FACTORS RELATED TO CANCER-RELATED FATIGUE IN ADVANCED GASTRIC CANCER PATIENTS ONE MONTH AFTER GASTRECTOMY IN WENZHOU, CHINA

XIANG YANG

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR MASTER DEGREE OF NURSING SCIENCE
(INTERNATIONAL PROGRAM)
IN ADULT NURSING PATHWAY
FACULTY OF NURSING
BURAPHA UNIVERSITY
2024

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

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XIANG YANG : FACTORS RELATED TO CANCER-RELATED FATIGUE IN ADVANCED GASTRIC CANCER PATIENTS ONE MONTH AFTER GASTRECTOMY IN WENZHOU, CHINA. ADVISORY COMMITTEE: NIPHAWAN SAMARTKIT, Ph.D. CHUTIMA CHANTAMIT-O-PAS, Ph.D. 2024.

Cancer-related fatigue (CRF) is the most common and painful symptom in cancer patients. The aim of this study was to describe CRF and to determine the relationships between sleep disturbance, nutritional risk, anxiety, and social support with CRF among advanced gastric cancer patients one month after gastrectomy in Wenzhou, China. Simple random technique was applied to recruit 111 participants from the inpatient and outpatient department of gastrointestinal surgery, the First Affiliated Hospital of Wenzhou Medical University in Wenzhou, China. Research instruments included Demographic questionnaire, Athens Insomnia Scale (AIS), the Patient-Generated Subjective Global Assessment (PG-SGA), Zung Self-Rating Anxiety Scale (SAS), Social Support Rating Scale (SSRS) and Brief Fatigue Inventory (BFI). The scales all have good reliability that the Cronbach's coefficient alpha was .82, .80, .81, .81, and .94 respectively. Data was analyzed by descriptive statistics and Pearson correlation.

The results of this study showed that the mean score of CRF was 2.71 (SD = 1.50) out of 10. The Pearson correlation analysis revealed the sleep disturbance, nutritional risk, and anxiety were positively relationship with CRF ($r = .37$, $p < .001$), ($r = .35$, $p < .001$), ($r = .57$, $p < .001$) respectively and social support was negatively relationship with CRF ($r = -.40$, $p < .001$) among advanced gastric cancer patients one month after gastrectomy in Wenzhou, China.

The findings can provide a theoretical basis for developing nursing intervention to improve sleep quality, enhance nutrition, reduce anxiety and provide more social support to enable advanced gastric cancer patients after gastrectomy to reduce cancer-related fatigue in order to continue further treatment, and to improve their quality of life.

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Xiang Yang

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CHAPTER 1
INTRODUCTION

Background and significance of the study

Gastric cancer is a common malignant tumor with poor prognosis, which rank fifth in morbidity and third in mortality in the world among all cancers (Bray et al., 2018). China is one of the countries with the highest incidence and mortality of gastric cancer in the world, accounting for 44% of the global incidence of gastric cancer and 50 % of all gastric cancer mortality (Feng et al., 2019). According to cancer incidence in China, gastric cancer has the third highest incidence of all malignant tumors accounting for about 10.6% in China (Feng et al., 2019). Moreover, the mortality rate of gastric cancer is the second highest, accounting for 13.6%, which is closely related to the low early detection rate of gastric cancer (Feng et al., 2019). Therefore, many patients are diagnosed gastric cancer in the advanced stage. In addition, the worse thing is that China has a large population with an increasingly aging population, while gastric cancer is an age-related disease (Zuo et al., 2017). Then, the burden of gastric cancer is very serious in China.

Wenzhou is one of the eastern coastal cities with high incidence of gastric cancer contributing to unhealthy eating habits, as prefer to pickled food (Wang, 2014). According to data released by the Center for Disease Control and Prevention show that there were 2,391 cases of gastric cancer and 1,606 deaths due to gastric cancer in 2018 in Wenzhou, accounting for about 5% of all morbidity and mortality rates in China (Center for Disease Control and Prevention, 2019; Feng et al., 2019).

Patients with advanced gastric cancer have different health problems at different stages. Before diagnosis, the patients usually go to the hospital because of the following symptoms: abdominal pain, loss of appetite and weight loss, nausea and vomiting, hematemesis and melena, diarrhea, and difficulty swallowing (Wu, 2017). Then, patients who diagnosed during preoperative preparation, not only have physical symptoms but also have various psychological symptoms, such as worry and anxiety (Hellstadius et al., 2017).

