychological stress to caregiver. The family caregiver not only have to bear various care burdens from the economy, family, and society. Therefore, this requires the attention of medical staff and society and the importance of taking active response measures to reduce the burden on family caregiver.

2. Factors influencing family caregiver burden in elderly stroke patients

2.1 The patients’ activity of daily living

The Chinese version of Modified Barthel Index (MBI-C) was utilized for the evaluation of functional independence in activity of daily living (ADL) among elderly stroke patients (Yüzbaşıoğlu & Fertelli, 2024). The study findings revealed that the activity of daily living score was at a moderate level (*M* = 54.13, *SD* = 25.40), indicating that elderly stroke patients had a moderate level of dependence in their activity of daily living , which was consistent with the findings of domestic scholar Neng Huang (Huang et al., 2023). According to the results of the multivariate linear regression analysis, the activity of daily living in elderly stroke patients has a significant predictive effect on the family caregiver's burden. Specifically, a direct correlation exists between the level of burden experienced by family caregiver and stroke patients' performance in activity of daily living (ADL). That higher scores on the Chinese version of the Modified Barthel Index suggest decreased dependence on activity of daily living (ADL) (Lee & Jung, 2023), and subsequently alleviate caregiver burden. Furthermore, this study revealed a significant negative association between the activity of daily living (β=-.400, P<.001) and caregiver burden. According to the findings of a study (Razali et al., 2020), there was no statistically significant correlation observed between the activity of daily living among stroke patients in Malaysia and the burden of family caregiver. However, these results contradict our study findings, which may be because our research subjects were older individuals with stroke, with an average age of 70.93 years. Previous studies have shown (Yoo et al., 2020), that there are certain limitations in long-term functional recovery for stroke patients aged 70 and above. There is a correlation between the age of stroke patients and their dependence on daily activities (Gulo et al., 2022), and as the level of dependence increases, the burden on family caregiver also intensifies.With senior status of our participants, more devotion was needed from family members, which lead to a heavier burden for the family caregivers.

Suneerat Boonsin (Boonsin et al., 2021) and HE Yuzbaşıoğlu's (Yüzbaşıoğlu & Fertelli, 2024) research suggests that as the level of dependence on activity of daily living increases among stroke patients, family caregivers experience greater physical fatigue.The provision of Long-term care work also leads to psychological exhaustion among family caregivers, there by limiting their social life and increasing their burden. A study suggests (Khedr et al., 2020), that a higher level of dependence on daily activities among stroke patients is associated with an increased risk of developing post-stroke depression, as well as imposing a greater burden on family caregivers. Therefore, in clinical practice, nurses should pay attention to patients' activity of daily living (ADL) and provide early health education on stroke-related knowledge. They should advocate for early interventional rehabilitation to enable patients to achieve maximum independence in daily living activities before discharge and reduce their reliance on family caregivers, thereby alleviating the burden on family caregivers.

2.2 Social support

Perceived social support refers to an individual's subjective assessment of the assistance they receive from family, friends, neighbors, and other social networks. Family caregivers who perceive a strong support system often experience reduced emotional fatigue and anxiety, allowing them to maintain a healthier mental state and greater motivation during the caring process (Zhang & Dong, 2022). Studies have indicated that higher levels of perceived social support can significantly alleviate the burden on family caregivers and enhance their abilities (Xu et al., 2024). However, the role of perceived social support as a mediating factor in the context of stroke care still requires further investigation. Social support refers to the help people receive from society or others through their social networks; it includes objective support, subjective support, and support utilization (Bao et al., 2023).

The findings of this study revealed a significant negative association between social support (β=-.353, $p<0.001$) and family caregiver burden, that the social support was in the moderate level (*M* = 36.42, *SD* = 8.46). This implies that caregivers with higher levels of social support experience lower levels of caregiver burden, aligning with the outcomes reported by Lulucao's (Cao et al., 2022) investigation on caregiving burden among stroke patients in western China and Leung et al.'s (Leung et al., 2020) research on caregiving burden among palliative care patients. This indicates that social support significantly predicts the burden of family caregivers. Social support encompasses the provision of moral or material assistance and aid from family, friends, and social institutions. Lingxu’s (Xu et al., 2021) research on the caregiving burden of dementia patients suggests that robust social support can effectively assist caregivers in managing the burden, and those who receive greater social support also demonstrate enhanced stress coping abilities. The study found (Tao et al., 2020) that the burden on family caregivers may have an impact on their physical and mental health, but through improving the social support system, the physical and mental burden of family caregivers can be reduced. Caregivers experiencing lesser amounts of social support tend to bear greater burdens and exhibit more pronounced signs of anxiety (Shukri et al., 2020). This underscores that social support plays a direct role in lightening their load. These findings indicate that perceived social support can serve as strategies to alleviate the burden on family caregivers. All family members and clinicians should proactively assess the family resilience and social support of family caregivers, and implement interventions aimed at enhancing resilience and strengthening social support. This approach can help alleviate the burden on caregivers and improve the health status of stroke survivors.

2.3 Caregiver-patient relationship: Cousin

The findings of this study that caregiver-patient relationship: cousin ($\beta = -.177$, $p < 0.05$) significantly and negatively predicted the burden of family caregiver. This implies that the closer the relationship between the patient and the caregiver, the heavier the burden on the family caregiver. According to Chinese educational customs, once adult children marry and the intimate relationships network from the original family is severed, patients may anticipate increased support from their spouse or children. They are less inclined to share their illness and complications with parents, siblings, or other relatives. According to the survey on the psychological status of family caregiver of stroke patients at various phases by Neng Huang (Huang et al., 2023), the relationship between caregivers and patients significantly affects the burden that caregivers bear. In particular, when the caregiver is a spouse, they face greater pressure, which is consistent with the results of this study. It may be because most caregivers are women, and in the family, they often have multiple roles, such as work, housework, and childcare, which leads to role accumulation. Additionally, any physical problems of the partner may bring serious psychological and emotional problems to the other party. Kumar et al (Kumar et al., 2022) conducted a study on the burden of caregiving among 164 stroke patients and their caregivers in India. The findings revealed that spouse caregivers experienced lower levels of stress compared to younger caregivers, while daughters-in-law encountered higher levels of stress, which contradicts the results of this study. In recent decades, the rapid growth of the Chinese economy has accelerated people's lifestyles. At the same time, the implementation of the one-child policy has made it the responsibility of an adult child to support two parents and four grandparents. Therefore, the spouse often needs to take on the task of caring for the stroke patient. Meanwhile, in the current situation of China, universal free medical care has not yet been implemented, which puts huge pressure on family caregiver. They face financial, emotional, physical, and psychological anxiety, as well as the influence of family relationships and social customs. This also means that the closer the relationship between the caregiver and the cared-for person, the heavier the burden on the family caregiver. In a study conducted in Korea, it was observed that spouses reported the highest level of challenges in providing care, followed by daughters-in-law and sons, while daughters exhibited comparatively lower levels of caregiving difficulties (Lee et al., 2010). In a study on the burden experienced by cancer patients and their caregivers in Turkey, it was observed that the severity of the burden was higher when the caregiver was a spouse or child as compared to when they were a sibling or parent of the patient (Oven Ustaalioglu et al., 2018). Therefore, it is recommended to implement welfare policies for caregivers, such as providing paid leave and tax-free benefits, in order to alleviate the financial burden on caregivers and extend their caregiving time. This will help mitigate their negative emotions.

2.4 Post-stroke depression

According to the results of the multivariate linear regression analysis, the post-stroke depression in stroke patients has a significant predictive effect on the family caregiver's burden ($\beta = .188$, $p < 0.05$). Ahn et al (Ahn et al., 2015) found that more than half of stroke patients demonstrate symptoms of depression , which had a negative impact on the functional recovery results of patients, and impose additional burdens on family caregivers. In Dong-Mei Dou's (Dou et al., 2018) research , a weak correlation was observed between post-stroke depression (PSD) and caregiver burden in Chinese acute ischemic stroke patients. This indicates that post-stroke depression (PSD) functions as a significant independent predictive factor for caregiver burden, aligning with the findings of this study. In addition, the research findings that the post-stroke depression score was low level ($M = 6.17$, $SD = 4.20$).

A study conducted in Chengdu, China revealed that the patients’ depression status had a negative impact on the ZBI score of the main caregivers. This indicates that post-stroke depression imposes a substantial burden on family caregivers (He et al., 2023). Stroke patients rely heavily on family support, especially those with disabilities. Xiao Wang (Wang et al., 2022) discovered in a research study involving Post-Stroke Depression in First-Ever Stroke Survivors, Good family functioning is an important protective factor against PSD. A positive relationship between stroke patients and their family members, including spouses and children, can improve their quality of life (Xiao et al., 2024), and alleviate the burden on caregivers. The emotional distress and stress experienced by caregivers may significantly increase the risk of post-stroke depression. Research indicates that more severe anxiety symptoms in stroke survivors and caregivers are associated with lower overall quality of life, including that of their partners (Yuliana et al., 2023). Furthermore, post-stroke depression can significantly impair a stroke patient's physical, cognitive, and social functioning (Medeiros et al., 2020). It may also disrupt rehabilitation efforts and is linked to unfavorable patient outcomes (Chau et al., 2021), thereby adding to the burden on caregivers.

Strengths and Limitations

Given that this study was conducted solely at the Second Affiliated Hospital of Wenzhou Medical University, it is important to recognize that the findings may not be generalizable to all Chinese populations. Future research studies should concentrate on diversifying sampling sources to enhance the reliability and inclusivity of the results. Response bias may be caused by self-reporting, as participants may underreport or overstate their experiences. Furthermore, limitations were identified concerning the selection of predictors in this study. In addition, the Barthel ADL index may not fully reflect the actual functional status of patients. While factors like activity of daily living, post-stroke depression, social support, and the caregiver-patient relationship were considered, other potentially significant variables, such as self-efficacy, perceived health status, and comorbidities, were not explored. These unobserved confounding variables that could potentially limit our understanding of the burden faced by family caregivers in this study. Hence, in future research, it is imperative to comprehensively consider other social or environmental factors, especially a broader range of predictors to enhance the understanding of family caregiver burden in older adults caring for stroke patients. Furthermore, although our research findings support the proposed role of predictor for burden family caregiver burden, this study did not explore other potential mediators and moderating variables.

Implications for nursing

1. For nursing practice

This study determined that factors predicting family caregiver burden for elderly stroke patients in Wenzhou China included the activity of daily living in stroke patients, social support, post-stroke depression, and caregiver-patient relationship. The results of this study can provide guidance for healthcare professionals in the future, to strengthen the attention of caregivers and develop systematic plans to guide them in the care approach. Nurses can instruct caregivers in fundamental nursing skills through observation and demonstration, thereby reinforcing their commitment to patient care. In addition to providing health education for patients, it's important to pay attention to and alleviate the mental burden on caregivers and patients. At the same time, provide them with more social support such as information about community or online support groups to reduce family caregiving responsibilities.

2. For nursing education

This study found that patient's activity of daily living, post-stroke depression, social support, and the caregiver-patient relationship can serve as indicators to predict caregiver burden. Therefore, in the education of nursing students, special attention should be paid to regional cultural customs and strengthened recognition of the burden of caring for elderly stroke patients.

3. For nursing research

The results identified the predictors of family caregiver burden for elderly stroke patients in Wenzhou. In the future, the results of this study could be used to explore interventions and care plans to reduce the burden on family caregivers of elderly stroke patients.

Recommendations for future research

The burden on caregivers of stroke patients is a constantly changing process, from onset to recovery. Due to the long and complex course of the disease, it further increases the burden of family caregivers. In view of foreign models and combined with Chinese characteristics, feasible intervention methods suitable for caregivers of stroke patients in China were explored, and practical application was carried out. A nurse-led model of multidisciplinary and continuing professional collaboration ensures that patients receive ongoing guidance in the community or at home after discharge to develop individualized interventions for specific problems.

REFERENCES

Achilike, S., Beauchamp, J. E., Cron, S. G., Okpala, M., Payen, S. S., Baldridge, L., Okpala, N., Montiel, T. C., Varughese, T., & Love, M. (2020). Caregiver burden and associated factors among informal caregivers of stroke survivors. Journal of Neuroscience Nursing, 52(6), 277-283.

Ahn, D.-H., Lee, Y.-J., Jeong, J.-H., Kim, Y.-R., & Park, J.-B. (2015). The effect of post-stroke depression on rehabilitation outcome and the impact of caregiver type as a factor of post-stroke depression. *Annals of rehabilitation medicine, 39*(1), 74-80.

Akosile, C. O., Banjo, T. O., Okoye, E. C., Ibikunle, P. O., & Odole, A. C. (2018). Informal caregiving burden and perceived social support in an acute stroke care facility. *Health and quality of life outcomes, 16*(1), 1-7.

Almutairi, M., Xu, G., & Shi, H. (2019). Iron pathophysiology in stroke. *Brain Iron Metabolism and CNS Diseases*, 105-123.

Amarenco, P., Bogousslavsky, J., Caplan, L., Donnan, G., & Hennerici, M. (2009a). Classification of stroke subtypes. *Cerebrovascular diseases, 27*(5), 493-501.

Amarenco, P., Bogousslavsky, J., Caplan, L., Donnan, G., & Hennerici, M. (2009b). New approach to stroke subtyping: the ASCO (phenotypic) classification of stroke. *Cerebrovascular diseases, 27*(5), 502-508.

Ammann, B. C., Knols, R. H., Baschung, P., De Bie, R. A., & de Bruin, E. D. (2014). Application of principles of exercise training in sub-acute and chronic stroke survivors: a systematic review. BMC neurology, 14, 1-11.

Araújo, O., Lage, I., Cabrita, J., & Teixeira, L. (2018). Training informal caregivers to care for older people after stroke: A quasi-experimental study. *Journal of Advanced Nursing, 74*(9), 2196-2206.

Association, A. H. (2012). Heart disease and stroke statistics-2012 update: A report from the American Heart Association. *Circulation, 125*, e12-e230.

Bao, J., Wang, X.-Y., Chen, C.-H., & Zou, L.-T. (2023). Relationship between primary caregivers' social support function, anxiety, and depression after interventional therapy for acute myocardial infarction patients. *World Journal of Psychiatry, 13*(11), 919.

Barnes, C. L., Given, B. A., & Given, C. W. (1992). Caregivers of elderly relatives:

Spouses and adult children. *Health & Social Work, 17*(4), 282-289.

Boonsin, S., Deenan, A., & Wacharasin, C. (2021). Factors Influencing the Burden of Family Caregiving for Survivors of Stroke. *Pacific Rim International Journal of Nursing Research, 25*(1).

Cao, L.-L., Tang, Y.-F., Xia, Y.-Q., Wei, J.-H., Li, G.-R., Mu, X.-M., Jiang, C.-Z., Jin, Q.-Z., He, M., & Cui, L.-J. (2022). A survey of caregiver burden for stroke survivors in non-teaching hospitals in Western China. *Medicine, 101*(50), e31153.

Caro, C. C., Costa, J. D., & Da Cruz, D. M. C. (2018). Burden and quality of life of family caregivers of stroke patients. *Occupational therapy in health care, 32*(2), 154-171.

Caro, C. C., Mendes, P. V. B., Costa, J. D., Nock, L. J., & Cruz, D. M. C. d. (2017). Independence and cognition post-stroke and its relationship to burden and quality of life of family caregivers. *Topics in Stroke Rehabilitation, 24*(3), 194-199.

Chak, A. (1996). Conceptualizing Social Support--A Micro or Macro Perspective? *プシコロギア, 東洋国際心理学誌, 39*(2), 74-83.

Chau, J. P., Lo, S. H., Zhao, J., Choi, K. C., Lam, S. K., Butt, L., & Thompson, D. R. (2021). Factors associated with post-stroke depression in Chinese stroke survivors. *Journal of Stroke and Cerebrovascular Diseases, 30*(11), 106076.

Chen, L., Xiao, L. D., Chamberlain, D., & Newman, P. (2021). Enablers and barriers in hospital-to-home transitional care for stroke survivors and caregivers: A systematic review. *Journal of Clinical Nursing, 30*(19-20), 2786-2807.

Cheng, J., Wang, W., Xu, J., Yin, L., Liu, Y., & Wu, J. (2022). Trends in Stroke Mortality Rate—China, 2004–2019. *China CDC Weekly, 4*(24), 513.

Chien, W. T., Chan, S. W., & Morrissey, J. (2007). The perceived burden among Chinese family caregivers of people with schizophrenia. *Journal of Clinical Nursing, 16*(6), 1151-1161.

Choi-Kwon, S., Kim, H.-S., Kwon, S. U., & Kim, J. S. (2005). Factors affecting the burden on caregivers of stroke survivors in South Korea. *Archives of physical medicine and rehabilitation, 86*(5), 1043-1048.

Collins, C. E., Given, B. A., & Given, C. W. (1994). Interventions with family caregivers of persons with Alzheimer's disease. *The Nursing Clinics of North America, 29*(1), 195-207.

Costa, T. F. d., Costa, K. N. d. F. M., Martins, K. P., Fernandes, M. d. G. d. M., & Brito, S. d. S. (2015). Burden over family caregivers of elderly people with stroke. *Escola Anna Nery, 19*, 350-355.

Coupland, A. P., Thapar, A., Qureshi, M. I., Jenkins, H., & Davies, A. H. (2017). The definition of stroke. *Journal of the Royal Society of Medicine, 110*(1), 9-12.

Davis, L. L., Burgio, L. D., Buckwalter, K. C., & Weaver, M. (2004). A comparison of in-home and telephone-based skill training interventions with caregivers of persons with Dementia. *Journal of Mental Health and Aging*.

Day, C. B., Bierhals, C. C. B. K., Santos, N. O. d., Mocellin, D., Predebon, M. L., Dal Pizzol, F. L. F., & Paskulin, L. M. G. (2018). Nursing home care educational intervention for family caregivers of older adults post stroke (SHARE): study protocol for a randomised trial. *Trials, 19*(1), 1-9.

Donkor, E. S. (2018). Stroke in the century: a snapshot of the burden, epidemiology, and quality of life. *Stroke research and treatment, 2018*.

Dou, D.-M., Huang, L.-L., Dou, J., Wang, X.-X., & Wang, P.-X. (2018). Post-stroke depression as a predictor of caregivers burden of acute ischemic stroke patients in China. *Psychology, Health & Medicine, 23*(5), 541-547.

Duan, X., Ni, X., Shi, L., Zhang, L., Ye, Y., Mu, H., Li, Z., Liu, X., Fan, L., & Wang, Y. (2019). The impact of workplace violence on job satisfaction, job burnout, and turnover intention: the mediating role of social support. *Health and quality of life outcomes, 17*(1), 1-10.

Edemekong, P. F., Bomgaars, D. L., Sukumaran, S., & Levy, S. B. (2021). Activities of daily living. In *StatPearls [Internet]*. StatPearls Publishing.

Edwards, N. E., & Scheetz, P. S. (2002). Predictors of burden for cregivers of patients with Parkinson's disease. *Journal of Neuroscience Nursing, 34*(4), 184.

Eifert, E. K., Adams, R., Dudley, W., & Perko, M. (2015). Family caregiver identity: A literature review. *American Journal of Health Education, 46*(6), 357-367.

Engstad, T., Engstad, T. T., Viitanen, M., & Ellekjær, H. (2012). Epidemiology of stroke in the elderly in the Nordic countries. Incidence, survival, prevalence and risk factors. *Norsk epidemiologi, 22*(2).

Ergh, T. C., Rapport, L. J., Coleman, R. D., & Hanks, R. A. (2002). Predictors of caregiver and family functioning following traumatic brain injury: Social support moderates caregiver distress. *The Journal of head trauma rehabilitation, 17*(2), 155-174.

Fadilah, N., & Rahariyani, L. D. (2019). The Impact of Independent of Activity Daily Living among Stroke Patients on Caregivers Burden. *Jurnal Ners, 14*(3), 188-194.

Fang, L., Dong, M., Fang, W., & Zheng, J. (2022). Relationships between care burden, resilience, and depressive symptoms among the main family caregivers of stroke patients: a cross-sectional study. *Frontiers in psychiatry, 13*, 960830.