Moreover, most of the patients who have been diagnosed should be received the operation with adjuvant chemo-radiotherapy for the treatments (Wang et al., 2019). The surgical methods of gastric cancer include total gastrectomy and subtotal gastrectomy (Wu, 2017). After surgery, the patients often experience a series of physical and psychological symptoms during hospitalization, such as surgical wound pain, dumping syndrome, nausea, diarrhea, anemia, weakness, weight loss after surgery, anxiety, and depression (Liu et al., 2015; Xiao et al., 2018). After discharge, the patients also have many health problems, such as dumping syndrome, indigestion, increased flatulence borborygmus, abdominal distension, belching, anxiety, fatigue, fear and so on (Choi et al., 2015; Gonzalez et al., 2014; Jeon et al., 2016).

As mentions above, patients with advanced gastric cancer experience many gastrointestinal symptoms and other health problems from pre-diagnosis stage, preoperative preparation stage, postoperative hospitalization stage, to recovery stage at home after discharge. In particular, the patients have a lot of gastrointestinal symptoms after surgery, which are inseparable from the reconstruction of the physiological anatomical structure of the digestive tract (Jinxia et al., 2016; Poort et al., 2017). Therefore, basic life activities of these patients will be affected, such as eating (Feifei et al., 2020). In addition, the economic pressure of the family and the uncertainty about the treatment and prognosis of the disease also lead to varying degrees of fatigue symptoms in a period of time after operation (Feifei et al., 2020). These seriously affect the physical function, mental health, postoperative comfort, and interfere with the follow-up treatment and hinder postoperative rehabilitation (Feifei et al., 2020). Moreover, it may cause or aggravate cancer-related fatigue (Jinxia et al., 2016; Poort et al., 2017).

Cancer-related fatigue (CRF) is a chronic illness, multidimensional symptom, subjective feeling that does not have a clear definition at present (Yeun & Jeon, 2019). However, most researchers follow the definition published by the National Comprehensive Cancer Network (NCCN), that defined as “a distressing, persistent, subjective sense of physical, emotional and/or cognitive tiredness or exhaustion related to cancer or cancer treatment that is not proportional to recent activity and that interferes with normal functioning” (NCCN, 2019). There were some

studies have shown that CRF is related to dysregulation of cytokines and hypothalamic-pituitary-adrenal (HPA) axis (Bower, 2014). Before treatment, the tumor itself may be the source of pro-inflammatory cytokines (Aggarwal et al., 2009; Coussens & Werb, 2002). While during treatment, there may come into being cytokines to response the tissue damage caused by surgery or chemo-radiotherapy, leading to fatigue (Aggarwal et al., 2009; Stone et al., 2003). In addition, changes in the HPA axis have been identified as an underlying mechanism of CRF, either directly or through an effect on inflammatory processes (Bower, 2014).

CRF is the most common and painful symptom in cancer patients (Thong et al., 2018). The prevalence of CRF ranges from 14.03% to 100% (Ma et al., 2020). Moreover, CRF is a common uncomfortable symptom of gastric cancer. The prevalence of CRF is also quite high, seriously affects the life and quality of life of the patients. In a study of factors related to fatigue in gastric cancer survivors after surgery, the prevalence rate of CRF was 51.3% (Hwang et al., 2014). Besides, the patients reported higher levels of fatigue after surgery than before surgery (Zhang, 2017; Zhou et al., 2017).

Unlike normal fatigue, CRF cannot be relieved by rest and can last for months or even years after cancer treatment (Bower, 2014). The effect of CRF lasts longer than the complications such as pain, nausea, vomiting and depression that occur during the progression of cancer (Gerber, 2017). Therefore, CRF greatly affects the rest of patients' lives and is a strong independent predictor of lower satisfaction and lower quality of life scores for patient (Zhang, 2017). A survey of perioperative colorectal cancer patients by Zhou et al. (2017) showed that the majority (71.6%) of patients have experienced CRF. Most of them reported it was difficulty in participating with their activities which they used to do regularly and must to limit what they could do each day due to the influence of CRF. At the same time, fatigue also has strongly related with cancer recurrence and low overall survival rate (Groenvold et al., 2007; Kelada et al., 2019). However, in clinical practice, most of health care workers do not pay attention to the harm that CRF brings to patients, but only deal with some acute uncomfortable symptoms of patients, such as pain and nausea (Rau et al., 2020). In the fatigue survey of cancer patients in Taiwan, 45% of

patients reported that they did not receive fatigue intervention in time (Rau et al., 2020).