Farahani, M. A., Bahloli, S., JamshidiOrak, R., & Ghaffari, F. (2020). Investigating the needs of family caregivers of older stroke patients: a longitudinal study in Iran. *BMC geriatrics, 20*(1), 1-12.

Fauziah, W., Mayumi, K., Shogenji, M., Tsujiguchi, H., & Taniguchi, Y. (2022). Factors associated with depression among family caregivers of patients with stroke in Indonesia: a cross-sectional study. *Journal of Nursing Research, 30*(5), e231.

Feigin, V. L., Brainin, M., Norrving, B., Martins, S., Sacco, R. L., Hacke, W., Fisher, M., Pandian, J., & Lindsay, P. (2022). World Stroke Organization (WSO): global stroke fact sheet 2022. *International Journal of Stroke, 17*(1), 18-29.

Flowers, H. L., Silver, F. L., Fang, J., Rochon, E., & Martino, R. (2013). The incidence, co-occurrence, and predictors of dysphagia, dysarthria, and aphasia after first-ever acute ischemic stroke. *Journal of communication disorders, 46*(3), 238-248.

Ghoreyshi, Z., Nilipour, R., Bayat, N., Nejad, S. S., Mehrpour, M., & Azimi, T. (2021). The Incidence of Aphasia, Cognitive Deficits, Apraxia, Dysarthria, and Dysphagia in Acute Post Stroke Persian Speaking Adults. *Indian Journal of Otolaryngology and Head & Neck Surgery*, 1-11.

Good, D. C. (2011). Cerebrovascular disease.

Govindarajan, P., Soundarapandian, R. K., Gandomi, A. H., Patan, R., Jayaraman, P., & Manikandan, R. (2020). Classification of stroke disease using machine learning algorithms. *Neural Computing and Applications, 32*(3), 817-828.

Graf, R., LeLaurin, J., Schmitzberger, M., Freytes, I. M., Orozco, T., Dang, S., & Uphold, C. R. (2017). The stroke caregiving trajectory in relation to caregiver depressive symptoms, burden, and intervention outcomes. *Topics in Stroke Rehabilitation, 24*(7), 488-495.

Guan, T., Ma, J., Li, M., Xue, T., Lan, Z., Guo, J., Shen, Y., Chao, B., Tian, G., & Zhang, Q. (2017). Rapid transitions in the epidemiology of stroke and its risk factors in China from 2002 to 2013. *Neurology, 89*(1), 53-61.

Gulo, L. I., Cendrasilvinia, H., & Manus, W. C. (2022). Caregivers of elderly with moderate to total dependence in activities of daily living in Yogyakarta Indonesia: Correlation of burden and quality of life. *Makara Journal of Health Research, 26*(3), 5.

Hackett, M. L., & Anderson, C. S. (2005). Predictors of depression after stroke: a systematic review of observational studies. *Stroke, 36*(10), 2296-2301.

Haley, W. E., Allen, J. Y., Grant, J. S., Clay, O. J., Perkins, M., & Roth, D. L. (2009). Problems and benefits reported by stroke family caregivers: results from a prospective epidemiological study. *Stroke, 40*(6), 2129-2133.

Haley, W. E., Roth, D. L., Hovater, M., & Clay, O. J. (2015). Long-term impact of stroke on family caregiver well-being: a population-based case-control study. *Neurology, 84*(13), 1323-1329.

He, L., Wang, J., Wang, F., Wang, L., Liu, Y., Zhou, F., & Xu, F. (2023). Depression status and functional outcome of patients with ischemic stroke and the impact on caregivers living in Chengdu: a cross-sectional study. *Frontiers in psychiatry, 14*, 1166273.

Hou, Y., & Yang, L. (2022). Effective Analysis of Multichannel Functional Electrical Stimulation plus Early Rehabilitation Training for Hemiplegic Patients after Stroke. *Evidence-Based Complementary and Alternative Medicine, 2022*.

Hu, P., Yang, Q., Kong, L., Hu, L., & Zeng, L. (2018). Relationship between the anxiety/depression and care burden of the major caregiver of stroke patients. *Medicine, 97*(40).

Hu, X., Dolansky, M. A., Hu, X., Zhang, F., & Qu, M. (2016). Factors associated with the caregiver burden among family caregivers of patients with heart failure in southwest China. *Nursing & health sciences, 18*(1), 105-112.

Huang, N., Tang, Y., Zeng, P., Guo, X., & Liu, Z. (2023). Psychological status on informal carers for stroke survivors at various phases: a cohort study in China. *Frontiers in psychiatry, 14*, 1173062.

Hupcey, J. E. (1998). Clarifying the social support theory-research linkage. *Journal of Advanced Nursing, 27*(6), 1231-1241.

Jeong, Y.-G., Jeong, Y.-J., Kim, W.-C., & Kim, J.-S. (2015). The mediating effect of caregiver burden on the caregivers' quality of life. *Journal of physical therapy science, 27*(5), 1543-1547.

Katz, S. (1983). Assessing self-maintenance: activities of daily living, mobility, and instrumental activities of daily living. *Journal of the American Geriatrics Society*.

Kavga, A., Kalemikerakis, I., Faros, A., Milaka, M., Tsekoura, D., Skoulatou, M., Tsatsou, I., & Govina, O. (2021). The effects of patients' and caregivers' characteristics on the burden of families caring for stroke survivors. *International journal of environmental research and public health, 18*(14), 7298.

Khedr, E. M., Abdelrahman, A. A., Desoky, T., Zaki, A. F., & Gamea, A. (2020). Post-stroke depression: frequency, risk factors, and impact on quality of life among 103 stroke patients—hospital-based study. *The Egyptian Journal of Neurology, Psychiatry and Neurosurgery, 56*, 1-8.

Kim, H.-M., Park, J.-H., & Jang, G.-J. (1998). The Degree of Burden of Family Caregivers as Related to the Level of ADL of Patients with Strokes. *Journal of Korean Academy of Community Health Nursing, 9*(2), 362-373.

King, R. B., Ainsworth, C. R., Ronen, M., & Hartke, R. J. (2010). Stroke caregivers: pressing problems reported during the first months of caregiving. *Journal of Neuroscience Nursing, 42*(6), 302-311.

Kisoli, A., Gray, W. K., Dotchin, C. L., Orega, G., Dewhurst, F., Paddick, S.-M., Longdon, A., Chaote, P., Dewhurst, M., & Walker, R. W. (2015). Levels of functional disability in elderly people in Tanzania with dementia, stroke and Parkinson's disease. *Acta neuropsychiatrica, 27*(4), 206-212.

Kong, K.-H., & Lee, J. (2014). Temporal recovery of activities of daily living in the first year after ischemic stroke: a prospective study of patients admitted to a rehabilitation unit. *NeuroRehabilitation, 35*(2), 221-226.

Kruithof, W. J., van Mierlo, M. L., Visser-Meily, J. M., van Heugten, C. M., & Post, M. W. (2013). Associations between social support and stroke survivors' health-related quality of life—a systematic review. *Patient Education and Counseling, 93*(2), 169-176.

Kumar, A., Yadav, A. K., Singh, V. K., Pathak, A., Chaurasia, R. N., Mishra, V. N., & Joshi, D. (2022). Caregiver burden in caregivers of stroke survivors: A hospital-based study. *Annals of Indian Academy of Neurology, 25*(6), 1092-1098. https://doi.org/10.4103/aian.aian_318_22

Kuptniratsaikul, V., Thitisakulchai, P., Sarika, S., & Khaewnaree, S. (2018). The burden of stroke on caregivers at 1-year after discharge: a multicenter study. *J Thai Rehabil Med, 28*(1), 8-14.

Langford, C. P. H., Bowsher, J., Maloney, J. P., & Lillis, P. P. (1997). Social support: a conceptual analysis. *Journal of Advanced Nursing, 25*(1), 95-100.

Lee, J.-H., & Jung, M. S. (2023). Factors Influencing the Quality of Life of Family Caregivers of Stroke Patients: A Cross-Sectional Survey. *Journal of Korean Academy of Fundamentals of Nursing, 30*(4), 479-488.

Lee, J., Yoo, M., & Jung, D. (2010). Caregiving appraisal of family caregivers for older stroke patients in Korea. *International nursing review, 57*(1), 107-112.

Lenzi, G., Altieri, M., & Maestrini, I. (2008). Post-stroke depression. *Revue neurologique, 164*(10), 837-840.

Leung, S. O., Chan, C. C., & Shah, S. (2007). Development of a Chinese version of the Modified Barthel Index-validity and reliability. *Clinical rehabilitation, 21*(10), 912-922.

Leung, D. Y., Chan, H. Y., Chiu, P. K., Lo, R. S., & Lee, L. L. (2020). Source of social support and caregiving self-efficacy on caregiver burden and patient's quality of life: a path analysis on patients with palliative care needs and their caregivers. *International journal of environmental research and public health, 17*(15), 5457.

Li, J., Liang, Z., & Wang, Z. (2019). Analysis of current status and influencing factors of social support for elderly hypertensive patients in community.

Lie, W., Xiaoshi, Y., & Zhe, H. (2006). Application and evaluation of Chinese version of zarit caregiver burden interview. *中国公共卫生, 22*(8), 970-972.

Lipton, R., Schwedt, T., & Friedman, B. (2016). GBD 2015 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet, 388*(10053), 1545-1602.

Liu, L., Wang, D., Wong, K. L., & Wang, Y. (2011). Stroke and stroke care in China: huge burden, significant workload, and a national priority. *Stroke, 42*(12), 3651-3654.

Liu, Z., Heffernan, C., & Tan, J. (2020). Caregiver burden: A concept analysis. *International journal of nursing sciences, 7*(4), 438-445.

Llanque, S., Savage, L., Rosenburg, N., & Caserta, M. (2016). Concept Analysis: A lzheimer's Caregiver Stress. Nursing forum,

Longde, W., Ling, Y., Yang, H., Yi, Z., Yongjun, W., Xunming, J., Xiaoyuan, N., Qiumin, Q., Li, H., & Yuming, X. (2015). Fixed-dose combination treatment after stroke for secondary prevention in China: a national community-based study. *Stroke, 46*(5), 1295-1300.

Lou, V. W., Tang, J. Y. M., Lau, G. K. K., Lum, T. Y. S., Fong, K., Ko, R. W. T., Cheng, C. Y. M., Fu, J. Y., Chow, E. S. L., & Chu, A. C. K. (2021). Effectiveness of a Two-Tier Family-Oriented Intervention in Enhancing the Family Functioning and Care Capacity of the Family Caregivers of Stroke Survivors: Protocol for a Randomized Controlled Trial. *JMIR Research Protocols, 10*(5), e16703.

Lu, L., Wang, L., Yang, X., & Feng, Q. (2009). Zarit Caregiver Burden Interview: development, reliability and validity of the Chinese version. *Psychiatry and clinical neurosciences, 63*(6), 730-734.

Lui, S. K., & Nguyen, M. H. (2018). Elderly stroke rehabilitation: overcoming the complications and its associated challenges. *Current gerontology and geriatrics research, 2018*.

Luo, Y., Reis, C., & Chen, S. (2019). NLRP3 inflammasome in the pathophysiology of hemorrhagic stroke: a review. *Current neuropharmacology, 17*(7), 582-589.

Mahoney, D. F., Tarlow, B. J., & Jones, R. N. (2003). Effects of an automated telephone support system on caregiver burden and anxiety: findings from the REACH for TLC intervention study. *The Gerontologist, 43*(4), 556-567.

Martini, S., Ningrum, D. A. S., Abdul-Mumin, K. H., & Yi-Li, C. (2022). Assessing quality of life and associated factors in post-stroke patients using the world health organization abbreviated generic quality of life questionnaire (WHOQOL-BREF). *Clinical Epidemiology and Global Health, 13*, 100941.

Medeiros, G. C., Roy, D., Kontos, N., & Beach, S. R. (2020). Post-stroke depression: a 2020 updated review. *General hospital psychiatry, 66*, 70-80.

Menon, B., Salini, P., Habeeba, K., Conjeevaram, J., & Munisusmitha, K. (2017). Female caregivers and stroke severity determines caregiver stress in stroke patients. *Annals of Indian Academy of Neurology, 20*(4), 418.

Mergenthaler, P., Dirnagl, U., & Meisel, A. (2004). Pathophysiology of stroke: lessons from animal models. *Metabolic brain disease, 19*(3), 151-167.

Montgomery, R. J., Stull, D. E., & Borgatta, E. F. (1985). Measurement and the analysis of burden. *Research on aging, 7*(1), 137-152.

Mrozek, S., Vardon, F., & Geeraerts, T. (2012). Brain temperature: physiology and pathophysiology after brain injury. *Anesthesiology research and practice, 2012*.

Muller-Kluits, N., & Slabbert, I. (2018). Caregiver burden as depicted by family caregivers of persons with physical disabilities. *Social Work, 54*(4), 493-502.

Murphy, N. A., Christian, B., Caplin, D. A., & Young, P. C. (2007). The health of caregivers for children with disabilities: caregiver perspectives. *Child: care, health and development, 33*(2), 180-187.

National Academies of Sciences, E., & Medicine. (2016). *Families caring for an aging America*. National Academies Press.

Neau, J.-P., Ingrand, P., Mouille-Brachet, C., Rosier, M.-P., Couderq, C., Alvarez, A., & Gil, R. (1998). Functional recovery and social outcome after cerebral infarction in young adults. *Cerebrovascular diseases, 8*(5), 296-302.

Olver, J., Yang, S., Fedele, B., Ni, J., Frayne, J., Shen, G., & McKenzie, D. (2021). Post Stroke Outcome: global insight into persisting sequelae using the Post Stroke

Checklist. *Journal of Stroke and Cerebrovascular Diseases, 30*(4), 105612.

Oni, O. D., Olagunju, A. T., Okpataku, C. I., Erinfolami, A. R., & Adeyemi, J. D. (2019). Predictors of caregiver burden after stroke in Nigeria: effect on psychosocial well-being. *Indian Journal of Psychiatry, 61*(5), 457.

Oven Ustaalioglu, B., Acar, E., & Caliskan, M. (2018). The predictive factors for perceived social support among cancer patients and caregiver burden of their family caregivers in Turkish population. *International journal of psychiatry in clinical practice, 22*(1), 63-69.

Peng, Y., Brown, C. C., Zhang, J., Tang, X., Zhou, B., Zhao, Y., & Yan, L. (2019). An examination of a simplified stroke rehabilitation program for reducing family caregiver’s burden for stroke patients in rural China. *Contemporary Family Therapy, 41*(2), 168-179.

Pierce, L. L., Steiner, V. L., Khuder, S. A., Govoni, A. L., & Horn, L. J. (2009). The effect of a Web-based stroke intervention on carers' well-being and survivors' use of healthcare services. *Disability and Rehabilitation, 31*(20), 1676-1684.

Platt, S., & Hirsch, S. (1981). The effects of brief hospitalization upon the psychiatric patient's household. *Acta Psychiatrica Scandinavica, 64*(3), 199-216.

Pohl, J. M., Given, C. W., Collins, C. E., & Given, B. A. (1994). Social vulnerability and reactions to caregiving in daughters and daughters-in-law caring for disabled aging parents. *Health Care for Women International, 15*(5), 385-395.

Razali, N. S. N. M., Talib, S. S., Roslan, N. F. A., & Daud, A. Z. C. (2020). Caregivers’ burdens and its’ association with activities of daily living performance of individuals with stroke: A cross-sectional study. *Healthscope: The Official Research Book of Faculty of Health Sciences, UiTM, 3*(3), 44-48.

Rebouças, E. d. S., Marques, R. C., Braga, A. M., Oliveira, S. A., de Albuquerque, V. H. C., & Rebouças Filho, P. P. (2019). New level set approach based on Parzen estimation for stroke segmentation in skull CT images. *Soft Computing, 23*(19), 9265-9286.

Roger, V. L., Go, A. S., Lloyd-Jones, D. M., Adams, R. J., Berry, J. D., Brown, T. M., Carnethon, M. R., Dai, S., De Simone, G., & Ford, E. S. (2011). Heart disease and stroke statistics—2011 update: a report from the American Heart

Association. *Circulation, 123*(4), e18-e209.

Roopchand-Martin, S., & Creary-Yan, S. (2014). Level of caregiver burden in Jamaican stroke caregivers and relationship between selected sociodemographic variables. *The West Indian Medical Journal, 63*(6), 605.

Roy, C. (1976). The roy adaptation model. Comment. *Nursing outlook, 24*(11), 690-691.

Ru, X., Wang, W., Sun, H., Sun, D., Fu, J., Ge, S., Wang, L., Wang, L., & Jiang, B. (2019). GeographicalDifference, rural-urban transition and trend in stroke prevalence in China: findings from a national epidemiological survey of stroke in China. *Scientific reports, 9*(1), 1-11.

Rudnicka, E., Napierała, P., Podfigurna, A., Męczekalski, B., Smolarczyk, R., & Grymowicz, M. (2020). The World Health Organization (WHO) approach to healthy ageing. *Maturitas, 139*, 6-11.

Saarni, S. I., Suvisaari, J., Sintonen, H., Pirkola, S., Koskinen, S., Aromaa, A., & Lönnqvist, J. (2007). Impact of psychiatric disorders on health-related quality of life: general population survey. *The British journal of psychiatry, 190*(4), 326-332.

Sacco, R. L., Kasner, S. E., Broderick, J. P., Caplan, L. R., Connors, J., Culebras, A., Elkind, M. S., George, M. G., Hamdan, A. D., & Higashida, R. T. (2013). An updated definition of stroke for the 21st century: a statement for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke, 44*(7), 2064-2089.

Sambasivam, R., Liu, J., Vaingankar, J. A., Ong, H. L., Tan, M. E., Fauziana, R., Picco, L., Chong, S. A., & Subramaniam, M. (2019). The hidden patient: chronic physical morbidity, psychological distress, and quality of life in caregivers of older adults. *Psychogeriatrics, 19*(1), 65-72.

Shao, R., He, P., Ling, B., Tan, L., Xu, L., Hou, Y., Kong, L., & Yang, Y. (2020). Prevalence of depression and anxiety and correlations between depression, anxiety, family functioning, social support and coping styles among Chinese medical students. *BMC psychology, 8*, 1-19.

Shukri, M., Mustofai, M. A., Md Yasin, M. A. S., & Tuan Hadi, T. S. (2020). Burden, quality of life, anxiety, and depressive symptoms among caregivers of hemodialysis patients: The role of social support. *The International Journal of Psychiatry in Medicine, 55*(6), 397-407.

Stets, J. E., & Burke, P. J. (2003). A sociological approach to self and identity. *Handbook of self and identity, 128152*, 23-50.

Strandgaard, S., & Paulson, O. (1990). Pathophysiology of stroke. *Journal of cardiovascular pharmacology, 15*, S38-42.

Su, L., & Wei, B. (2009). Study on the reliability, validity and norm of social support scale in Chuang peasants. *Modern Preventive Medicine, 36*(23), 4411-4413.

Suh, M., Kim, K., Kim, I., Cho, N., Choi, H., & Noh, S. (2005). Caregiver's burden, depression and support as predictors of post-stroke depression: a cross-sectional survey. *International journal of nursing studies, 42*(6), 611-618.

Suksatan, W., Collins, C. J., Koontalay, A., & Posai, V. (2021). Burdens among familial caregivers of stroke survivors: a literature review. *Working with Older People*.

Sullivan, J. E., & Hedman, L. D. (2008). Sensory dysfunction following stroke: incidence, significance, examination, and intervention. *Topics in Stroke Rehabilitation, 15*(3), 200-217.

Sun, J., Sun, R., Jiang, Y., Chen, X., Li, Z., Ma, Z., Wei, J., He, C., & Zhang, L. (2020). The relationship between psychological health and social support: Evidence from physicians in China. *PloS one, 15*(1), e0228152.

Swartz, K., & Collins, L. G. (2019). Caregiver care. *American family physician, 99*(11), 699-706.

Swearingen, P. L., & Wright, J. (2019). *All-in-One Nursing Care Planning Resource-E-Book: Medical-Surgical, Pediatric, Maternity, and Psychiatric-Mental Health*. Elsevier Health Sciences.

Tamizi, Z., Fallahi-Khoshknab, M., Dalvandi, A., Mohammadi-Shahboulaghi, F., Mohammadi, E., & Bakhshi, E. (2019). Defining the concept of family caregiver burden in patients with schizophrenia: a systematic review protocol. *Systematic reviews, 8*(1), 1-6.

Tang, Y.-Y., & Chen, S.-P. (2002). Health promotion behaviors in Chinese family caregivers of patients with stroke. *Health Promotion International, 17*(4), 329-339.

Tao, X., Chow, S. K. Y., Zhang, H., Huang, J., Gu, A., Jin, Y., He, Y., & Li, N. (2020). Family caregiver's burden and the social support for older patients undergoing peritoneal dialysis. *Journal of Renal Care, 46*(4), 222-232.

Tsai, P.-c., Yip, P.-K., Tai, J. J., & Lou, M.-F. (2015). Needs of family caregivers of stroke patients: a longitudinal study of caregivers’ perspectives. *Patient Preference and Adherence, 9*, 449.

Tsai, P.-F. (2003). A middle-range theory of caregiver stress. *Nursing Science Quarterly, 16*(2), 137-145.

Tu, W.-J., Hua, Y., Yan, F., Bian, H., Yang, Y., Lou, M., Kang, D., He, L., Chu, L., & Zeng, J. (2022). Prevalence of stroke in China, 2013–2019: a population-based study. *The Lancet Regional Health-Western Pacific*, 100550.

Wang Laihua, Joseph, and Schneider. (2000). Types of Elderly Family Care and Family Relationships in Care. *Sociological research, 4*, 32-34.

Wang, H., Abajobir, A. A., Abate, K. H., Abbafati, C., Abbas, K. M., Abd-Allah, F., Abera, S. F., Abraha, H. N., Abu-Raddad, L. J., & Abu-Rmeileh, N. M. (2017). Global, regional, and national under-5 mortality, adult mortality, age-specific mortality, and life expectancy, 1970–2016: a systematic analysis for the Global Burden of Disease Study 2016. *The Lancet, 390*(10100), 1084-1150.

Wang, W., Jiang, B., Sun, H., Ru, X., Sun, D., Wang, L., Wang, L., Jiang, Y., Li, Y., & Wang, Y. (2017). Prevalence, incidence, and mortality of stroke in China: results from a nationwide population-based survey of 480 687 adults. *Circulation, 135*(8), 759-771.

Wang, X., Hu, C.-X., Lin, M.-Q., Liu, S.-Y., Zhu, F.-Y., & Wan, L.-H. (2022). Family functioning is associated with post-stroke depression in first-ever stroke survivors: a longitudinal study. *Neuropsychiatric Disease and Treatment*, 3045-3054.

Wang, Y.-J., Li, Z.-X., Gu, H.-Q., Zhai, Y., Jiang, Y., Zhao, X.-Q., Wang, Y.-L., Yang, X., Wang, C.-J., & Meng, X. (2020). China stroke statistics 2019: a report from the National center for healthcare quality management in neurological diseases, China national clinical research center for neurological diseases, the Chinese stroke association, National center for chronic and non-communicable disease control and prevention, Chinese center for disease control and prevention and Institute for global neuroscience and stroke collaborations. *Stroke and vascular neurology, 5*(3).

Watanabe, A., Fukuda, M., Suzuki, M., Kawaguchi, T., Habata, T., Akutsu, T., & Kanda, T. (2015). Factors decreasing caregiver burden to allow patients with cerebrovascular disease to continue in long-term home care. *Journal of Stroke and Cerebrovascular Diseases, 24*(2), 424-430.

Wei Fengmei, Li Huiju, and Zhao Long. (2016). Caregiver classification system. *Chinese Journal of Gerontology, 36*(7), 1775-1777.

Wu, S., Wu, B., Liu, M., Chen, Z., Wang, W., Anderson, C. S., Sandercock, P., Wang, Y., Huang, Y., & Cui, L. (2019). Stroke in China: advances and challenges in epidemiology, prevention, and management. *The Lancet Neurology, 18*(4), 394-405.

Xiao, W., Liu, Y., Huang, J., Huang, L.-a., Bian, Y., & Zou, G. (2024). Analysis of factors associated with depressive symptoms in stroke patients based on a national cross-sectional study. *Scientific Reports, 14*(1), 9268.

Xiao Yuanshui. （1994）. Theoretical Foundation and Research Applications of the Social Support Rating Scale. *Journal of Clinical Psychiatry, 4*(2),98-100.

Xu, L., Liu, Y., He, H., Fields, N. L., Ivey, D. L., & Kan, C. (2021). Caregiving intensity and caregiver burden among caregivers of people with dementia: The moderating roles of social support. *Archives of Gerontology and Geriatrics, 94*, 104334.

Xu, Q., Ma, J., Zhang, Y., & Gan, J. (2024). Family resilience and social support as mediators of caregiver burden and capacity in stroke caregivers: a cross-sectional study. Frontiers in Psychology, 15, 1435867.

Yoo, J. W., Hong, B. Y., Jo, L., Kim, J.-S., Park, J. G., Shin, B. K., & Lim, S. H. (2020). Effects of age on long-term functional recovery in patients with stroke. *Medicina, 56*(9), 451.

Yousufuddin, M., & Young, N. (2019). Aging and ischemic stroke. *Aging (Albany NY),* *11*(9), 2542.

Yue, Y., Liu, R., Lu, J., Wang, X., Zhang, S., Wu, A., Wang, Q., & Yuan, Y. (2015). Reliability and validity of a new post-stroke depression scale in Chinese population. *Journal of affective disorders, 174*, 317-323.

Yuliana, S., Yu, E., Rias, Y. A., Atikah, N., Chang, H. J., & Tsai, H. T. (2023). Associations among disability, depression, anxiety, stress, and quality of life between stroke survivors and their family caregivers: An Actor-Partner Interdependence Model. *Journal of Advanced Nursing, 79*(1), 135-148.

Yüzbaşıoğlu, H. E., & Fertelli, T. K. (2024). Care Burden and Compassion in Caregivers of Stroke Survivors. *Clinical and Experimental Health Sciences, 14*(2), 385-392.

Zarit, S. H., Todd, P. A., & Zarit, J. M. (1986). Subjective burden of husbands and wives as caregivers: a longitudinal study. *The Gerontologist, 26*(3), 260-266.

Zeng, Y., Zhou, Y., & Lin, J. (2017). Perceived burden and quality of life in chinese caregivers of people with serious mental illness: A comparison cross-sectional survey. *Perspectives in psychiatric care, 53*(3), 183-189.

Zhang, J., & Lee, D. T. F. (2019). Meaning in stroke family caregiving in China: A phenomenological study. *Journal of Family Nursing, 25*(2), 260-286.

Zhang, X., & Dong, S. (2022). The relationships between social support and loneliness: a meta-analysis and review. Acta Psychologica, 227, 103616.

Zhao, J., Zeng, Z., Yu, J., Xu, J., Chen, P., Chen, Y., Li, J., & Ma, Y. (2021). Effect of main family caregiver's anxiety and depression on mortality of patients with moderate-severe stroke. *Scientific reports, 11*(1), 1-9.

Zhong, Y., Wang, J., & Nicholas, S. (2020). Social support and depressive symptoms among family caregivers of older people with disabilities in four provinces of urban China: the mediating role of caregiver burden. *BMC geriatrics, 20*(1), 1-10.

Zhu, W., & Jiang, Y. (2018). A meta-analytic study of predictors for informal caregiver burden in patients with stroke. *Journal of Stroke and Cerebrovascular Diseases, 27*(12), 3636-3646.

APPENDIX

APPENDIX A

Questionaire

Dear participants,

My name is Yuanyuan Cai, a graduate student from Burafa University and Wenzhou Medical University , and I am now conducting a study on "Predictive factors of family caregivers burden in elderly stroke patients in Wenzhou, China". The purpose of this study is to investigate the current situation of family caregiver burden of elderly stroke patients in Wenzhou, China, explore the predictive relationship between the daily living ability of elderly stroke patients, post-stroke depression, the relationship between caregivers and stroke patients, social support and the burden of family caregivers, so as to provide intervention measures for family caregivers of elderly stroke patients, Reduce the burden of caregivers, improve the quality of life of caregivers, provide better care services for patients, but also for clinical nursing staff to develop corresponding countermeasures, provide reference and guidance.

As a participant of this project, if you agree, please help to fill in the relevant questionnaire. Each session should take about 30-60 minutes. Participating in this survey will not cause you any risk or discomfort. Please fill in the answer according to the actual situation. There is no correct or wrong answer. We guarantee that the information you fill in will be kept confidential. The results of the questionnaire are anonymous and the data is only used for research purposes. We will keep all your information absolutely confidential.

We will not charge you any fee to participate in this study. This study will not cause you any harm, and your participation is completely voluntary, or even withdrawal from this study. These questionnaires include:

1. Chronic disease patients and caregivers demographic data questionnaire
2. The Zarit Burden Interview
3. Scoring system for the modified Bathel Index

4. A New PostStroke Depression Scale (PSDS)

5. Social Support Rating Scale

Thank you for your cooperation

Yuanyuan Cai
Master’s degree student
Adult Nursing Pathway
Faculty of Nursing, Burapha University, Thailand in collaboration with
School of Nursing, Wenzhou Medical University, China

Questionnaires

Predictive factors of family caregivers burden in elderly stroke patients in Wenzhou, China

The questionnaires include 5 parts as follows:

Part 1. Chronic disease patients and caregivers demographic data questionnaire with 20 items.

Part 2. The Zarit Burden Interview with 22 items.

Part 3. Scoring system for the modified Bathel Index with 10items.

Part 4. A New PostStroke Depression Scale (PSDS)with 8 items.

Part 5. Social Support Rating Scale with 10 items.

Please read each question carefully and then chose the answer that you think suitable on your conditions.

Part 1: Chronic disease patients and family caregivers demographic

Instructions: Please read the questions in part 1 carefully and give an honest answer. Please mark "√" in the appropriate box or write down your answers into the blank

Encoding:

1. Age: Age of patient

Age of family caregivers

2. Gender (1.Male 2.Female) : Patient_________Family caregivers

3. Education (1. Junior high school and below 2. High school and below 3. College and above 4. Others__________) :Patient_________Family caregivers

4. Marital status (1. Unmarried 2. Married or cohabiting 3. Divorced or separated 4. Other___________) : Patient_________Family caregivers

5. Current employment status (1. Full-time employment 2. Part-time employment 3. Do not work 4. Other_______) :Patient_________Family caregivers

6. Your relationship with the patient:

1. Spouse 2. Parents 3. Sons and daughters (including daughter-in-law and son-in-law) 4. Brothers and sisters 5. Other_______):Patient_________Family caregivers

7. Do you live with the patient: 1. Yes 2. No

8. Who does the patient live with now (more than one can choose) ?

1. Living alone 2. Spouse 3. Children 4. Other relatives or friends 5. Parents 6. Others, please specify

9. Number of family members living with the patient:

10. Was there anyone else involved in caring for the patient? 1. No, just me 2. There are others who care for the patient

11. The average time you spend with patients per week:___________Hour

12. The number of years you have cared for the patient:_______Year

13. Caregiver working hours per week: _______Hour

14. How long has the patient be sick:

15. Knowledge of the disease (1. Don't know 2. Know some 3. Know a lot 4. Fully understand) : Patient_________Family caregivers

16. Current treatment:1. Inpatient treatment 2. Outpatient treatment 3.Self-purchase 4.untreated

17. Payment method:1. Free medical care 2. Labor insurance medical care 3. Social pooling of medical expenses 4. Cooperative Medical Commercial medical insurance 6. Fully self-funded 7. Other

18. Your out-of-pocket medical expenses in the past year:

19. The patient's total family income in the past year: 1. 10,000 Yuan and below 2.10,000-30,000 Yuan 3.3000 -50000 Yuan 4.50000-100000 Yuan 5.100000 yuan or more

20. Out-of-pocket medical expenses as a percentage of income:1.0-20% 2.20-40% 3.40-50% 4.50-80% 5.80% and above

Part 2: The Zarit Burden Interview: Original version

Please select the best option on the right and type it "√"

Items	Never	Rarely	Sometimes	Quite frequently	Nearly always
1.Do you feel that your relative asks for more help than he/she needs?					
2.Do you feel that because of the time you spend with your relative that you don't have enough time for yourself ?					
3.Do you feel stressed between caring for your relative and trying to meet other responsibilities for your family or work?					
4. Do you feel embarrassed over your relative's behavior?					
5. Do you feel angry when you are around your relative?					
6. Do you feel that your relative currently affects your relationships with other family members or friends in a negative way?					
7. Are you afraid what the future holds for your relative?					
8. Do you feel your relative is dependent on you?					
9. Do you feel strained when you are around your relative?					

Items	Never	Rarely	Sometimes	Quite frequently	Nearly always
10. Do you feel your health has suffered because of your involvement with your relative?					
11. Do you feel that you don't have as much privacy as you would like because of your relative?					
12. Do you feel that your social life has suffered because you are caring for your relative?					
13. Do you feel uncomfortable about having friends over because of your relative?					
14. Do you feel that your relative seems to expect you to take care of him/her as if you were the only one he/she could depend on?					
15. Do you feel that you don't have enough money to take care of your relative in addition to the rest of your expenses?					
16. Do you feel that you will be not able to take care of your relative much longer?					
17. Do you feel you have lost control of your life since your relative's illness?					
18. Do you wish you could just leave the care of your relative to someone else?					

Items	Never	Rarely	Sometimes	Quite frequently	Nearly always
19. Do you feel uncertain about what to do about your relative?					
20. Do you feel you should be doing more for your relative ?					
21. Do you feel you could do a better job in caring for your relative?					
22. Overall, how burdened do you feel in caring for your relative?					

Notes: Answering format ZBI: (0) Never (1) Rarely, (2) Sometimes, (3) Quite frequently, (4) Nearly always.

Part 3: Scoring system for the modified Bathel Index

Please select the best option on the right and type it “√”

Items/activity	Unable to perform task	Attempts task but unsafe	Moderate help required	Minimal help required	Fully independent
Feeding	0	2	5	8	10
Bathing self	0	1	3	4	5
Dressing	0	2	5	8	10
Grooming/personal hygiene	0	1	3	4	5
Toilet	0	2	5	8	10
Bowel control	0	2	5	8	10
Bladder control	0	2	5	8	10
Chair/bed transfers	0	3	8	12	15
Ambulation	0	3	8	12	15
Wheelchair（only if ambulation is 0）	0	1	3	4	5
Stair climbing	0	2	5	8	10
Total score					100

Part 4: A New PostStroke Depression Scale (PSDS)

Please select the best option number on the right and type it "√"

	absent=0	some of the time=1	part of the time=2	most of the time=3
1.decreased speech (do not want to speak)	0	1	2	3
2.easy fatigability	0	1	2	3
3.easy to cry	0	1	2	3
4.insomnia (waking up too early)	0	1	2	3
5.feeling of decreased capability	0	1	2	3
6.suicidal ideation	0	1	2	3
7.feeling of diffificult to recover	0	1	2	3
8.more irritable than usual	0	1	2	3
Total score:				

PSDS is a self rating scale, the subjects were asked to read each of the 8 items and carefully decided how often the statement describes according their feeling during the last 7 days in the following four quantitative_Terms:absent=0,some of the time=1,part of the time=2,most of the time=3.

Part 5: Social Support Rating Scale

Instructions: The following questions are designed to measure your support received in society. Depending on the fact, please finish the rating scale in accordance with the specific requirements of each issue and type it “√”. Thank you for your cooperation.

1. How many intimate friends do you have, from whom you can receive support and help? (Exclusive Choice)
    (1) None
    (2) 1~2
    (3) 3~5
    (4) no less than 6
2. Over the past year, you_______ (Exclusive Choice)
    (1) stay away from family, and live alone
    (2) often move the residence, and most of time live together with strangers
    (3) live together with students, colleagues or friends
    (4) live together with family
3. With your neighbors, you_______ (Exclusive Choice)
    (1) have a speaking acquaintance and never care about each other
    (2) maybe have a little concern when meeting trouble
    (3) are deeply concerned by some of them
    (4) are deeply concerned by most of them
4. With your colleagues, you_______ (Exclusive Choice)
    (1) have a speaking acquaintance and never care about each other
    (2) maybe have a little concern when meeting trouble
    (3) are deeply concerned by some of them
    (4) are deeply concerned by most of them

5. Obtain support and help from family members (Draw “ √ ” in the suitable box)

	none	rarely	normally	full support
A. couple				
B. parents				
C. children				
D. siblings				
E. others (for example, sister-in-law)				

6. In the past, when you encounter difficulties, what is the source that you ever received either economic support or practical problem-solving help?

(1) no source

(2) the following source (more than one answer is permitted)

A. spouse

B. other family members

C. friends

D. relatives

E. colleagues

F. companies

G. official or semi-official organizations, such as, parties, leagues and trade union

H. unofficial organizations, such as, religion, social group and etc.

I. others ______________________ (please list)

7. In the past, when you encounter difficulties, what is the source that you ever received comfort and caring?

(1) no source

(2) the following source (more than one answer is permitted)

A. spouse

B. other family members

C. friends

D. relatives

E. colleagues

F. companies

G. official or semi-official organizations, such as, parties, leagues and trade union

H. unofficial organizations, such as, religion, social group and etc.

I. others ________________________ (please list)

8. What is the way of talking when you are in trouble? (Exclusive Choice)

(1) never complain to anyone

(2) only complain to 1 or 2 persons who have a close relationship with

(3) will talk to the friend who takes the initiative to inquiry

(4) take the initiative to talk their own troubles in order to get support and understanding

9. What is the way of seeking help when you are in trouble? (Exclusive Choice)

(1) just rely on myself, and do not accept the help of others

(2) rarely ask someone for help

(3) sometimes ask someone for help

(4) ask family, friends or organizations for help when facing troubles

10. Organized activities for groups (such as, party and youth league organizations, religious organization, trade union, student union and etc.), you ________. (Exclusive Choice)

(1) never attend

(2) occasionally attend

(3) often attend

(4) take the initiative to attend and are active with

尊敬的参与者：

您好!我是泰国布拉法大学和温州医科大学2020级的研究生蔡圆圆，现在进行“温州老年脑卒中患者家庭照顾者负担相关的预测因素”的研究。本研究的目的是通过调查中国温州地区老年脑卒中患者的家庭照顾者负担的现状，探究老年脑卒中患者日常生活能力、脑卒中后抑郁、照顾者与脑卒中患者关系、社会支持等因素与家庭照顾者负担之间的预测关系，从而对老年脑卒中患者家庭照顾者提供科学干预措施，减低照顾者的负担，提高照顾者的生活质量，更好的为患者提供照顾服务，也为临床护理人员制定相应的对策，提供借鉴与指导。

做为本项目的参与者，如果您同意，请协助填写相关问卷。每次大约需要30-60 分钟。参与此次调研不会给您带来任何风险或不适，请根据实际情况填写答案，答案无正确错误。你所填写的资料我们保证替您保密，问卷结果是匿名进行的，数据仅用于研究使用，我们将对您的所有信息绝对保密。

我们不会向您收取任何参与本次研究的费用。本研究不会对您造成任何伤害，您的参与完全是出于自愿，甚至退出本研究。这些问卷包括：

1. 慢性病患者及照顾者人口统计数据问卷。
2. 照顾者压力负担量表（ZBI）
3. 改良Barthel指数评分标准
4. 卒中后抑郁障碍评估量表（PSD-S）
5. 社会支持评定量表

谢谢你的合作

蔡圆圆
研究生
成人护理专业
泰国东方大学联合温州医科大学

问卷表格

温州老年脑卒中患者家庭照顾者负担相关的预测因素

问卷调查包括以下5个部分:

第一部分：慢性病患者及照顾者人口统计学调查问卷，共20题。

第二部分：照顾者负担量表（ZBI），共22题。

第三部分：改良Barthel指数评分标准，共10题。

第四部分：卒中后抑郁障碍评估量表（PSD-S），共8题。

第五部分：社会支持评定量表，共10题。

请仔细阅读每个问题，然后根据自己的情况选择合适的答案。

第一部分：慢性病患者及照顾者人口统计学调查问卷

注意:请仔细阅读第一部分的问题,

并如实作答。请在下列空格内打勾“√”或写下你的答案。

编码：

1. 年龄：患者年龄

照顾者年龄

2. 性别（1. 男　2. 女）：患者__________　照顾者

3. 文化程度（1. 初中及以下　2. 高中及以下　3. 大专及以上　4. 其他________）：

患者______________　照顾者

4. 婚姻状况（1. 未婚　2. 已婚或同居　3. 离异或分居　4. 其他________）：

患者______________　照顾者

5. 当前就业状况（1. 全职工作　2. 非全职工作　3. 不工作　4. 其他________）：

患者______________　照顾者

6. 你与患者的关系：

1. 配偶　2. 父母　3. 子女（含儿媳、女婿）　4. 兄弟姐妹　5. 其他

7. 你是否与患者居住在一起：1. 是　2. 否

8. 患者现在与谁生活在一起（可多选）？

1. 独居　2. 配偶　3. 孩子　4. 其他亲戚或朋友　5. 父母　6. 其他，请注明

9. 与患者共同生活的家庭成员人数：______________人

10. 是否还有其他人参与照顾改患者？

1. 无，仅我一人　2. 还有其他人照顾该患者

11. 你平均每周与患者在一起的时间：___________小时

12. 你照顾该患者的年限：___________年

13. 照顾者每周上班工作时间：_________小时

14. 患者何时被诊断中风：

15. 对该疾病的认知（1.　不了解　　　2.了解一些　　　3.了解很多　4.完全了解）：

患者___________　　照顾者

16. 目前的治疗方式：1.住院治疗　　　2.门诊治疗　　　3.自行购药　4.未治疗

17. 医药费支付方式：1.公费医疗　　2.劳保医疗　　3.医疗费用社会统筹　4.合作医疗

5.　商业医疗保险　6.完全自费　7.其他

18. 您过去一年需自付的医疗费用：__________元/年

19. 患者过去的一年的家庭总收入：1.　10000元及以下　　2.10000-30000元

3.30000-50000元　　4.50000-100000元　　5.100000元以上

20. 自付医疗费用占收入的比例：

1.0-20%　　2.20-40%　　3.40-50%　　4.50-80%　5.80%及以上

第二部分: 照顾者负担量表（ZBI）

请在以下问题中，您认为最合适的答案上打“√”

编号	条目	没有	偶尔	有时	经常	总是
1	您是否认为， 您所照料的病人会向您提出过多的照顾要求？					
2	您是否认为， 由于护理病人会使自己感到时间不够？					
3	您是否认为， 在照料病人和努力做好家务以及工作之间，会感到压力？					
4	您是否认为，因病人的行为而感到为难？					
5	您是否认为， 因病人在您身边而感到烦恼？					
6	您是否认为， 您的病人已经影响到您和您家人与朋友之间的关系？					
7	您对病人的将来，感到担心吗？					
8	您是否认为，病人依赖于您？					
9	当病人在您身边时，您感到紧张吗？					
10	您是否认为，由于护理病人， 您的健康受到影响？					
11	您是否认为，由于护理病人， 您没有时间办自己的私事？					
12	您是否认为，由于护理病人， 您的社交受到影响？					

13	您有没有由于病人在家，放弃请朋友来家里的想法？					
14	您是否认为，病人只期盼您的照料，您好像是他/她唯一可依赖的人？					
15	您是否认为，除了您的花费，您没有余钱用于护理病人？					
16	您是否认为，您有可能花更多的时间来护理病人？					
17	您是否认为，开始护理以来，按照自己的意愿生活已经不可能了？					
18	您是否希望，能把病人留给他人照顾？					
19	您对病人有不知如何是好的情形吗？					
20	您认为应该为病人做更多的事情是吗？					
21	您认为在护理患者上，您能做得更好吗？					
22	综合来看您怎样评价自己在护理上的负担？					

第三部分: 改良Barthel指数评分标准

基本的评级标准:每个活动的评级可分5级，不同的级别代表了不同程度的独立能力，最低的是1级，而最高是5级。级数越高，代表独立能力越高。选择最能代表患者目前需要帮助的程度，请在相应等级上“☑”

进食	0分□:完全依赖别人帮助进食。 2分□：某种程度上能运用餐具，通常是勺子或筷子，但在进食的整个过程中需要别人提供协助。 5分□：能使用餐具，通常是勺子或筷子， 但在进食的某些过程仍需要别人提供协助。 8分□：除了在准备或收拾时需要协助，病人可以自行进食；或进食过程中需有人从旁监督或提示，以策安全。 10分□:可自行进食，而无需别人在场监督、提示或协助。
洗澡	0分□：完全依赖别人协助洗澡。 1分□：某种程度上能参与， 但在整个活动的过程中需要别人提供协助才能完成。 3分□：能参与大部份的活动， 但在某些过程中仍需要别人提供协助才能完成整项活动。 4分□：除了在准备或收拾时需要协助， 病人可以自行洗澡;或过程中需别人从旁监督或提示，以策安全。 5分□：病人可用任何适当的方法自行洗澡，而无需别人在场监督、提示或协助.
穿衣	0分□：完全依赖别人协助穿衣。 2分□：某种程度上能参与， 但在整个活动的过程中需要别人提供协助才能完成。 5分□：能参与大部份的活动， 但在某些过程中仍需要别人提供协助才能完成整项活动。 8分□：除了在准备或收拾时需要协助，

	病人可以自行穿衣；或过程中需有人从旁监督或提示，以策安全。 10分□：自行穿衣而无需别人监督、提示或协助。
个人卫生	0分□：完全依赖别人处理个人卫生。 1分□：某种程度上能参与， 但在整个活动的过程中需要别人提供协助才能完成。 3分□：能参与大部份的活动， 但在某些过程中仍需要别人提供协助才能完成整项活动。 4分□：除了在准备或收拾时需要协助， 病人可以自行处理个人卫生;或过程中需别人从旁监督或提示， 以策安全。 5分□：病人可自行处理个人卫生,不需别人在场监督、提示或协助. 男性病人可自行剃须,而女性病人可自行化妆及整理头发。
如厕	0分□：完全依赖别人协助如厕。 2分□：某种程度上能参与， 但在整个活动的过程中需要别人提供协助才能完成。 5分□：能参与大部份的活动， 但在某些过程中仍需要别人提供协助才能完成整项活动。 8分□：除了在准备或收拾时需要协助， 病人可以自行如厕；或过程中需有人从旁监督或提示，以策安全。 10分□：病人可用任何适当的方法自行如厕,而无需别人在场监督、提示或协助。如有需要,病人亦可在晚间使用便盆、便椅或尿壶。然而,此类方法需包括将排泄物倒出并把器皿清洗干净。
大便控制	0分□：完全大便失禁。 2分□：在摆放适当的姿势和诱发大肠活动的技巧方面需要协助,并 出现大便失禁。。 5分□：病人能采取适当的姿势， 但不能运用诱发大肠活动的技巧;或在清洁身体及更换纸尿片方面需 协助，并间中出现大便失禁。

	8分□：偶尔出现大便失禁，病人在使用栓剂或灌肠器时需要监督；或需要定时有人从旁提示，以防失禁。 10分□：没有大便失禁，在需要时病人可自行使用栓剂或灌肠器。
小便控制	0分□：完全小便失禁。 2分□：病人是经常小便失禁。 5分□：病人通常在日间能保持干爽但晚上小便失禁，并在使用内用或外用辅助器具时需要协助。 8分□：病人通常能整天保持干爽但间中出现失禁；或在使用内用或外用辅助器具时需要监督;或需要定时有人从旁提示，以防失禁。 10分□：没有小便失禁或在需要时病人亦可自行使用内用或外用辅助工具。
床椅转移	0分□：完全依赖或需要两人从旁协助或要使用机械装置来帮助转移. 3分□：某种程度上能参与,但在整个活动的过程中需要别人提供协助才能完成。 8分□：能参与大部份的活动,但在某些过程中仍需要别人提供协助才能完成整项活动。 12分□：除了在准备或收拾时需要协助,病人可以自行转移；或过程中需有人从旁监督或提示,以策安全。 15分□：自行转移来回于床椅之间，并无需别人从旁监督、提示或协助。
行走	0分□：完全不能步行。 3分□：某种程度上能参与，但在整个活动的过程中需要别人提供协助才能完成。 8分□：能参与大部份的活动,但在某些过程中仍需要别人提供协助才能完成整项活动。

	12分□：可自行步行一段距离,但不能完成五十米；或过程中需有人从旁监督或提示，以策安全。 15分□：可自行步行五十米,并无需其它人从旁监督、提示或协助。
*轮椅操作（代替步行）	0分□：完全不能操控轮椅。 1分□：可在平地上自行推动轮椅并移动短距离,但在整个活动的过程中需要别人提供协助才能完成。 3分□：能参与大部份的轮椅活动,但在某些过程中仍需要别人提供协助才能完成整项活动。 4分□：可驱动轮椅前进、后退、转弯及移至桌边、床边或洗手间等,但在准备及收拾时仍需协助;或过程中需有人从旁监督或提示,以策安全。 5分□：可完全自行操控轮椅并移动至少五十米,并无需其它人从旁监督、提示或协助。
上下楼梯	0分□：完全依赖别人协助上下楼梯。 2分□：某种程度上能参与,但在整个活动的过程中需要别人提供协助才能完成。 5分□：能参与大部份的活动,但在某些过程中仍需要别人提供协助才能完成整项活动。 8分□：病人基本上不需要别人协助,但在准备及收拾时仍需协助;或过程中需有人从旁监督或提示，以策安全。 10分□：病人可在没有监督、提示或协助下,安全地在两段楼梯上下.有需要时，可使用扶手或/及助行器.

备注：

1.完全依赖别人去完成整项活动。

2.某种程度上参与,但在整个活动过程中需要别人提供协助才能完成。

注：“整个活动过程”是指有超过一半的活动过程。

3.能参与大部份的活动,但在某些过程中仍需要别人提供协助才能完成整项活动。

注：“某些过程”是指一半或以下的工作。

4. 除了在准备或收拾时需要协助，

病人可以独立完成整项活动；或进行活动时需要别人从旁监督或提示，以策安全。

注：“准备或收拾”是指一些可在测试前后去处理的非紧急活动过程.

5. 可以独立完成整项活动而需别人在旁监督、提示或协助。

第四部分：卒中后抑郁障碍评估量表（PSD-S）

指导语：请仔细阅读每一条，把意思弄明白，然后根据您最近一星期的实际情况，选择最适合您的答案上打“√”。

项目	无=0	小部分时间=1	相当多时间=2	绝大部分或全部时间有=3
1. 言语减少（不想说话）	0	1	2	3
2. 容易疲乏	0	1	2	3
3. 容易哭泣	0	1	2	3
4. 睡眠差、早醒	0	1	2	3
5. 感到自己能力下降	0	1	2	3
6. 有想死的念头	0	1	2	3
7. 感觉自己好不了	0	1	2	3
8. 比平时容易生气激动	0	1	2	3

（无=0，小部分时间=1，相当多时间=2，绝大部分或全部时间有=3）

得分：

第五部分:社会支持评定量表

指导语：下面的问题用于反映您再社会中所获得的支持,

请按各个问题的具体要求, 根据您的实际情况填写或者“√”。谢谢您的合作。

1. 您有多少关系密切, 可以得到支持和帮助的朋友？（只选一项）

（1）一个也没有　（2）1~2个　（3）3~5个　（4）6个或6个以上

2. 近一年来您：（只选一项）

（1）远离家人, 目独居一室。　（2）住处经常变动, 多数时间和陌生人住一起

（2）和同学、同事或朋友住一起　（4）和家人住在一起

3. 您与邻居：（只选一项）

（1）相互之间从不关心, 只是点头之交　（2）遇到困难可能稍微关心。

(3）有些邻居很关心您　（4）大多数邻居都很关心您

4. 您与同事：（只选一项）

（1）相互之间从不关心, 只是点头之交　（2）遇到困难可能稍微关心。

(4）有些同事很关心您　（4）大多数同事都很关心您

5. 从家庭成员得到的支持和照顾（在合适的框内划“√”）

	无	极少	一般	全力支持
A、夫妻（恋人）				
B、父母				
C、儿女				
C、兄弟姐妹				
D、其他成员（如嫂子）				

6. 过去, 在您遇到急难情况是, 曾经得到的经济支持或解决实际问题的帮助的来源有：

（1）无任何来源

（2）下列来源（可选多项）

A、配偶　B、其他家人　C、朋友　D、亲戚　E、同事

F、工作单位

G、党团工会等官方或半官方组织　H、宗教、社会团体等非官方组织

I、其他（请列出）

7. 过去, 在您遇到急难情况时, 曾经得到的安慰和关心来源有：

（1）无任何来源

（2）下列来源（可选多项）

A、配偶　　B、其他家人　　C、朋友　　D、亲戚　　E、同事

F、工作单位

G、党团工会等官方或半官方组织　　H、宗教、社会团体等非官方组织

I、其他（请列出）

8. 您遇到烦恼时的倾诉方式：（只选一项）

（1）从不向任何人诉述

（2）只向关系极为密切的1-2个人诉述

（3）如果朋友主动询问您会说出来

（4）主动诉述自己的烦恼, 以获得支持和理解。

9. 您遇到烦恼时的求助方式：（只选一项）

（1）只靠自己，不接受别人帮助

（2）很少请求别人帮助

（3）有时请求别人帮助

（4）有困难是经常向家人、亲友、组织求援。

10. 对于团体（如党团组织、宗教组织、工会、学生会等）组织活动, 您：（只选一项）

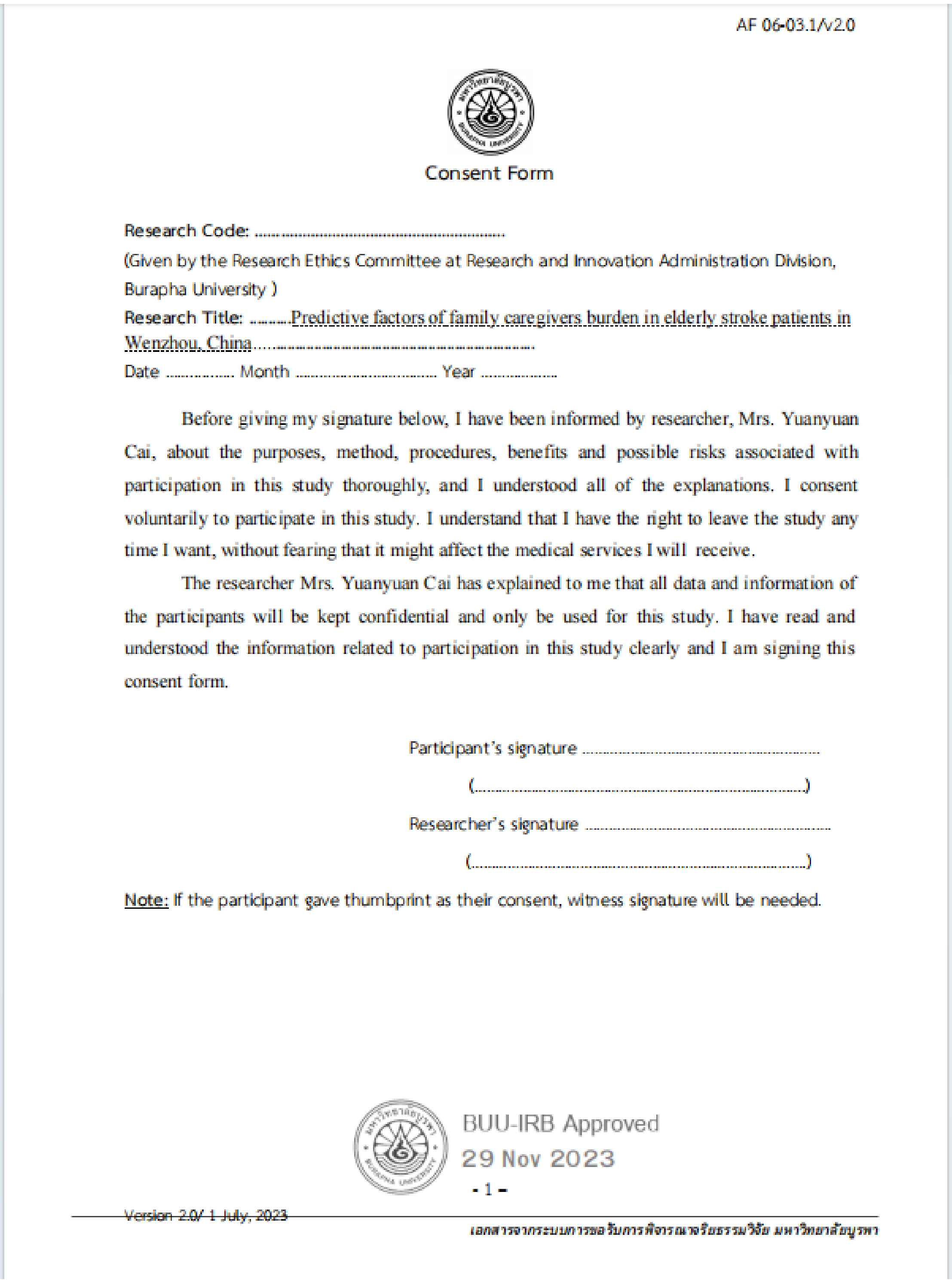
（1）从不参加　　（2）偶尔参加　　（3）经常参加

(4)主动参加并积极活动

总分：

APPENDIX B

IRB Approval



AF 06-03.1/v2.0

Consent Form

Research Code: ....

(Given by the Research Ethics Committee at Research and Innovation Administration Division, Burapha University)

Research Title: ....Predictive factors of family caregivers burden in elderly stroke patients in Wenzhou, China..

Date .... Month .... Year ....

Before giving my signature below, I have been informed by researcher, Mrs. Yuanyuan Cai, 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 Mrs. Yuanyuan Cai 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.

Participant's signature ....

(...)

Researcher's signature ....

(...)

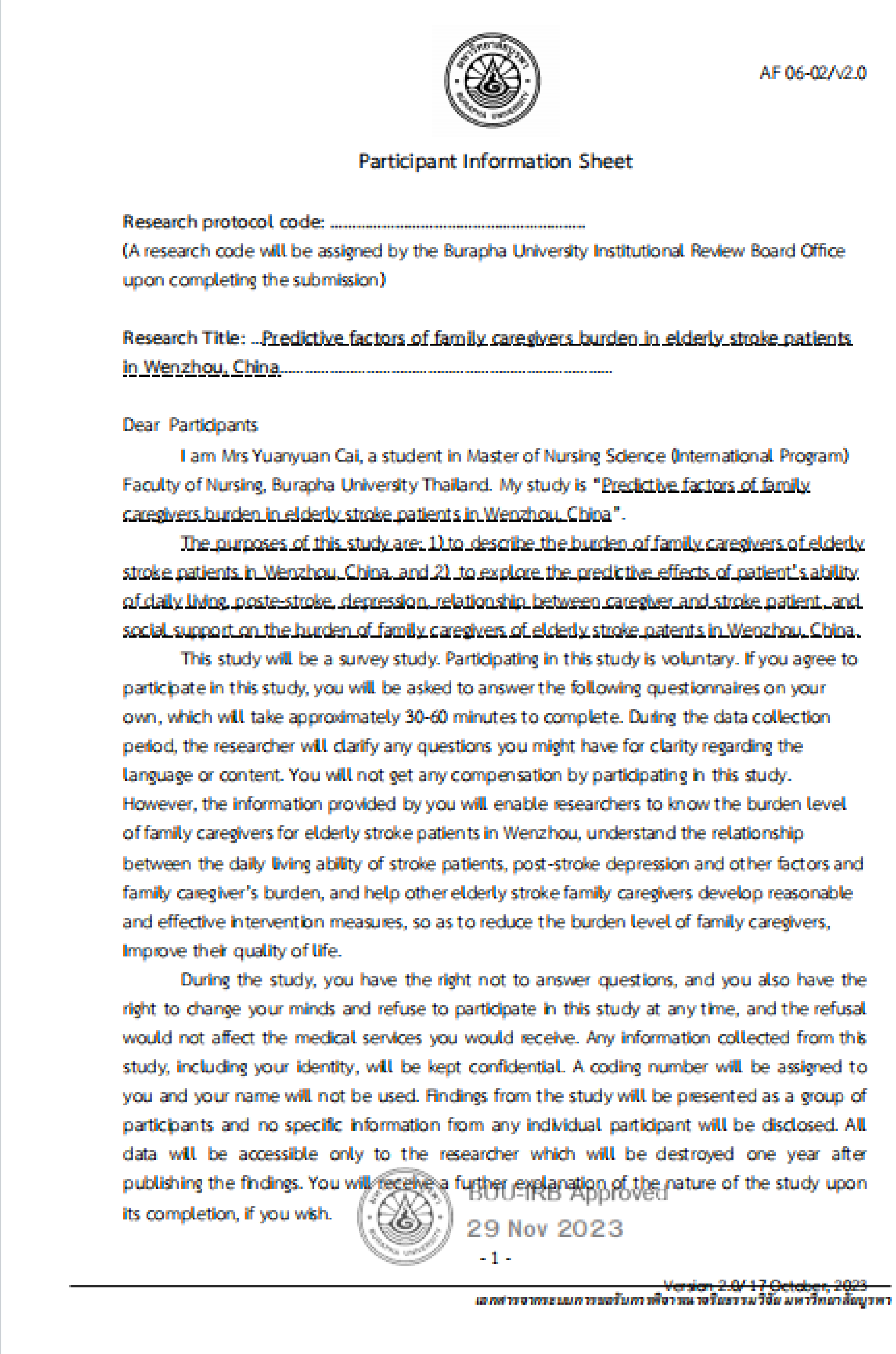
Note: If the participant gave thumbprint as their consent, witness signature will be needed.