In the clinical, if patients recover well after operation, all of them need to receive chemotherapy or radiation therapy one month after operation (Wang et al., 2019). As a review mentioned, chemo-radiotherapy was one of the factors for CRF, and fatigue levels increased significantly during chemo-radiotherapy treatment (Bower, 2014). Moreover, the study by Araújo et al. (2017) showed that a higher fatigue score before treatment would increase the CRF score during and after chemotherapy. In a study of fatigue in patients before and after chemotherapy, it showed that the fatigue levels at baseline predicted post-treatment fatigue (Pertl et al., 2014). If the patients feel more CRF before receiving the further treatment, such as chemo-radiotherapy, they may be unsuccessful complete the course and the tumor will likely recur (X. Guo et al., 2019; Palmieri et al., 2021). If the factors associated with CRF are known, interventions can be provided to help patients reduce CRF in order to continue treatment. So, it is great significance to identify the factors of CRF before chemotherapy and radiation therapy.

Therefore, health care providers should pay attention to help advanced gastric cancer patients to reduce fatigue. This makes it very necessary to know the related factors of CRF and solve the problem at its root. The Theory of Unpleasant Symptoms (TOUS) is a holistic middle-range theory that considers symptoms as multidimensional (Lenz et al., 1997). CRF is a symptom that makes patients feel unpleasant. According to the theory, CRF can be analyzed from the three domains influencing factors (physiological, psychological and situational) that affect unpleasant symptoms. In the domain of physiological, gastrointestinal symptoms (Park et al., 2015), pain (Hwang et al., 2014), cancer stage (M. Guo et al., 2019), operation method (Wang, 2018), nutritional risk (Paiva & Paiva, 2013), chemo-radiotherapy (Araújo et al., 2017) and sleep quality (Tian et al., 2016) are all related factors to CRF, which have been confirmed in the studies. On the psychological side, anxiety and depression have been linked to CRF by many studies (Hwang et al., 2014; Zhang, 2017). In terms of situational, social support is an important related factor to CRF (Tan & Xia, 2014; Zhang, 2017).

Base on the TOUS, this study explored the four related factors that had the greatest impact on patients' CRF during one month after gastrectomy. Sleep is an indispensable and important physiological phenomenon for human beings. Good sleep quality can promote the recovery of people's physiological state, the improvement of their own immunity and reaction speed. Once sleep quality is poor, there will be a variety of psychosomatic symptoms (Loh et al., 2018; Wu et al., 2018). Sleep disturbance, such as difficulty in falling asleep, difficulty in maintaining sleep, low sleep efficiency, excessive daytime sleepiness, and early awakening, can lead to aggravation of CRF (Roscoe et al., 2007). Li Xiaoxue's research on the influencing factors of CRF in lung cancer and its relationship with quality of life, the result showed that if patients have symptoms of sleep disturbance, CRF would increase accordingly (Li, 2014). In the study of Chen et al. showed that sleep disturbance was positively associated with CRF in lung cancer patients (Chen et al., 2020). At the same time, many researchers have suggested that the relationship between sleep quality and CRF need to be further explored (Araújo et al., 2017; Inglis et al., 2020). So, based on the Theory of Unpleasant Symptoms, sleep disturbance was regarded as a physiological factor associate CRF in this study.

Nutritional risk is closely related to food intake, digestion, absorption and metabolism. For advanced gastric cancer patients, the malignancy tumor of the stomach affects the stomach function, which result in a decrease in energy intake and a sharp increase in energy consumption. This can also lead to malnutrition and weight loss, as a result the patients feel fatigue (Chaonan et al., 2016; Lang et al., 2014).The incidence of gastric cancer-related malnutrition is very high, and the diet for patients with gastric cancer after operation is different according to individual differences (Shi et al., 2015). For gastric cancer after operation, the basic dietary treatment is as follows. The patients can drink a small amount of water on the day of removal of the gastrointestinal decompression tube, which is usually the 1st to 3rd day after gastrectomy. Then, the patients should take liquid diet for around 2 weeks. On the third week after surgery, the patients can gradually add soft foods. And if they don’t have any complications with soft diet for around 4 weeks, they can gradually add regular foods (Connie, 2017; Wu, 2017). With this diet situation, this group of

patients may cause insufficient calorie uptake and are risk for malnutrition. The state of malnutrition was a lack of energy metabolism, which can lead to fatigue (Wei & Li, 2018). For cancer patients, cancer and its treatment lead to nutritional complications and nutritional deficiencies, which causes or aggravates CRF (Inglis et al., 2019). Good nutritional status can improve CRF in cancer patients (Baguley et al., 2017). Moreover, in a study of the relationship between nutritional risk and CRF in patients with colorectal cancer, there was a significant positive correlation between CRF and nutritional risk status (Wei & Li, 2018). So, based on the Theory of Unpleasant Symptoms, nutritional risk was regarded as another physiological factor associate CRF in this study.