BUU-IRB Approved
29 Nov 2023

- 1 -

Version 2.0/ 1 July, 2023

เอกสารจากระบบการขอรับการพิจารณาจริยธรรมวิจัย มหาวิทยาลัยบูรพา



AF 06-02/v2.0

Participant Information Sheet

Research protocol code: ……………………………………………………
(A research code will be assigned by the Burapha University Institutional Review Board Office upon completing the submission)

Research Title: …<u>Predictive factors of family caregivers burden in elderly stroke patients in Wenzhou, China</u>…………………………………………………………

Dear Participants

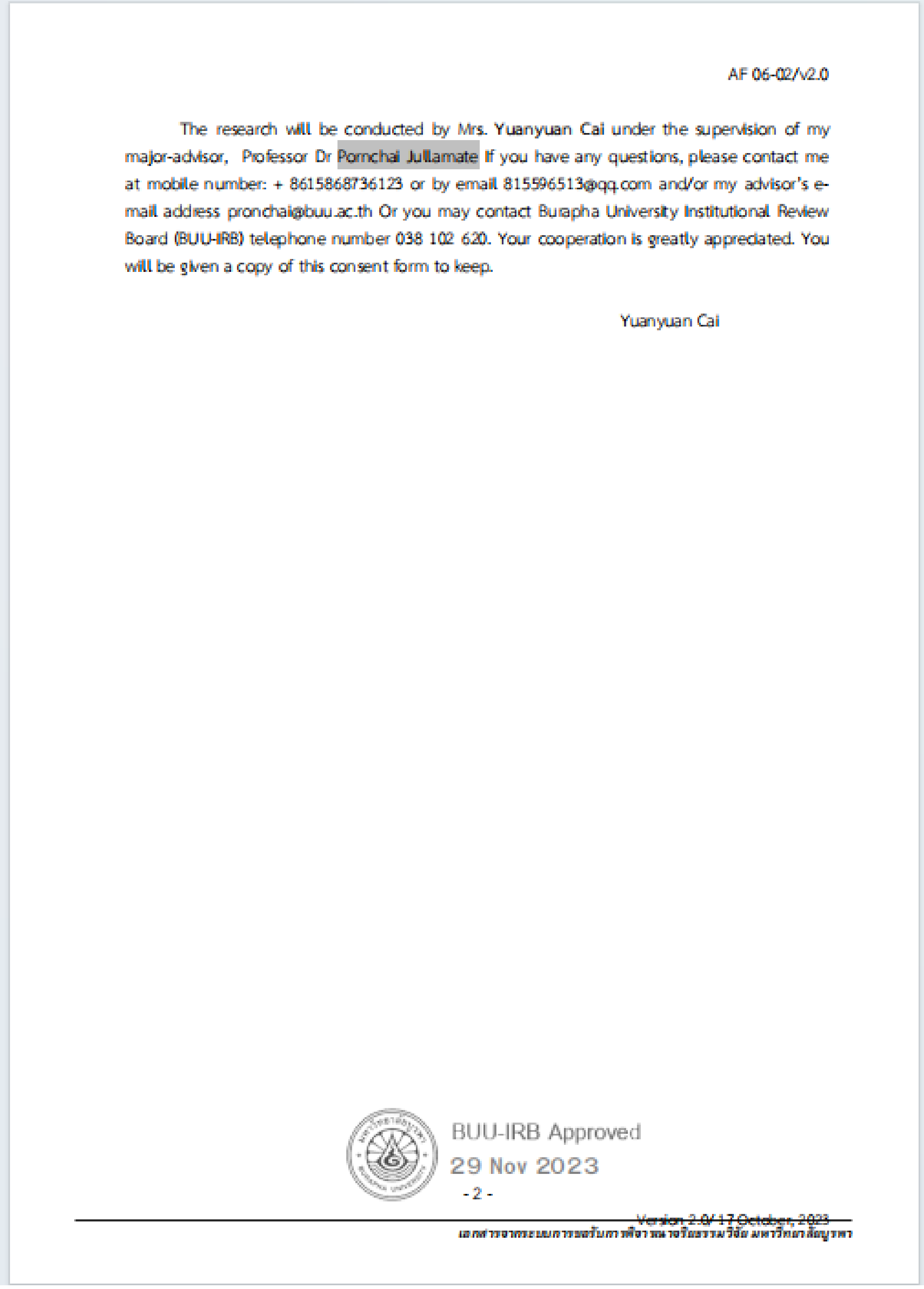
I am Mrs Yuanyuan Cai, a student in Master of Nursing Science (International Program) Faculty of Nursing, Burapha University Thailand. My study is "<u>Predictive factors of family caregivers burden in elderly stroke patients in Wenzhou, China</u>".

<u>The purposes of this study are: 1) to describe the burden of family caregivers of elderly stroke patients in Wenzhou, China, and 2) to explore the predictive effects of patient's ability of daily living, poste-stroke, depression, relationship between caregiver and stroke patient, and social support on the burden of family caregivers of elderly stroke patents in Wenzhou, China.</u>

This study will be a survey study. Participating in this study is voluntary. If you agree to participate in this study, you will be asked to answer the following questionnaires on your own, which will take approximately 30-60 minutes to complete. During the data collection period, the researcher will clarify any questions you might have for clarity regarding the language or content. You will not get any compensation by participating in this study. However, the information provided by you will enable researchers to know the burden level of family caregivers for elderly stroke patients in Wenzhou, understand the relationship between the daily living ability of stroke patients, post-stroke depression and other factors and family caregiver's burden, and help other elderly stroke family caregivers develop reasonable and effective intervention measures, so as to reduce the burden level of family caregivers, Improve their quality of life.

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 this study at any time, and the refusal would not affect the medical services you would receive. 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.

BUU-IRB Approved
29 Nov 2023

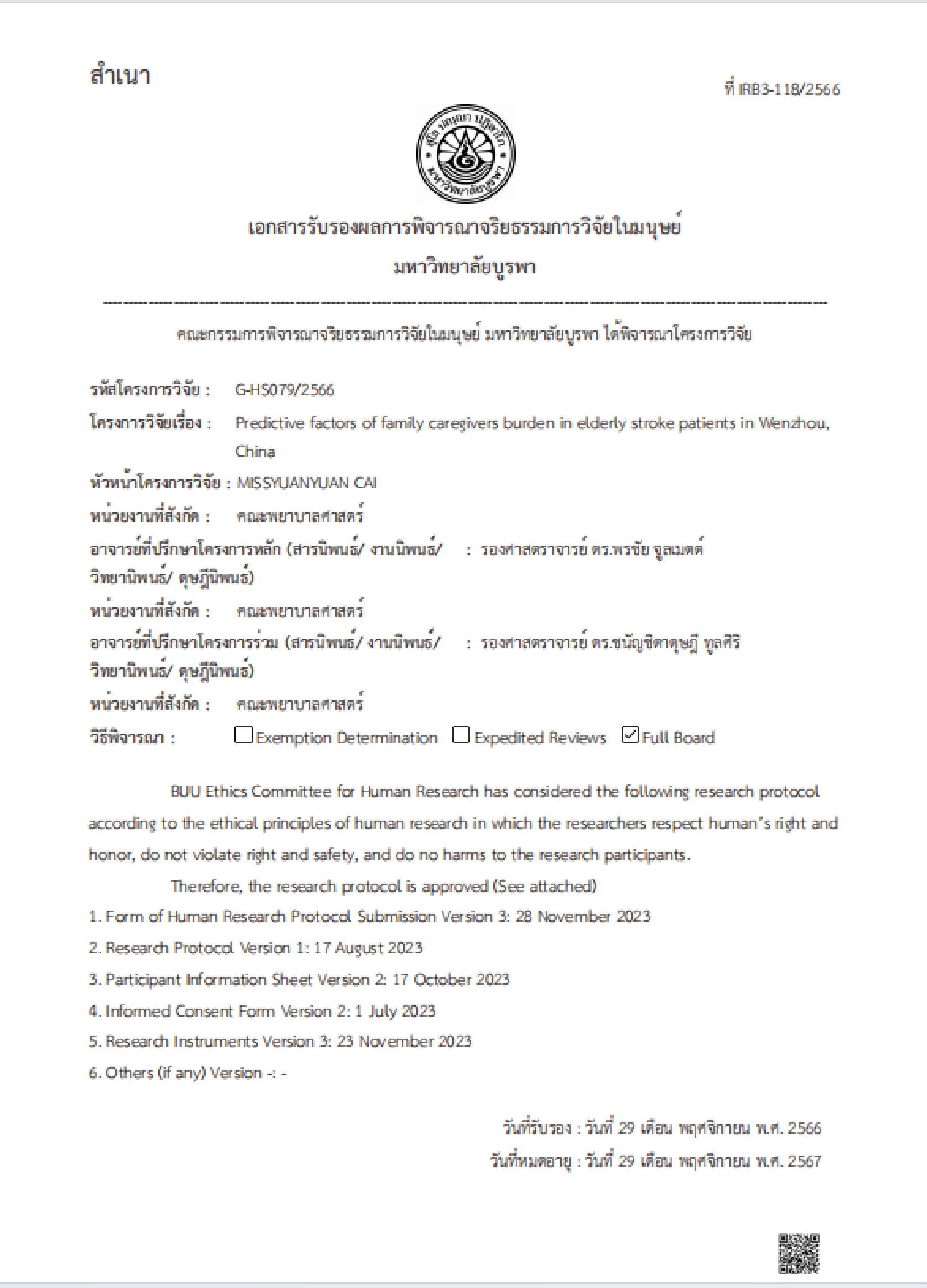


AF 06-02/v2.0

The research will be conducted by Mrs. **Yuanyuan Cai** under the supervision of my major-advisor, Professor Dr Pornchai Jullamate If you have any questions, please contact me at mobile number: + 8615868736123 or by email 815596513@qq.com and/or my advisor's e-mail address pronchai@buu.ac.th 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.

Yuanyuan Cai

BUU-IRB Approved
29 Nov 2023



สำเนา

ที่ IRB3-118/2566

เอกสารรับรองผลการพิจารณาจริยธรรมการวิจัยในมนุษย์
มหาวิทยาลัยบูรพา

คณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์ มหาวิทยาลัยบูรพา ได้พิจารณาโครงการวิจัย

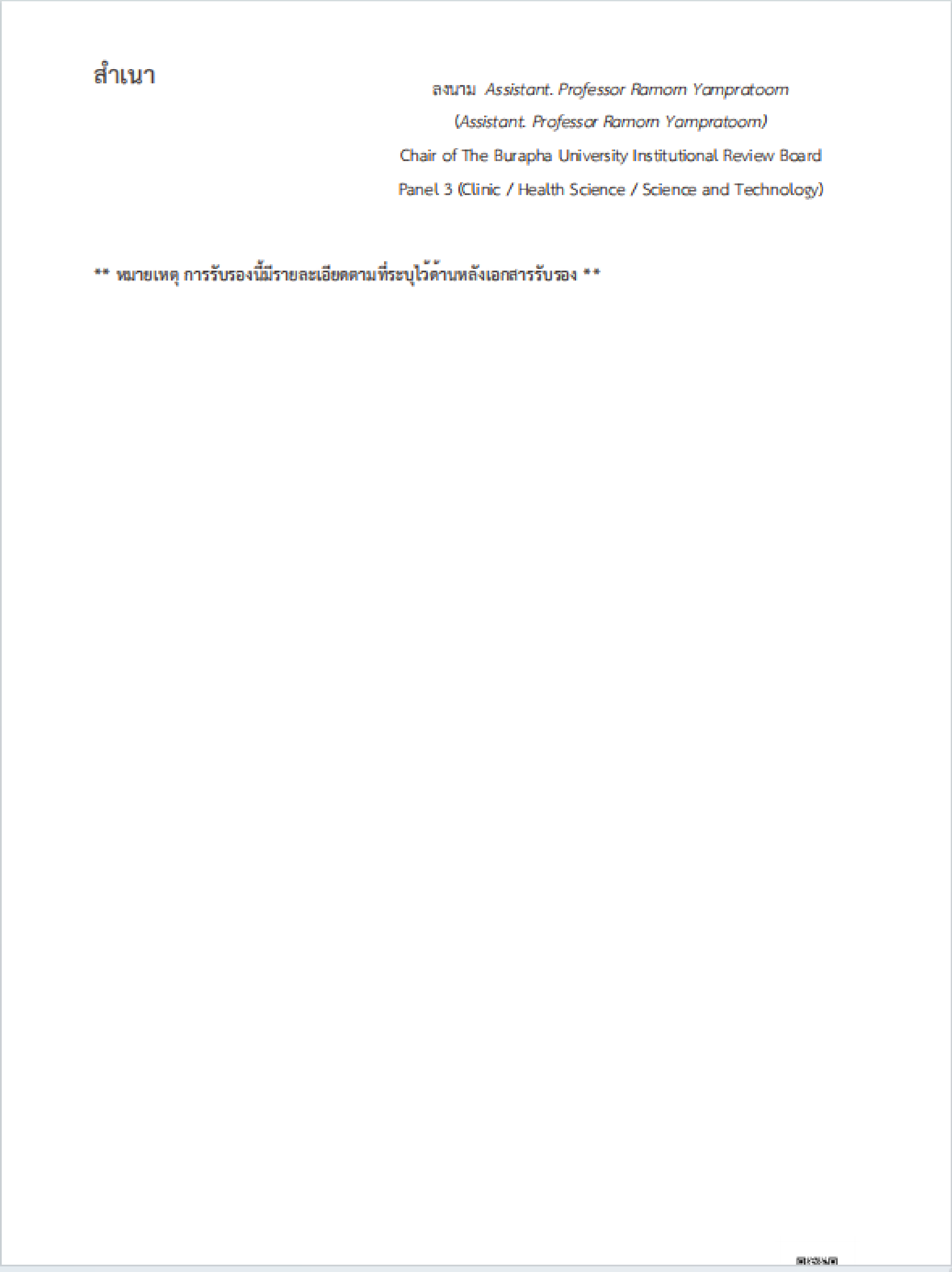
รหัสโครงการวิจัย : G-HS079/2566
โครงการวิจัยเรื่อง : Predictive factors of family caregivers burden in elderly stroke patients in Wenzhou, China
หัวหน้าโครงการวิจัย : MISSYUANYUAN CAI
หน่วยงานที่สังกัด : คณะพยาบาลศาสตร์
อาจารย์ที่ปรึกษาโครงการหลัก (สารนิพนธ์/ งานนิพนธ์/ วิทยานิพนธ์/ ดุษฎีนิพนธ์) : รองศาสตราจารย์ ดร.พรชัย จูลเมตต์
หน่วยงานที่สังกัด : คณะพยาบาลศาสตร์
อาจารย์ที่ปรึกษาโครงการร่วม (สารนิพนธ์/ งานนิพนธ์/ วิทยานิพนธ์/ ดุษฎีนิพนธ์) : รองศาสตราจารย์ ดร.ชนัญชิดาดุษฎี ทูลศิริ
หน่วยงานที่สังกัด : คณะพยาบาลศาสตร์
วิธีพิจารณา : ☐ Exemption Determination ☐ Expedited Reviews ☑ Full Board

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

Therefore, the research protocol is approved (See attached)

1. Form of Human Research Protocol Submission Version 3: 28 November 2023
2. Research Protocol Version 1: 17 August 2023
3. Participant Information Sheet Version 2: 17 October 2023
4. Informed Consent Form Version 2: 1 July 2023
5. Research Instruments Version 3: 23 November 2023
6. Others (if any) Version -: -

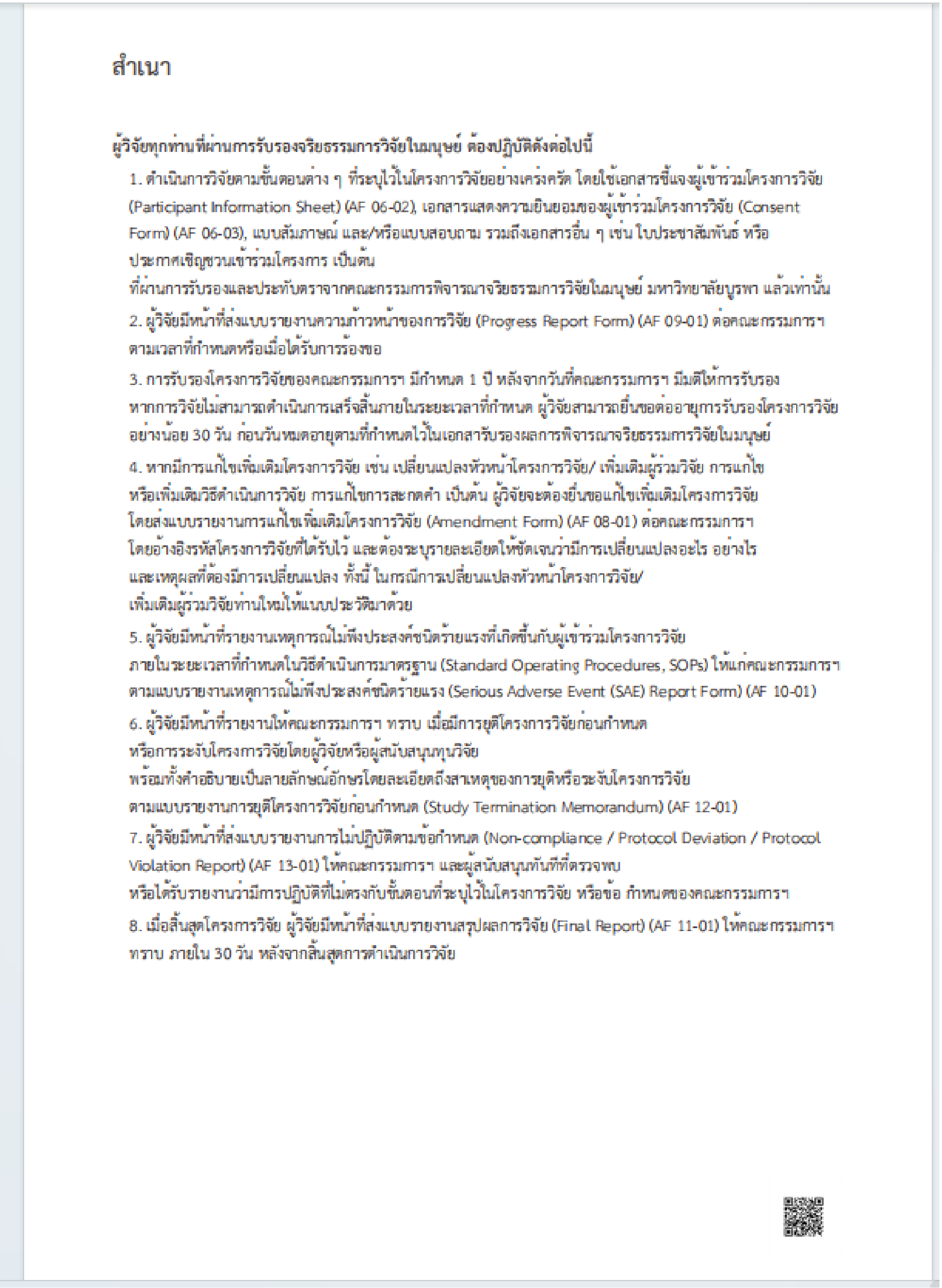
วันที่รับรอง : วันที่ 29 เดือน พฤศจิกายน พ.ศ. 2566
วันที่หมดอายุ : วันที่ 29 เดือน พฤศจิกายน พ.ศ. 2567



สำเนา

ลงนาม *Assistant. Professor Ramorn Yampratoom*
(Assistant. Professor Ramorn Yampratoom)
Chair of The Burapha University Institutional Review Board
Panel 3 (Clinic / Health Science / Science and Technology)

** หมายเหตุ การรับรองนี้มีรายละเอียดตามที่ระบุไว้ด้านหลังเอกสารรับรอง **



สำเนา

ผู้วิจัยทุกท่านที่ผ่านการรับรองจริยธรรมการวิจัยในมนุษย์ ต้องปฏิบัติดังต่อไปนี้

1. ดำเนินการวิจัยตามขั้นตอนต่าง ๆ ที่ระบุไว้ในโครงการวิจัยอย่างเคร่งครัด โดยใช้เอกสารชี้แจงผู้เข้าร่วมโครงการวิจัย (Participant Information Sheet) (AF 06-02), เอกสารแสดงความยินยอมของผู้เข้าร่วมโครงการวิจัย (Consent Form) (AF 06-03), แบบสัมภาษณ์ และ/หรือแบบสอบถาม รวมถึงเอกสารอื่น ๆ เช่น ใบประชาสัมพันธ์ หรือประกาศเชิญชวนเข้าร่วมโครงการ เป็นต้น
ที่ผ่านการรับรองและประทับตราจากคณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์ มหาวิทยาลัยบูรพา แล้วเท่านั้น

2. ผู้วิจัยมีหน้าที่ส่งแบบรายงานความก้าวหน้าของการวิจัย (Progress Report Form) (AF 09-01) ต่อคณะกรรมการฯ ตามเวลาที่กำหนดหรือเมื่อได้รับการร้องขอ

3. การรับรองโครงการวิจัยของคณะกรรมการฯ มีกำหนด 1 ปี หลังจากวันที่คณะกรรมการฯ มีมติให้การรับรอง
หากการวิจัยไม่สามารถดำเนินการเสร็จสิ้นภายในระยะเวลาที่กำหนด ผู้วิจัยสามารถยื่นขอต่ออายุการรับรองโครงการวิจัย
อย่างน้อย 30 วัน ก่อนวันหมดอายุตามที่กำหนดไว้ในเอกสารับรองผลการพิจารณาจริยธรรมการวิจัยในมนุษย์

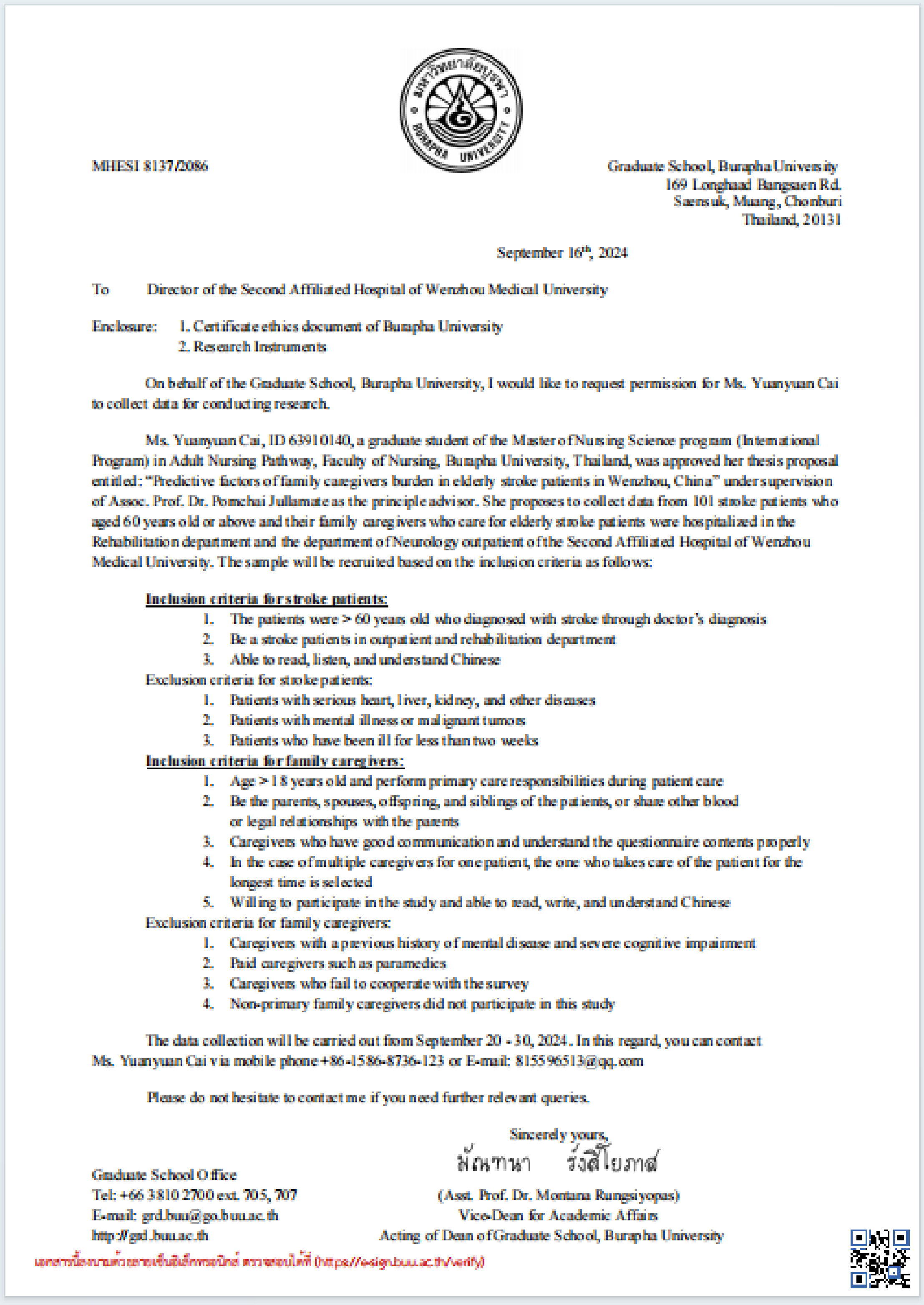
4. หากมีการแก้ไขเพิ่มเติมโครงการวิจัย เช่น เปลี่ยนแปลงหัวหน้าโครงการวิจัย/ เพิ่มเติมผู้ร่วมวิจัย การแก้ไข
หรือเพิ่มเติมวิธีดำเนินการวิจัย การแก้ไขการสะกดคำ เป็นต้น ผู้วิจัยจะต้องยื่นขอแก้ไขเพิ่มเติมโครงการวิจัย
โดยส่งแบบรายงานการแก้ไขเพิ่มเติมโครงการวิจัย (Amendment Form) (AF 08-01) ต่อคณะกรรมการฯ
โดยอ้างอิงรหัสโครงการวิจัยที่ได้รับไว้ และต้องระบุรายละเอียดให้ชัดเจนว่ามีการเปลี่ยนแปลงอะไร อย่างไร
และเหตุผลที่ต้องมีการเปลี่ยนแปลง ทั้งนี้ ในกรณีการเปลี่ยนแปลงหัวหน้าโครงการวิจัย/
เพิ่มเติมผู้ร่วมวิจัยท่านใหม่ให้แนบประวัติมาด้วย

5. ผู้วิจัยมีหน้าที่รายงานเหตุการณ์ไม่พึงประสงค์ชนิดร้ายแรงที่เกิดขึ้นกับผู้เข้าร่วมโครงการวิจัย
ภายในระยะเวลาที่กำหนดในวิธีดำเนินการมาตรฐาน (Standard Operating Procedures, SOPs) ให้แก่คณะกรรมการฯ
ตามแบบรายงานเหตุการณ์ไม่พึงประสงค์ชนิดร้ายแรง (Serious Adverse Event (SAE) Report Form) (AF 10-01)

6. ผู้วิจัยมีหน้าที่รายงานให้คณะกรรมการฯ ทราบ เมื่อมีการยุติโครงการวิจัยก่อนกำหนด
หรือการระงับโครงการวิจัยโดยผู้วิจัยหรือผู้สนับสนุนทุนวิจัย
พร้อมทั้งคำอธิบายเป็นลายลักษณ์อักษรโดยละเอียดถึงสาเหตุของการยุติหรือระงับโครงการวิจัย
ตามแบบรายงานการยุติโครงการวิจัยก่อนกำหนด (Study Termination Memorandum) (AF 12-01)

7. ผู้วิจัยมีหน้าที่ส่งแบบรายงานการไม่ปฏิบัติตามข้อกำหนด (Non-compliance / Protocol Deviation / Protocol Violation Report) (AF 13-01) ให้คณะกรรมการฯ และผู้สนับสนุนทันทีที่ตรวจพบ
หรือได้รับรายงานว่ามีการปฏิบัติที่ไม่ตรงกับขั้นตอนที่ระบุไว้ในโครงการวิจัย หรือข้อ กำหนดของคณะกรรมการฯ

8. เมื่อสิ้นสุดโครงการวิจัย ผู้วิจัยมีหน้าที่ส่งแบบรายงานสรุปผลการวิจัย (Final Report) (AF 11-01) ให้คณะกรรมการฯ ทราบ ภายใน 30 วัน หลังจากสิ้นสุดการดำเนินการวิจัย



MHESI 8137/2086

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

September 16th, 2024

To Director 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. Yuanyuan Cai to collect data for conducting research.

Ms. Yuanyuan Cai, ID 63910140, a graduate student of the Master of Nursing Science program (International Program) in Adult Nursing Pathway, Faculty of Nursing, Burapha University, Thailand, was approved her thesis proposal entitled: "Predictive factors of family caregivers burden in elderly stroke patients in Wenzhou, China" under supervision of Assoc. Prof. Dr. Pornchai Jullamate as the principle advisor. She proposes to collect data from 101 stroke patients who aged 60 years old or above and their family caregivers who care for elderly stroke patients were hospitalized in the Rehabilitation department and the department of Neurology outpatient of the Second Affiliated Hospital of Wenzhou Medical University. The sample will be recruited based on the inclusion criteria as follows:

Inclusion criteria for stroke patients:

1. The patients were > 60 years old who diagnosed with stroke through doctor's diagnosis
2. Be a stroke patients in outpatient and rehabilitation department
3. Able to read, listen, and understand Chinese

Exclusion criteria for stroke patients:

1. Patients with serious heart, liver, kidney, and other diseases
2. Patients with mental illness or malignant tumors
3. Patients who have been ill for less than two weeks

Inclusion criteria for family caregivers:

1. Age > 18 years old and perform primary care responsibilities during patient care
2. Be the parents, spouses, offspring, and siblings of the patients, or share other blood or legal relationships with the parents
3. Caregivers who have good communication and understand the questionnaire contents properly
4. In the case of multiple caregivers for one patient, the one who takes care of the patient for the longest time is selected
5. Willing to participate in the study and able to read, write, and understand Chinese

Exclusion criteria for family caregivers:

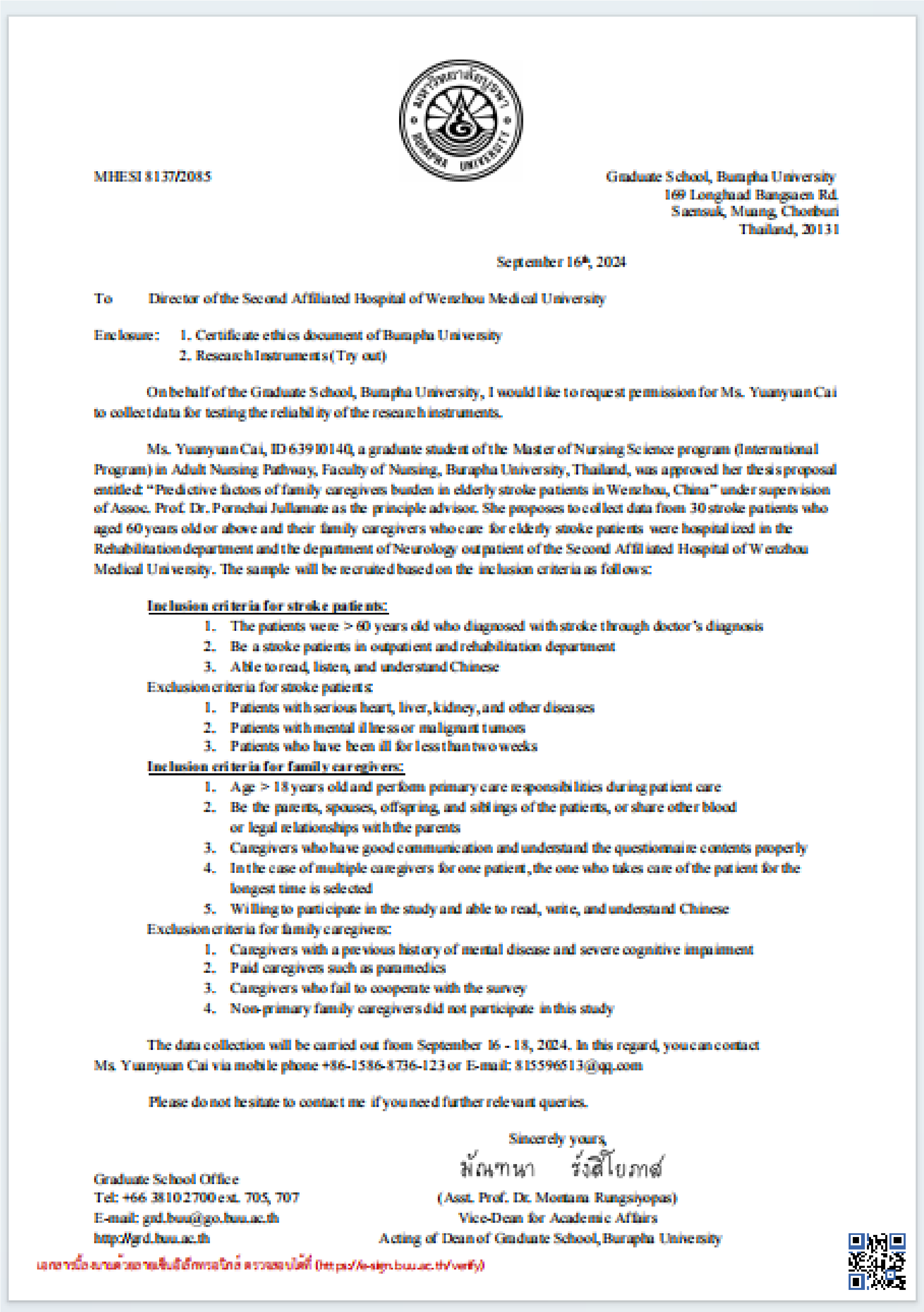
1. Caregivers with a previous history of mental disease and severe cognitive impairment
2. Paid caregivers such as paramedics
3. Caregivers who fail to cooperate with the survey
4. Non-primary family caregivers did not participate in this study

The data collection will be carried out from September 20 - 30, 2024. In this regard, you can contact Ms. Yuanyuan Cai via mobile phone +86-1586-8736-123 or E-mail: 815596513@qq.com

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

Sincerely yours,
มัณฑนา รังสิโยภาส
(Asst. Prof. Dr. Montana Rungsiyopas)
Vice-Dean for Academic Affairs
Acting of Dean of Graduate School, Burapha University

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



MHESI 8137/2085

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

September 16th, 2024

To Director 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. Yuanyuan Cai to collect data for testing the reliability of the research instruments.

Ms. Yuanyuan Cai, ID 63910140, a graduate student of the Master of Nursing Science program (International Program) in Adult Nursing Pathway, Faculty of Nursing, Burapha University, Thailand, was approved her thesis proposal entitled: "Predictive factors of family caregivers burden in elderly stroke patients in Wenzhou, China" under supervision of Assoc. Prof. Dr. Pornchai Jullamate as the principle advisor. She proposes to collect data from 30 stroke patients who aged 60 years old or above and their family caregivers who care for elderly stroke patients were hospitalized in the Rehabilitation department and the department of Neurology outpatient of the Second Affiliated Hospital of Wenzhou Medical University. The sample will be recruited based on the inclusion criteria as follows:

Inclusion criteria for stroke patients:

1. The patients were > 60 years old who diagnosed with stroke through doctor's diagnosis
2. Be a stroke patients in outpatient and rehabilitation department
3. Able to read, listen, and understand Chinese

Exclusion criteria for stroke patients:

1. Patients with serious heart, liver, kidney, and other diseases
2. Patients with mental illness or malignant tumors
3. Patients who have been ill for less than two weeks

Inclusion criteria for family caregivers:

1. Age > 18 years old and perform primary care responsibilities during patient care
2. Be the parents, spouses, offspring, and siblings of the patients, or share other blood or legal relationships with the parents
3. Caregivers who have good communication and understand the questionnaire contents properly
4. In the case of multiple caregivers for one patient, the one who takes care of the patient for the longest time is selected
5. Willing to participate in the study and able to read, write, and understand Chinese

Exclusion criteria for family caregivers:

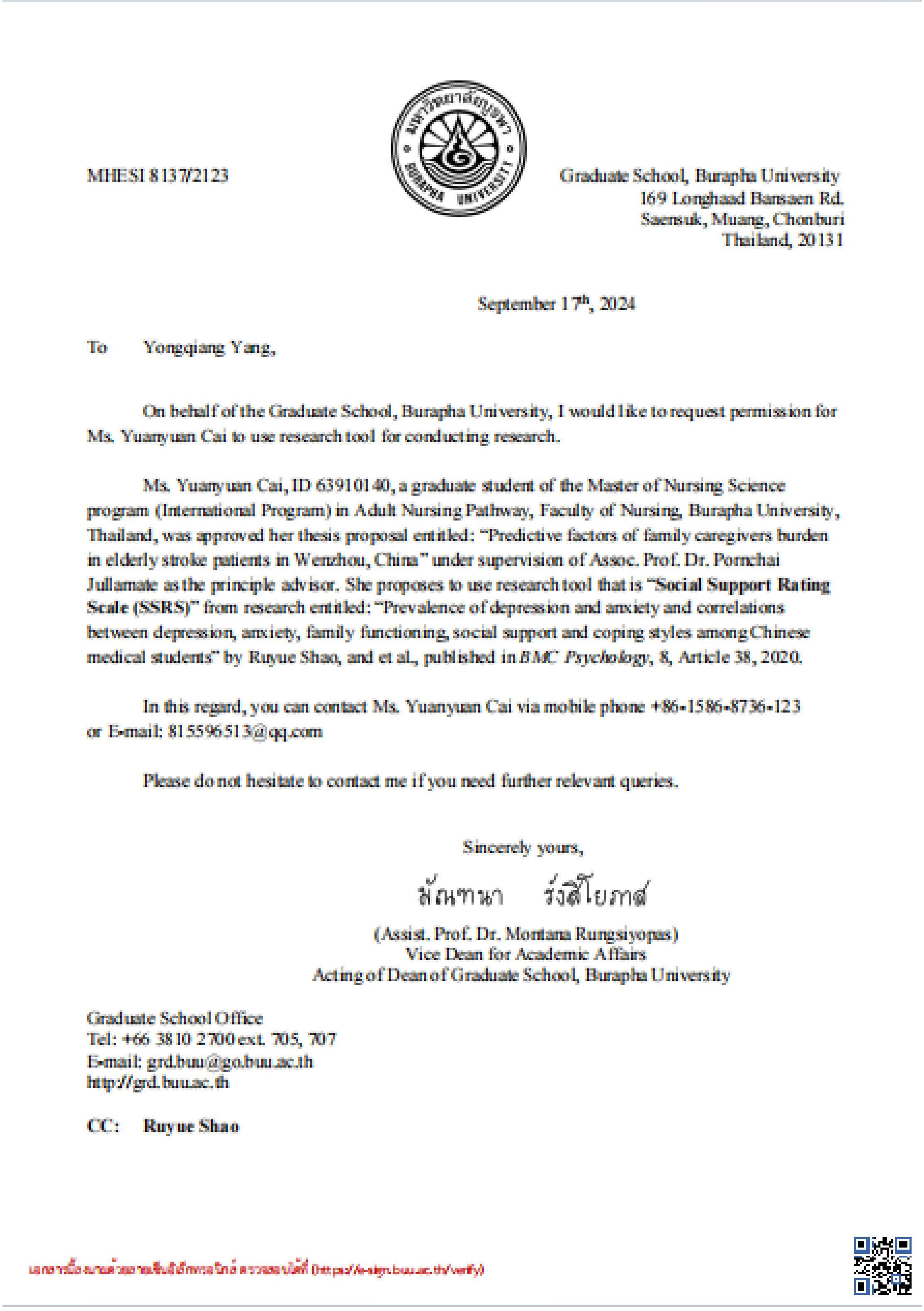
1. Caregivers with a previous history of mental disease and severe cognitive impairment
2. Paid caregivers such as paramedics
3. Caregivers who fail to cooperate with the survey
4. Non-primary family caregivers did not participate in this study

The data collection will be carried out from September 16 - 18, 2024. In this regard, you can contact Ms. Yuanyuan Cai via mobile phone +86-1586-8736-123 or E-mail: 815596513@qq.com

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

Sincerely yours,
มัณฑนา รังสิโยภาส
(Asst. Prof. Dr. Montana Rungsiyopas)
Vice-Dean for Academic Affairs
Acting of Dean of Graduate School, Burapha University

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



MHESI 8137/2123

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

September 17th, 2024

To Yongqiang Yang,

On behalf of the Graduate School, Burapha University, I would like to request permission for Ms. Yuanyuan Cai to use research tool for conducting research.