Anxiety is an emotion characterized by feelings of tension, worrying thoughts and physical changes (American Psychological Association, 2021). Patients were afraid and resistance to cancer and treatment, worry and uncertainty about the choice, effect, risk and complications of treatment, which are characterized by tension, fear and unease. At this time, patients are prone to varying degrees of anxiety (Zhang, 2017). Meanwhile, impaired daily activities, decreased ability to maintain social and family roles, and economic difficulties related to following treatment might lead to a serious anxiety after surgery for cancer patients (Huang et al., 2020).There was a study showed that the more anxiety cancer patients were, the more fatigue they were (Li, 2014). In the study of Hwang, it was concluded that there was a positive correlation between anxiety and CRF (Hwang et al., 2014). So, based on the Theory of Unpleasant Symptoms, anxiety was regarded as psychological factor related with CRF in this study.

Social support refers to the exchange, guidance, and social companionship of useful information from family, friends, or colleagues (Queenan et al., 2010). And some studies have shown that social support would affect the level of CRF (Tan & Xia, 2014; Zhang, 2017). Higher levels of social support were associated with lower levels of CRF (Tan & Xia, 2014; Zhang, 2017). With the support of a family member or spouse, the patient's CRF level would be reduced (Zhang, 2017). So, based on the Theory of Unpleasant Symptoms, social support was regarded as situational factor related with CRF in this study.

According to the literature review, there were not many studies on CRF in patients with advanced gastric cancer, especially those who were one month after gastrectomy. As noted above, it is particularly important to identify the factors related to CRF before receiving chemo-radiotherapy. Therefore, this study will be described level of CRF and its related factors in postoperative patients with advanced gastric cancer before receiving chemo-radiotherapy. This study will fill this gap and provide scientific evidence for nursing practice to reduce CRF and develop nursing intervention to help patients reduce CRF in order to continue further treatment, and to improve the quality of life of postoperative patients with advanced gastric cancer.

Research objective

1. To describe the level of cancer-related fatigue among advanced gastric cancer patients one month after gastrectomy in Wenzhou, China.

2. To determine the relationships between sleep disturbance, nutritional risk, anxiety and social support with cancer-related fatigue among advanced gastric cancer patients one month after gastrectomy in Wenzhou, China.

Research hypotheses

1. There is positive correlation between sleep disturbance and cancer-related fatigue among advanced gastric cancer patients one month after gastrectomy in Wenzhou, China.

2. There is positive correlation between anxiety and cancer-related fatigue among advanced gastric cancer patients one month after gastrectomy in Wenzhou, China.

3. There is positive correlation between nutritional risk and cancer-related fatigue among advanced gastric cancer patients one month after gastrectomy in Wenzhou, China.

4. There is negative correlation between social support and cancer-related fatigue among advanced gastric cancer patients one month after gastrectomy in Wenzhou, China.

Scope of the study

The purpose of this study was to study the level of cancer-related fatigue and to determine the relationship between sleep disturbance, nutritional risk, anxiety and social support with CRF among advanced gastric cancer patients one month after gastrectomy in Wenzhou, China. Data were collected in the inpatient and outpatient department of gastrointestinal surgery, the First Affiliated Hospital of Wenzhou Medical University during August 2021 to February 2022.

Conceptual framework

This study was based on the Theory of Unpleasant Symptoms (TOUS) by Lenz et al. (1997). This theory includes three core concepts: symptoms, influencing factors and performance (Lenz et al., 1997). Symptoms include four dimensions, including intensity, timing, distress and quality. Each symptom and its dimensions can exist alone or in clusters with other symptoms, which have a much greater impact on individuals than a single symptom. The influencing factors include physiological, psychological and environmental/situational factors. The performance was changes in cognitive and functional activities. TOUS emphasizes that there is a bidirectional correlation and influence among the three core concepts of symptoms, influencing factors and performance. That is, when the influencing factors play a role in the symptoms experienced by the individual, the symptoms can also act on the variables in turn. When the symptoms directly affect the performance, the performance can also have a feedback effect on the symptoms and influencing factors.

TOUS is sufficient to understand cancer-related fatigue as the unpleasant symptom, focusing on variables in the three aspects of physiological, psychological and environmental/situational factors to analyze CRF factors. This study determined the related factors of CRF among advanced gastric cancer patients one month after gastrectomy from the three influencing factors of TOUS. The variables chosen in the physiological factors were sleep disturbance and nutritional risk. Evidence showed that the patients with good sleep quality and good nutritional status, who would have less CRF (Baguley et al., 2017; Chen et al., 2020). The variable in the domain of psychological factors was anxiety, the patients with more anxiety had more CRF (Li,

2014). The variable in the situational factors was social support, the patients who had support from others would have less CRF (Zhang, 2017).

The relationship between factors in these three domains and cancer-related fatigue is shown in the Figure 1.