Ms. Yuanyuan Cai, ID 63910140, a graduate student of the Master of Nursing Science program (International Program) in Adult Nursing Pathway, Faculty of Nursing, Burapha University, Thailand, was approved her thesis proposal entitled: "Predictive factors of family caregivers burden in elderly stroke patients in Wenzhou, China" under supervision of Assoc. Prof. Dr. Pornchai Jullamate as the principle advisor. She proposes to use research tool that is **"Social Support Rating Scale (SSRS)"** from research entitled: "Prevalence of depression and anxiety and correlations between depression, anxiety, family functioning, social support and coping styles among Chinese medical students" by Ruyue Shao, and et al., published in *BMC Psychology*, 8, Article 38, 2020.

In this regard, you can contact Ms. Yuanyuan Cai via mobile phone +86-1586-8736-123 or E-mail: 815596513@qq.com

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

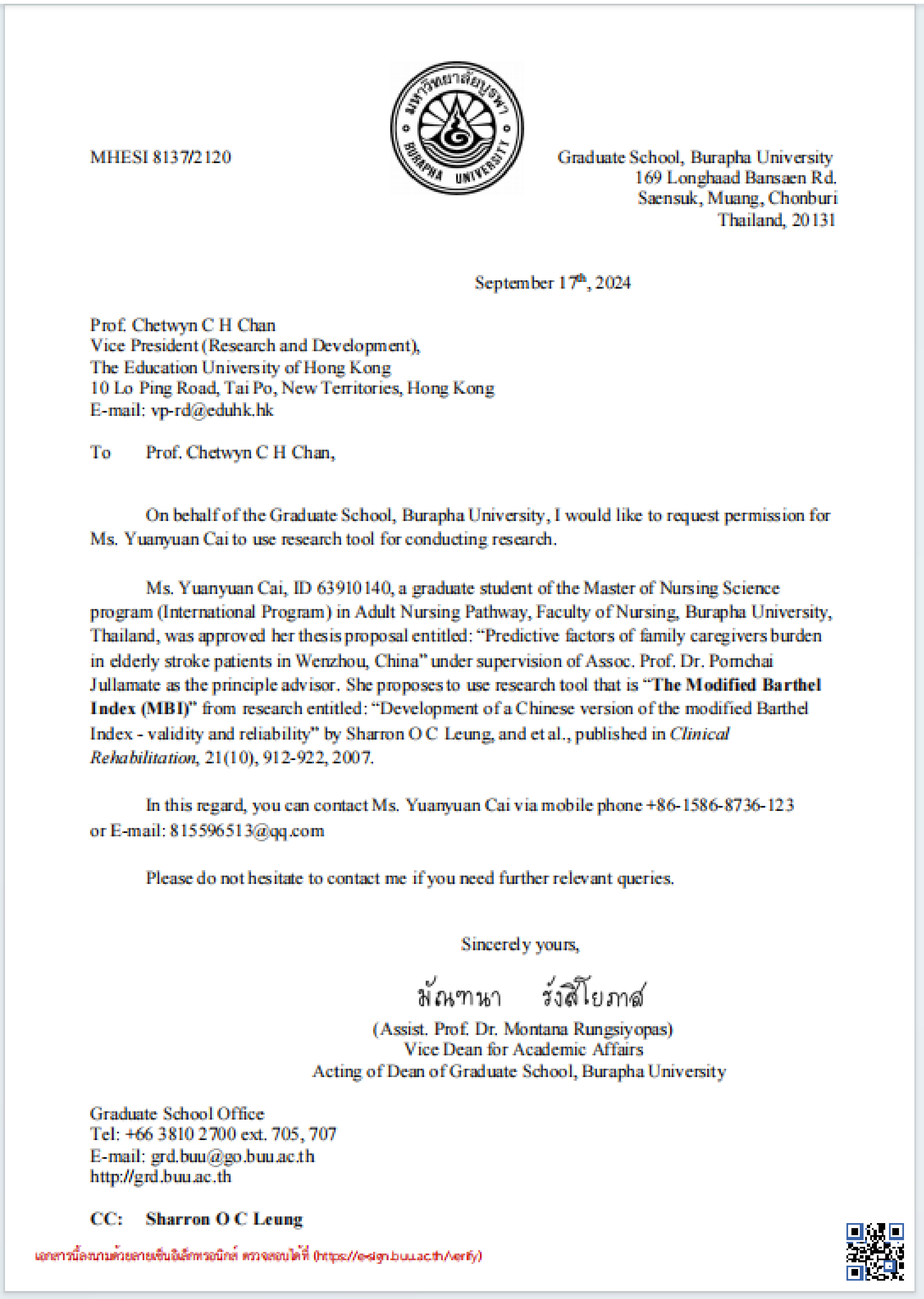
Sincerely yours,

มัณฑนา รุ่งสิโยภาส

(Assist. Prof. Dr. Montana Rungsiyopas)
Vice Dean for Academic Affairs
Acting of Dean of Graduate School, Burapha University

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

CC: Ruyue Shao



MHESI 8137/2120

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

September 17th, 2024

Prof. Chetwyn C H Chan
Vice President (Research and Development),
The Education University of Hong Kong
10 Lo Ping Road, Tai Po, New Territories, Hong Kong
E-mail: vp-rd@eduhk.hk

To Prof. Chetwyn C H Chan,

On behalf of the Graduate School, Burapha University, I would like to request permission for Ms. Yuanyuan Cai to use research tool for conducting research.

Ms. Yuanyuan Cai, ID 63910140, a graduate student of the Master of Nursing Science program (International Program) in Adult Nursing Pathway, Faculty of Nursing, Burapha University, Thailand, was approved her thesis proposal entitled: "Predictive factors of family caregivers burden in elderly stroke patients in Wenzhou, China" under supervision of Assoc. Prof. Dr. Pornchai Jullamate as the principle advisor. She proposes to use research tool that is **"The Modified Barthel Index (MBI)"** from research entitled: "Development of a Chinese version of the modified Barthel Index - validity and reliability" by Sharron O C Leung, and et al., published in *Clinical Rehabilitation*, 21(10), 912-922, 2007.

In this regard, you can contact Ms. Yuanyuan Cai via mobile phone +86-1586-8736-123 or E-mail: 815596513@qq.com

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

Sincerely yours,

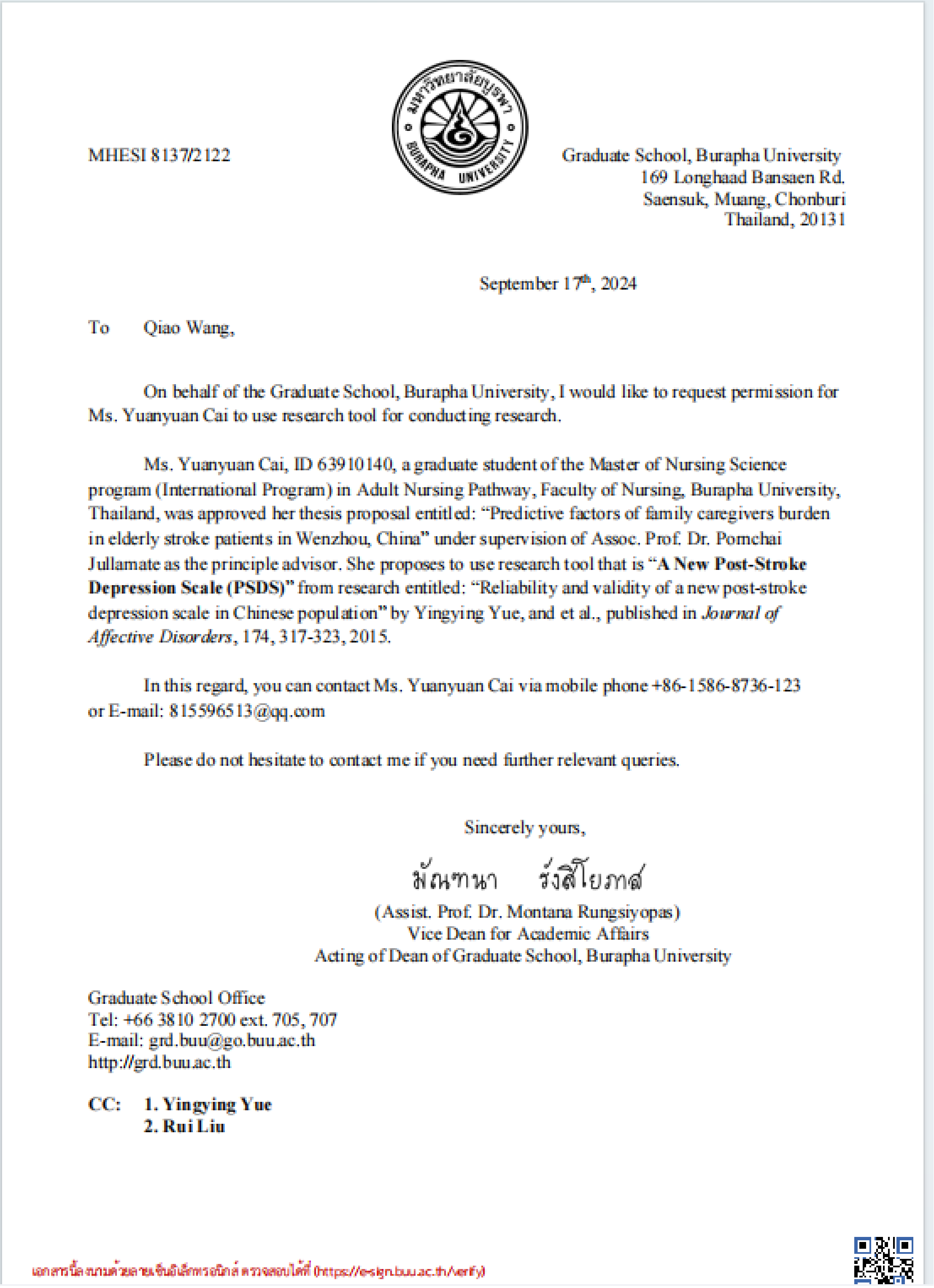
มัณฑนา รังสิโยภาส

(Assist. Prof. Dr. Montana Rungsiyopas)
Vice Dean for Academic Affairs
Acting of Dean of Graduate School, Burapha University

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

CC: Sharron O C Leung

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



MHESI 8137/2122

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

September 17th, 2024

To Qiao Wang,

On behalf of the Graduate School, Burapha University, I would like to request permission for Ms. Yuanyuan Cai to use research tool for conducting research.

Ms. Yuanyuan Cai, ID 63910140, a graduate student of the Master of Nursing Science program (International Program) in Adult Nursing Pathway, Faculty of Nursing, Burapha University, Thailand, was approved her thesis proposal entitled: "Predictive factors of family caregivers burden in elderly stroke patients in Wenzhou, China" under supervision of Assoc. Prof. Dr. Pornchai Jullamate as the principle advisor. She proposes to use research tool that is **"A New Post-Stroke Depression Scale (PSDS)"** from research entitled: "Reliability and validity of a new post-stroke depression scale in Chinese population" by Yingying Yue, and et al., published in *Journal of Affective Disorders*, 174, 317-323, 2015.

In this regard, you can contact Ms. Yuanyuan Cai via mobile phone +86-1586-8736-123 or E-mail: 815596513@qq.com

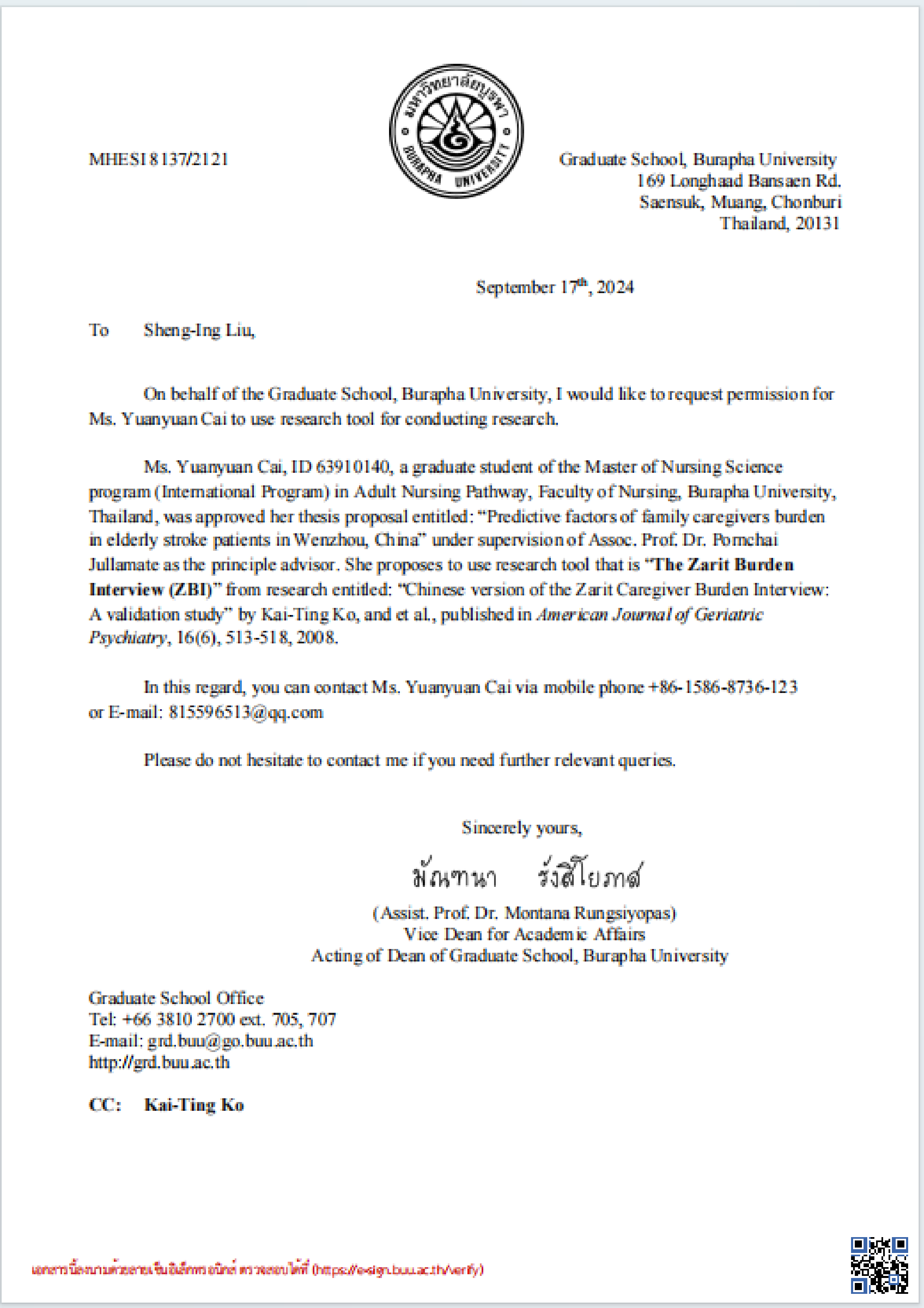
Please do not hesitate to contact me if you need further relevant queries.

Sincerely yours,

มัณฑนา รุ่งสิโยภาส
(Assist. Prof. Dr. Montana Rungsiyopas)
Vice Dean for Academic Affairs
Acting of Dean of Graduate School, Burapha University

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

CC: 1. Yingying Yue
2. Rui Liu



MHESI 8137/2121

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

September 17th, 2024

To Sheng-Ing Liu,

On behalf of the Graduate School, Burapha University, I would like to request permission for Ms. Yuanyuan Cai to use research tool for conducting research.

Ms. Yuanyuan Cai, ID 63910140, a graduate student of the Master of Nursing Science program (International Program) in Adult Nursing Pathway, Faculty of Nursing, Burapha University, Thailand, was approved her thesis proposal entitled: "Predictive factors of family caregivers burden in elderly stroke patients in Wenzhou, China" under supervision of Assoc. Prof. Dr. Pornchai Jullamate as the principle advisor. She proposes to use research tool that is **"The Zarit Burden Interview (ZBI)"** from research entitled: "Chinese version of the Zarit Caregiver Burden Interview: A validation study" by Kai-Ting Ko, and et al., published in *American Journal of Geriatric Psychiatry*, 16(6), 513-518, 2008.

In this regard, you can contact Ms. Yuanyuan Cai via mobile phone +86-1586-8736-123 or E-mail: 815596513@qq.com

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

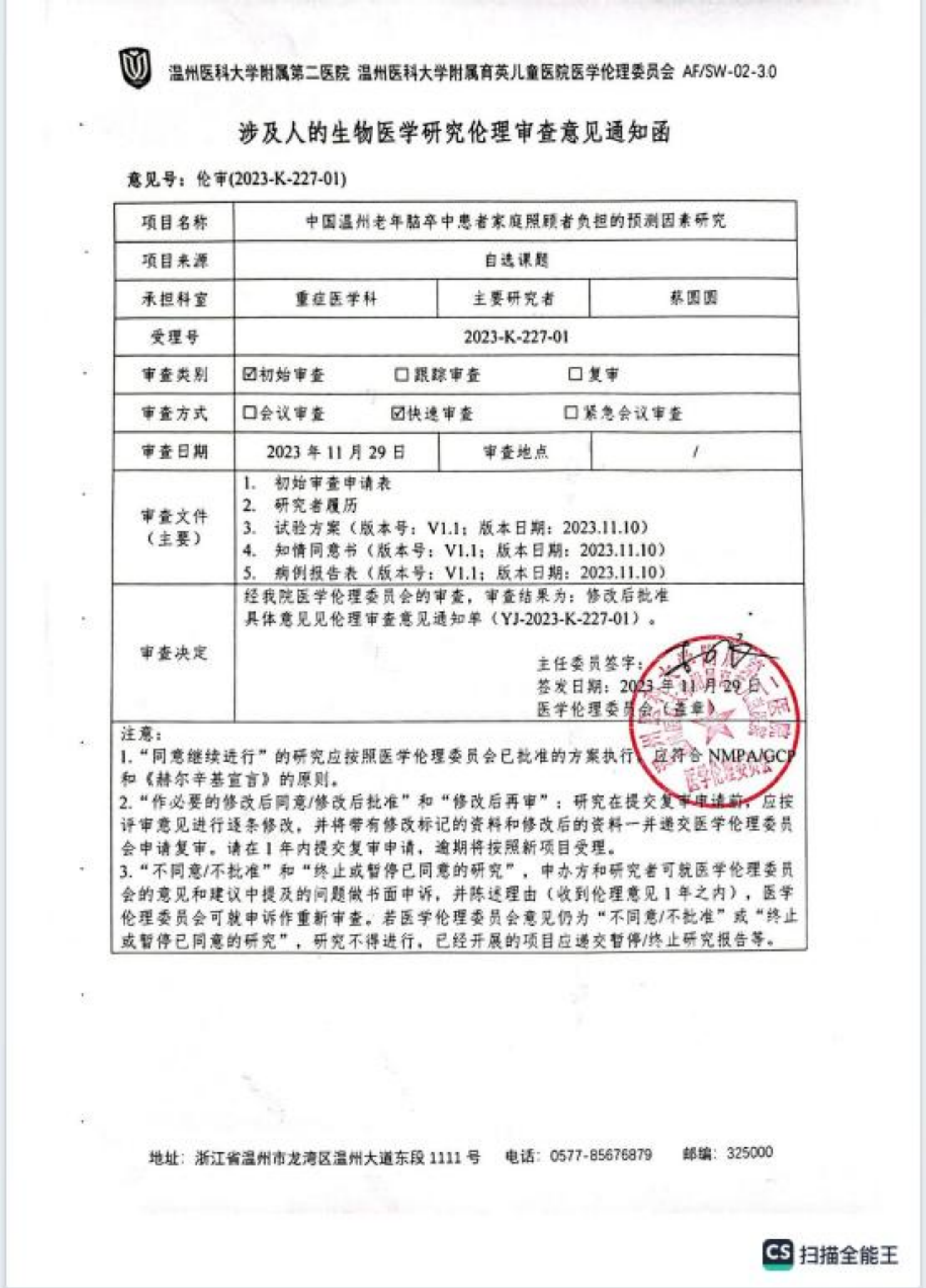
Sincerely yours,

มัณฑนา รังสิโยภาส

(Assist. Prof. Dr. Montana Rungsiyopas)
Vice Dean for Academic Affairs
Acting of Dean of Graduate School, Burapha University

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

CC: Kai-Ting Ko



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 AF/SW-02-3.0

涉及人的生物医学研究伦理审查意见通知函

意见号：伦审(2023-K-227-01)

项目名称	中国温州老年脑卒中患者家庭照顾者负担的预测因素研究		
项目来源	自选课题		
承担科室	重症医学科	主要研究者	蔡圆圆
受理号	2023-K-227-01		
审查类别	☑初始审查　□跟踪审查　□复审		
审查方式	□会议审查　☑快速审查　□紧急会议审查		
审查日期	2023 年 11 月 29 日	审查地点	/
审查文件（主要）	1. 初始审查申请表 2. 研究者履历 3. 试验方案（版本号：V1.1；版本日期：2023.11.10） 4. 知情同意书（版本号：V1.1；版本日期：2023.11.10） 5. 病例报告表（版本号：V1.1；版本日期：2023.11.10）		
审查决定	经我院医学伦理委员会的审查，审查结果为：修改后批准 具体意见见伦理审查意见通知单（YJ-2023-K-227-01）。 主任委员签字： 签发日期：2023 年 11 月 29 日 医学伦理委员会（盖章）		

注意：

1.“同意继续进行”的研究应按照医学伦理委员会已批准的方案执行，应符合 NMPA/GCP 和《赫尔辛基宣言》的原则。

2.“作必要的修改后同意/修改后批准”和“修改后再审”：研究在提交复审申请前，应按评审意见进行逐条修改，并将带有修改标记的资料和修改后的资料一并递交医学伦理委员会申请复审。请在 1 年内提交复审申请，逾期将按照新项目受理。

3.“不同意/不批准”和“终止或暂停已同意的研究”，申办方和研究者可就医学伦理委员会的意见和建议中提及的问题做书面申诉，并陈述理由（收到伦理意见 1 年之内），医学伦理委员会可就申诉作重新审查。若医学伦理委员会意见仍为“不同意/不批准”或“终止或暂停已同意的研究”，研究不得进行，已经开展的项目应递交暂停/终止研究报告等。

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

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 AF/SW-01-3.0

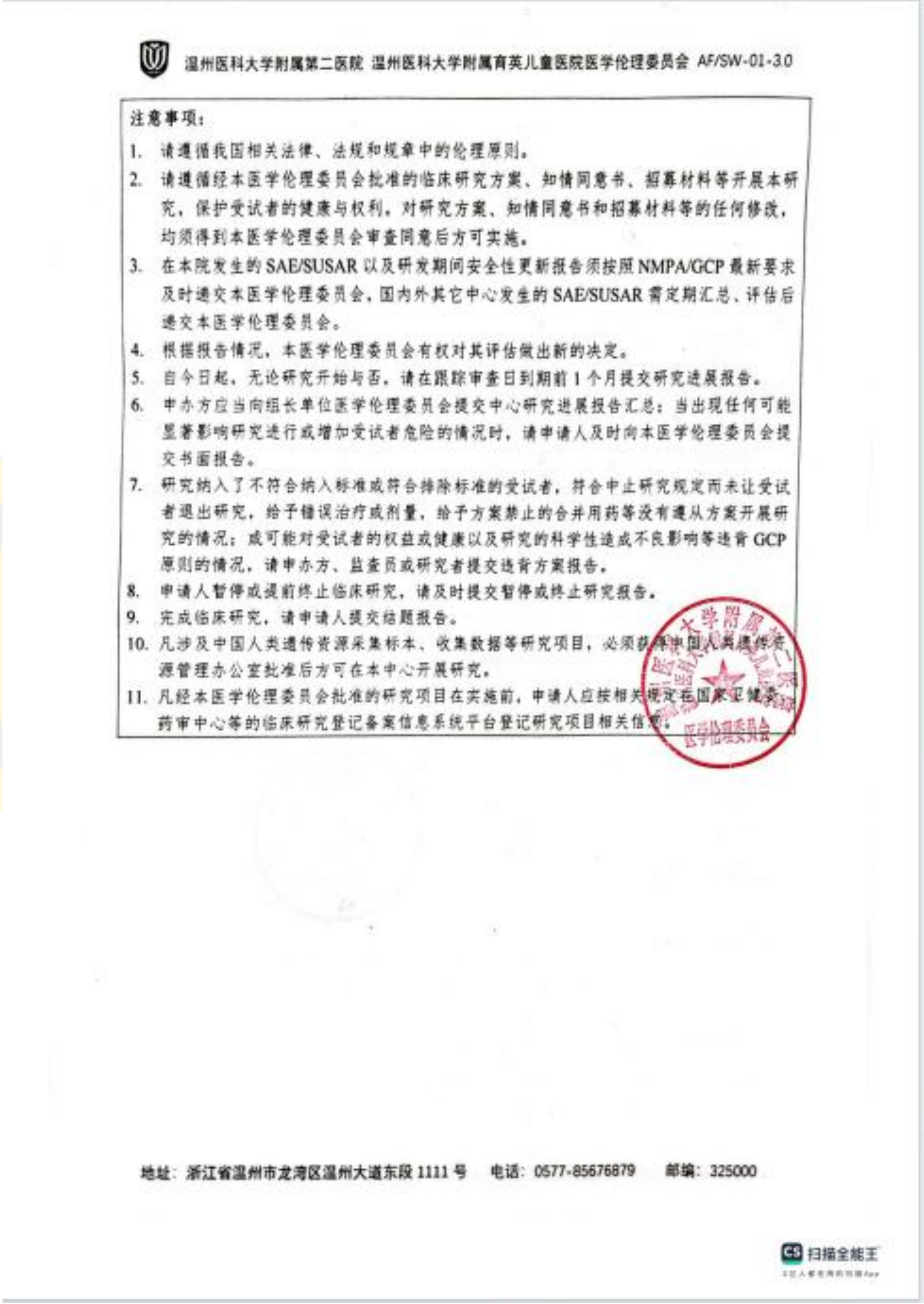
涉及人的生物医学研究伦理审查批件

Ethics Committee Approval Letter of Biomedical Research Involving Humans

批件号 Approval NO.：伦审（2023-K-227-02）

项目名称 Study Title	中国温州老年脑卒中患者家庭照顾者负担的预测因素研究		
项目来源 Source	自选课题		
受理号 Acceptance Number	2023-K-227-02		
主要研究者 Principal Investigator	蔡圆圆	承担科室 Responsible Department	重症医学科
审查类别 Category of Review	复审	审查方式 Type of Review	快速审查
审查日期 Date of Review	2023 年 12 月 20 日	审查地点 Location of Review	/
审查文件清单 Items Reviewed	1. 复审申请表 2. 知情同意书（版本号：V1.2；版本日期：2023.12.01） 3. 试验方案（版本号：V1.2；版本日期：2023.12.01）		
审评意见 Evaluation	批准		
审查决定 Decision	委员会对该项目的审查决定为：☑批准 (Approval)		
主任委员签字 Chair Signature			
签发日期 Date of issue	2023 年 12 月 20 日		
医学伦理委员会 Stamp of EC	医学伦理委员会盖章		
批件有效期 Period of Validity	自本医学伦理委员会初始审查批准之日起一年内，本临床研究应在本院启动。逾期未启动的，本批件自行废止。		
年度/定期跟踪审查 Continue Review	审查频率为该研究批准之日起每 12 月一次，首次请于 2024 年 12 月 19 日前 1 个月递交研究进展报告。 医学伦理委员会有根据实际进展情况改变跟踪审查频率的权利。		
声明 Statement	本医学伦理委员会的职责、人员组成、操作程序及记录遵循《涉及人的生物医学研究伦理审查办法》、《涉及人的健康相关研究国际伦理准则》、《赫尔辛基宣言》、GCP 和 ICH-GCP 等国际伦理指南和国内相关法律法规。		

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

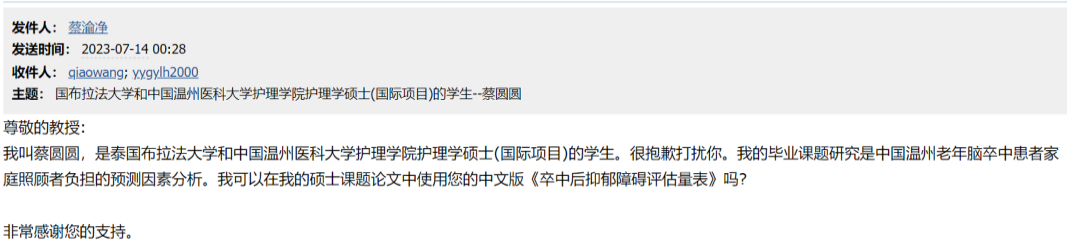


注意事项：

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

APPENDIX C

Permission for using instruments



发件人： 蔡渝净
发送时间： 2023-07-14 00:28
收件人： qiaowang; yygylh2000
主题： 国布拉法大学和中国温州医科大学护理学院护理学硕士(国际项目)的学生--蔡圆圆

尊敬的教授：
我叫蔡圆圆，是泰国布拉法大学和中国温州医科大学护理学院护理学硕士(国际项目)的学生。很抱歉打扰你。我的毕业课题研究是中国温州老年脑卒中患者家庭照顾者负担的预测因素分析。我可以在我的硕士课题论文中使用您的中文版《卒中后抑郁障碍评估量表》吗?

非常感谢您的支持。

发送时间: 2023年7月14日(星期五) 下午3:36
收件人: "蔡渝净"<815596513@qq.com>;
抄送: "yygylh2000"<yygylh2000@sina.com>;
主题: 回复: 国布拉法大学和中国温州医科大学护理学院护理学硕士(国际项目)的学生--蔡圆圆

小蔡，邮件已经收到。我们很高兴这项由袁勇贵教授主持的研究能被你应用。

祝一切顺利!

王桥

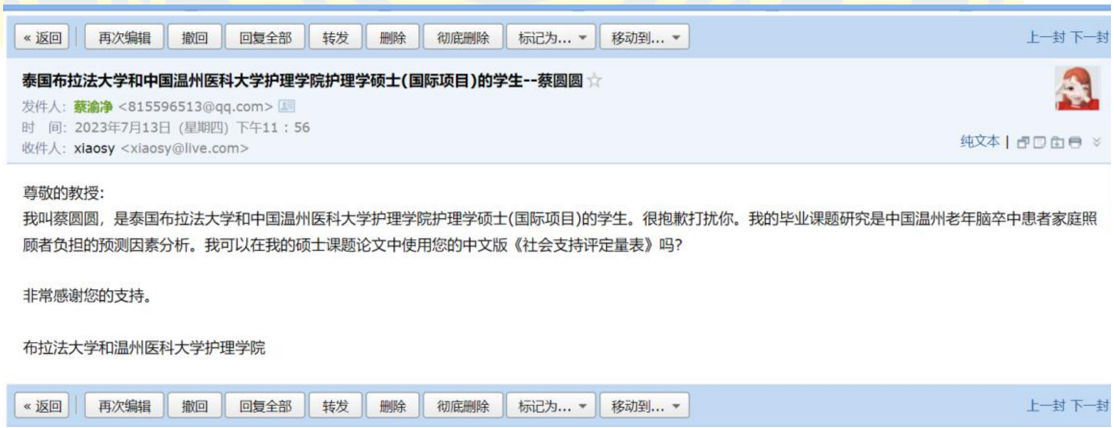
Qiao WANG, Ph.D, Professor

****

Mail:

School of Information Science and Engineering
Southeast University
Nanjing, 210096
China

Email: qiaowang@seu.edu.cn

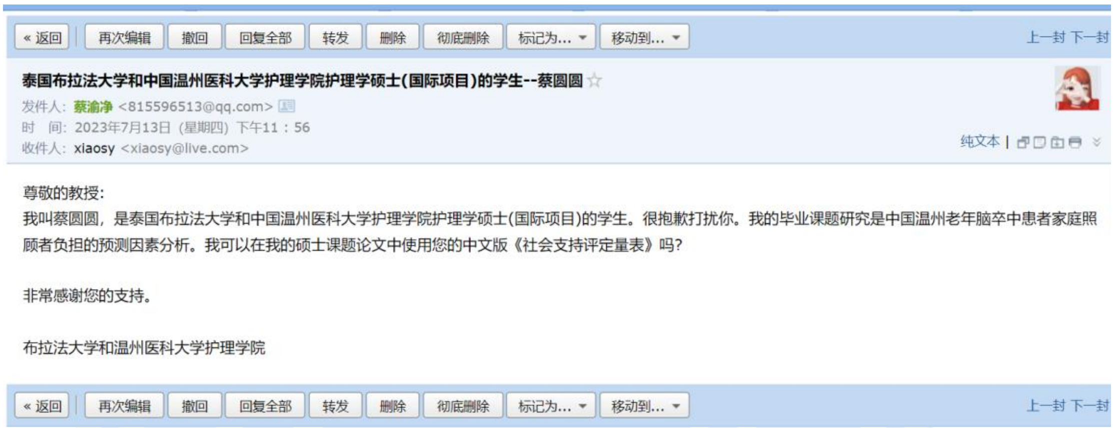


泰国布拉法大学和中国温州医科大学护理学院护理学硕士(国际项目)的学生--蔡圆圆
发件人: 蔡渝净 <815596513@qq.com>
时　间: 2023年7月13日 (星期四) 下午11 : 56
收件人: xiaosy <xiaosy@live.com>

尊敬的教授:
我叫蔡圆圆，是泰国布拉法大学和中国温州医科大学护理学院护理学硕士(国际项目)的学生。很抱歉打扰你。我的毕业课题研究是中国温州老年脑卒中患者家庭照顾者负担的预测因素分析。我可以在我的硕士课题论文中使用您的中文版《社会支持评定量表》吗?

非常感谢您的支持。

布拉法大学和温州医科大学护理学院



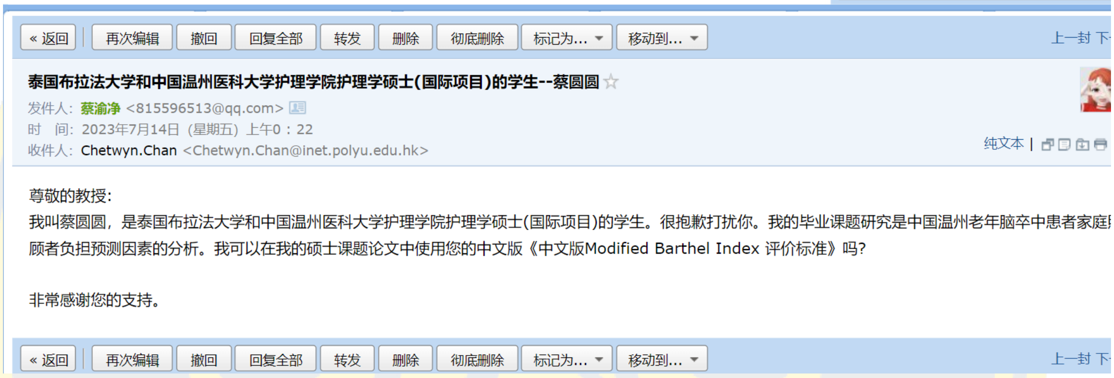
泰国布拉法大学和中国温州医科大学护理学院护理学硕士(国际项目)的学生--蔡圆圆

发件人：**蔡渝净** <815596513@qq.com>
时　间：2023年7月13日（星期四）下午11：56
收件人：xiaosy <xiaosy@live.com>

尊敬的教授：
我叫蔡圆圆，是泰国布拉法大学和中国温州医科大学护理学院护理学硕士(国际项目)的学生。很抱歉打扰你。我的毕业课题研究是中国温州老年脑卒中患者家庭照顾者负担的预测因素分析。我可以在我的硕士课题论文中使用您的中文版《社会支持评定量表》吗?

非常感谢您的支持。

布拉法大学和温州医科大学护理学院



泰国布拉法大学和中国温州医科大学护理学院护理学硕士(国际项目)的学生--蔡圆圆

发件人：**蔡渝净** <815596513@qq.com>
时　间：2023年7月14日（星期五）上午0：22
收件人：Chetwyn.Chan <Chetwyn.Chan@inet.polyu.edu.hk>

尊敬的教授：
我叫蔡圆圆，是泰国布拉法大学和中国温州医科大学护理学院护理学硕士(国际项目)的学生。很抱歉打扰你。我的毕业课题研究是中国温州老年脑卒中患者家庭
顾者负担预测因素的分析。我可以在我的硕士课题论文中使用您的中文版《中文版Modified Barthel Index 评价标准》吗?

非常感谢您的支持。

泰国布拉法大学和中国温州医科大学护理学院护理学硕士(国际项目)的学生--蔡圆圆 量表授权

发件人：**蔡渝净** <815596513@qq.com>
时　间：2024年9月10日（星期二）下午3：23
收件人：liuyip <liuyip@ms23.hinet.net>
发送状态：投递成功［查看详情］

尊敬的教授：
您好!
我叫蔡圆圆，是泰国布拉法大学和中国温州医科大学护理学院护理学硕士(国际项目)的学生。很抱歉打扰你。我的毕业课题研究是中国温州老年脑卒中患者家庭照顾者负担的预测因素分析。我可以在我的硕士课题论文中使用您的中文版"Chinese Version of the Zarit Caregiver Burden"吗?

非常感谢您的支持。

布拉法大学和温州医科大学护理学院

BIOGRAPHY

NAME	Yuanyuan Cai
DATE OF BIRTH	13 May 1980
PLACE OF BIRTH	China
PRESENT ADDRESS	Room 803,Yinzhu Building, 75Wuqiao Road,Lucheng District,Wenzhou City, Zhejiang Province ,China
POSITION HELD	Nurse
EDUCATION	Bachelor's degree