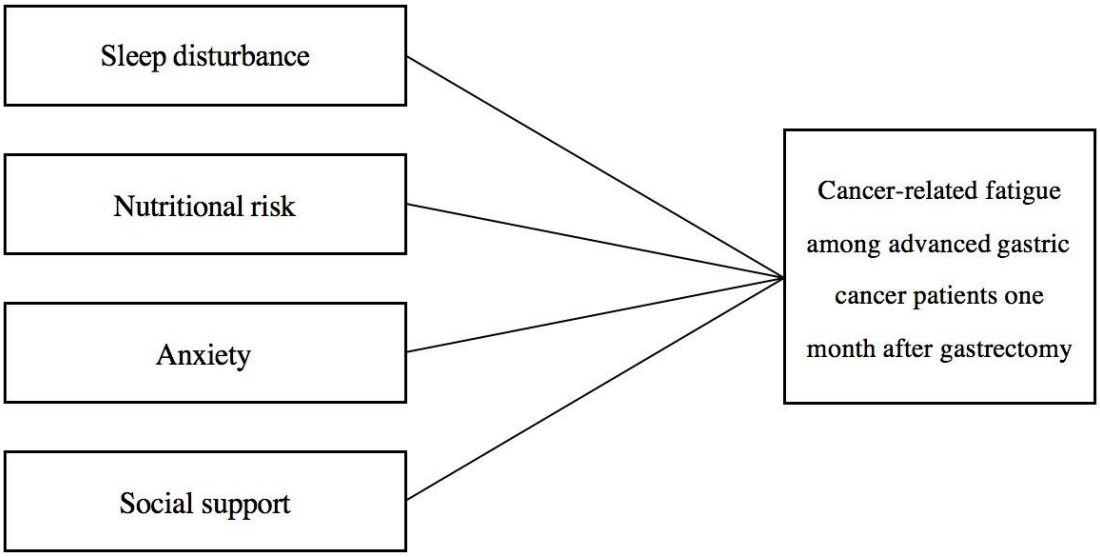

Figure 1 Conceptual framework

Definition of terms

Postoperative patients with advanced gastric cancer were referred to the patients who were diagnosed with advanced gastric cancer and received gastric cancer operation one month. Moreover, they came to receive further treatment both in the outpatient and inpatient department of gastrointestinal surgery, the First Affiliated Hospital of Wenzhou Medical University.

Cancer-related fatigue (CRF) was referred to a distressing, persistent, subjective sense of physical, emotional and/or cognitive tiredness or exhaustion related to cancer or cancer treatment that is not proportional to recent activity and that interferes with normal functioning. In this study, the Chinese version of the Brief Fatigue Inventory (BFI) (Wang et al., 2004) was used to measure CRF.

Sleep disturbance was referred to the problem of sleep quality and duration of sleep at night in patients with advanced gastric cancer, which affected the patients'

daytime life and mood. In this study, the Chinese version of the Athens Insomnia Scale (AIS) (Sun et al., 2011) was used to assess sleep disturbance.

Nutritional risk was referred to an advanced gastric cancer patient's malnutrition condition as it was influenced by the intake and utilization of nutrients and determined from the correlation of information from weight history, clinical symptoms, activities and function, nutritional requirements, metabolic demand, dietary intake, and physical examination. In this study, the Chinese version of the Patient-Generated Subjective Global Assessment (PG-SGA) (Fu et al., 2018) was used to measure nutritional risk.

Anxiety was referred to the feeling of being nervous or anxious to the limit among gastric cancer patients. In this study, the Chinese version of Zung Self-Rating Anxiety Scale (SAS) (Wang, 1984) was used to measure anxiety.

Social support was referred to the help and subjective feelings that patients with gastric cancer received from their family members, friends, colleagues and so on. In this study, the Chinese version of Social Support Rating Scale (SSRS) (Xiao, 1994) was used to measure social support.

CHAPTER 2
LITERATURE REVIEWS

This chapter presents the literature reviews including overview of gastric cancer, Cancer-related Fatigue (CRF) among advanced gastric cancer patients one month after gastrectomy, and factors related to CRF among advanced gastric cancer patients one month after gastrectomy. The specific contents of the literature review are as follows.

Overview of gastric cancer

Gastric cancer is a common malignant neoplasm originating from gastric mucosa and occurring between gastroesophageal junction and pylorus (Nagini, 2012). The gastric mucosa develops sequential histopathological changes, including atrophic gastritis with loss of parietal cell masses, intestinal metaplasia, and abnormal hyperplasia, eventually leading to carcinoma (Nagini, 2012).

The incidence rate of gastric cancer is the fifth in the world and the third in China, with a male-to-female incidence ratio of about 2:1 (Feng et al., 2019). The common risk factors for gastric cancer are helicobacter pylori (HP) infection, high-salt and smoked diets, smoking, chronic diseases, precancerous lesions, and susceptibility to hereditary gastric cancer syndrome (Feng et al., 2019; Wu, 2017).

There are obvious regional differences in the incidence of gastric cancer. Worldwide, Japan, South Korea and China have the highest incidence. In China, the incidence of gastric cancer in the northwest and eastern coastal areas is significantly higher than that in the southern areas. Wenzhou is one of the eastern coastal cities with high incidence of gastric cancer contributing to unhealthy eating habits prefer to pickled food (Wang, 2014). According to data released by the Center for Disease Control and Prevention show that there were 2,391 cases of gastric cancer and 1,606 deaths due to gastric cancer in 2018 in Wenzhou, accounting for about 5% of all morbidity and mortality rates in China (Center for Disease Control and Prevention, 2019; Feng et al., 2019).

In addition, gastric cancer is mostly diagnosed in the early stage in Japan, South Korea, and while in China, more than 80% of gastric cancer patients are in the advanced stage at the first time for diagnosis (Feng et al., 2019). Therefore, many people may miss the chance for radical treatment or there is a high risk of recurrence and postoperative metastasis (Feng et al., 2019; Wu, 2017). Moreover, the worse thing is that China has a large population with an increasingly aging population, while gastric cancer is an age-related disease (Zuo et al., 2017). Then, the burden of gastric cancer is very serious in China.

Classification of gastric cancer

Gastric cancer can be classified by the tumor-node-metastasis (TNM) staging system, which is enacted by the American Joint Committee on Cancer / Union for International Cancer Control (AJCC/UICC). TNM is the standard classification with recognized for gastric cancer (Japanese Gastric Cancer, 2020). T represents the range of tumor, N represents the range of tumor spread to lymph nodes, and M represents whether the tumor has distant metastasis or not. According to TNM, gastric cancer is classified by range of tumor, lymph node metastasis, and distant metastasis. In this staging, the corresponding last cancer staging can be obtained after the determination of T, N and M, that are named I, II, III and IV stage. Sometimes it is subdivided with letter combinations into IIA or IIIB and so on. For stage I, the tumors are usually relatively early tumors with good prognosis in generally. The higher the stage, the more advanced the tumor is.

However in clinical, gastric cancer roughly can be divided into early-stage gastric cancer and advanced gastric cancer (Wu, 2017). Early-stage gastric cancer is defined as gastric cancer confined to mucosa and sub mucosa, regardless of whether there is evidence of regional lymph nodes metastasis, and irrespective of tumor size (Wang et al., 2019). Advanced gastric cancer is defined as a tumor that invades the lamina propria or deeper gastric wall (Wang et al., 2019).

Sign and symptoms of advanced gastric cancer before treatment

When a person got gastric cancer, he or she should have some signs and symptoms. But the pathological changes of gastric cancer from small to large, from shallow to deep, from no metastasis to metastasis is a gradual process. So, there is no

obvious boundary between symptoms and signs between the early stage, the advanced stage and even the late stage. Most early-stage gastric cancer patients do not have obvious symptoms, sometimes they only have epigastric discomfort and have the feeling of abdomen fullness and nausea after eating (Wu, 2017).

But for advanced gastric cancer patients, the health problem should be more serious. The common symptoms and signs of advanced gastric cancer are as follows, abdominal pain, loss of appetite and weight loss, nausea and vomiting, hematemesis and melena, diarrhea, and difficulty swallowing (Wu, 2017).

Criteria for diagnosis of advanced gastric cancer

When patients come to the clinic with sign and symptoms of discomfort as mention above, the patients suspected of gastric cancer usually undergo the following investigation to confirm the diagnosis.

1. Esophagogastroduodenoscopy (EGD)

This examination can directly observe the location and extent of gastric mucosal lesions, and can clamp small pieces of suspicious lesions for pathological examination, which is the most effective method for the diagnosis of gastric cancer. The endoscopic features of advanced gastric cancer are obvious, which can be uneven and contaminated masses, or irregular and large ulcers which are easy to bleed, or the bottom is covered with dirty moss and the texture is relatively hard (Wu, 2017).

2. X - ray barium swallow examination

In this test, patients drink a substance called barium at first. Then the patients take some X-ray pictures. Because X-rays cannot pass through the barium coating, it is possible to outline any abnormal areas in the inner walls of the organs (esophagus, stomach, and small intestine). The result for advanced gastric cancer showed irregular filling defect, niche sign, and mucosal destruction (Wu, 2017).

3. Computed tomography (CT) /Positron emission tomography (PET)

CT and PET scans can check the extent of gastric cancer and whether it has metastasized to lymph nodes or other parts of the body. For advanced gastric cancer, the gastric wall of the lesion area is obviously thickened with gastric coarctation, the surface is uneven, and most of the central ulcers can be seen (Zhang, 2014).

Sign and symptoms of advanced gastric cancer after diagnosis

Then the patients are diagnosed as advanced gastric cancer by the above methods of examination, they should increase some psychological symptoms except previous physical signs and symptoms, such as worry and anxiety (Hellstadius et al., 2017). In a study in China, patients with gastric cancer have a high incidence of psychological disturbance in the post-diagnosis and pre-treatment stage (Hong et al., 2015). In Wenzhou, China, family members usually ask medical staff to conceal the patients for their condition before undergoing surgery. For patients who do not know their condition, they are more worried and afraid of surgery and anxious about their recovery after operation. But for patients who already know their condition, they think that cancer is incurable and should have higher levels of anxiety and depression. Moreover, they all need to receive following treatments.

Treatment of advanced gastric cancer

After diagnosing as advanced gastric cancer, the patients will receive the following treatments according to the newest version of guidelines (Wang et al., 2019) for Gastric cancer issued by the Chinese Society of Clinical Oncology (CSCO). Complete resection of the negative margins' tumor (R0 resection) and D2 lymphadenectomy with adjuvant chemo-radiotherapy after surgery is the standard therapy for advanced gastric cancer. Neoadjuvant treatment is also one of the recommendations for patients with advanced resectable gastric cancer. But for patients who cannot be resected after neoadjuvant therapy, the best treatment regimen can be developed through discussion by a multidisciplinary team (MDT) according to individual conditions. Moreover, the operation method is very important for recovery for advanced gastric cancer patients.

The surgical methods for advanced gastric cancer include total gastrectomy and subtotal gastrectomy (Wu, 2017). Common surgical methods include Billroth I surgery, Billroth II surgery, and Roux-en-Y anastomosis. All of these methods remove malignant tumors from the stomach to treat the patients. (Wu, 2017).

Billroth I operation is to anastomose the remnant stomach with duodenum after subtotal gastrectomy. Its advantage is that the postoperative complications caused by gastrointestinal dysfunction are reduced, and its disadvantage is that the

chance of postoperative ulcer recurrence is increased. It is not suitable for patients with duodenal ulcer with high gastric acid secretion, so this operation method is mostly used for patients with gastric ulcer and tumor in the stomach (Wu, 2017).

Billroth II operation is the combination of remnant stomach and jejunum, and duodenal stump is closed after subtotal gastrectomy, and its advantages and disadvantages are opposite to Billroth I operation. This operation method is widely used in clinic and is suitable for all kinds patients of gastroduodenal ulcers, especially for patients with duodenal ulcers and tumor is near the duodenum (Wu, 2017).

Roux-en-Y anastomosis is to close the duodenal stump after subtotal gastrectomy, cut the jejunum at 10~15cm from the Treitz ligament, anastomose the remnant stomach with the distal jejunum, and anastomose the jejunum and the proximal jejunum at the 45~60cm below the anastomosis. This operation method can effectively reduce bile reflux and prevent the occurrence of residual gastritis. This operation method is used in patients with severe reflux esophagitis with high gastric acid (Wu, 2017).

Moreover, most of the gastric cancer patients need operation first, and after that, if they are in the advanced stage, all of them need to receive chemo-radiotherapy for the following treatment (Wang et al., 2019). And the drugs commonly used for chemotherapy are 5-FU (fluorouracil), Capecitabine, Oxaliplatin, Carboplatin, Cisplatin, Docetaxel and so on (Wagner et al., 2017). A course of chemotherapy requires six to eight rounds, and there is a 3-week interval between the two rounds (Wagner et al., 2017). However, patients may discontinue chemotherapy if they are not in good condition or have some health problems, such as weakness or fatigue (Palmieri et al., 2021). Then, they do not receive the total course of chemotherapy, the tumor may spread (X. Guo et al., 2019). So, chemotherapy is very important for postoperative patients and it is also important to analyze the health problems after surgery which brings great changes to the physiological structure of the patients.

Sign and symptoms of advanced gastric cancer after surgery

When patients of advanced gastric cancer have received surgical treatment, they may experience a lot of discomfort and/or complications after surgery. The common signs and symptoms include surgical wound pain, nausea, diarrhea, anemia,

weakness, weight loss after surgery, anxiety, and depression (Liu et al., 2015; Xiao et al., 2018). The complications after surgery include postoperative gastric bleeding, duodenal stump rupture, anastomotic rupture, disturbance of gastric emptying, postoperative obstruction and dumping syndrome (Wu, 2017).

When patients of advanced gastric cancer recover well after surgery and meet the discharge criteria. Then they leave the hospital. In addition, they also maybe experience a lot of physical and mental symptoms for a period of time at home, such as bile reflux, pain, burning sensation, dyspnea, nausea, vomiting, indigestion, bowel habit change, dumping syndrome, increased flatulence borborygmus, abdominal distension, belching, anxiety, fatigue, and fear (Choi et al., 2015; Gonzalez et al., 2014; Inada et al., 2014; Jeon et al., 2016; Vella et al., 2017; Zhang et al., 2013). These uncomfortable symptoms may cause or aggravate fatigue and affect the patient's life and subsequent treatment (Jinxia et al., 2016; Poort et al., 2017).

Cancer-related fatigue among advanced gastric cancer patients one month after gastrectomy

As mentions above, patients with advanced gastric cancer experience many gastrointestinal symptoms and other health problems from pre-diagnosis stage, preoperative preparation stage, postoperative hospitalization stage, to recovery stage at home after discharge. Next, the patient will receive follow-up treatment, such as chemotherapy. From preoperative preparation stage to follow-up treatment stage, this period of time is about one month.

In particular, the patients have a lot of gastrointestinal symptoms after surgery, which are inseparable from the reconstruction of the physiological anatomical structure of the digestive tract (Jinxia et al., 2016; Poort et al., 2017). Therefore, basic life activities of these patients will be affected, such as eating. In addition, the economic pressure of the family and the uncertainty about the treatment and prognosis of the disease also lead to varying degrees of fatigue symptoms in a period of time after operation (Feifei et al., 2020). These seriously affect the physical function, mental health, postoperative comfort, and interfere with the follow-up treatment and hinder postoperative rehabilitation (Feifei et al., 2020).

For the follow-up treatment, chemotherapy also can induce fatigue, and the main reason is the toxic and side effects of chemotherapy (Bower, 2014). Fatigue usually increases during radiotherapy and chemotherapy for cancer (Bower, 2014). In the study of Hofman et al, 95% of cancer patients who received chemotherapy or radiotherapy showed high fatigue (Hofman et al., 2007). The incidence of fatigue during treatment is estimated to be between 25% and 99% (Lawrence et al., 2004; Servaes et al., 2002). This may be related to the fact that chemotherapy drugs can lead to a decrease in white blood cell count, resulting in a decline in the immune function of the patient (Jacobsen et al., 2004). And chemotherapy drugs can also reduce hemoglobin and cause anemia, which is positively correlated with increased CRF levels in patients (Jacobsen et al., 2004). Therefore, that are potential factors that cause or aggravate cancer-related fatigue, including gastrointestinal symptoms, psychological symptoms associated with the disease and treatment and side effect from treatment (Jinxia et al., 2016; Poort et al., 2017).

But other studies have found that CRF imposes a burden on patients before treatment (Aapro et al., 2017). Pertl et al. evaluated 100 patients after and before chemotherapy and found that only baseline fatigue could predict post-treatment fatigue (Pertl et al., 2014). In general, the fatigue caused by treatment would reduce at the end of treatment (Bower, 2014). But fatigue caused by cancer can affect the patients' quality of life for the rest of their life (Bower, 2014). Therefore, in order to control fatigue better both during and after treatment, it is necessary to thoroughly analyze the factors of fatigue which related to pro-treatment (at baseline) and cancer itself, then provide corresponding nursing intervention to help patients reduce CRF in order to continue further treatment and to improve the quality of life of patients.

Definition of cancer-related Fatigue

The first person who proposed the concept of cancer-related fatigue (CRF) was Piper in 1987. He defines CRF as a subjective feeling, unusual systemic fatigue associated with cancer and its treatment, with varying duration and intensity, and the degree of remission is disproportionate or irrelevant to an individual's behavior and efforts (Piper et al., 1987).

But now most scholars follow the definition published by the National Comprehensive Cancer Network (NCCN). It is defined ‘Cancer-related fatigue (CRF) as a distressing, persistent, subjective sense of physical, emotional and/or cognitive tiredness or exhaustion related to cancer or cancer treatment that is not proportional to recent activity and that interferes with normal functioning’ (NCCN, 2019).

Mechanism of cancer-related Fatigue

There were some studies have shown that CRF is related to dysregulation of cytokines and hypothalamic-pituitary-adrenal (HPA) axis (Bower, 2014). Before treatment, the tumor itself may be the source of pro-inflammatory cytokines (Aggarwal et al., 2009; Coussens & Werb, 2002). While during treatment, there may come into being cytokines to response the tissue damage caused by surgery or chemo-radiotherapy, leading to fatigue (Aggarwal et al., 2009; Stone et al., 2003). In addition, changes in the HPA axis have been identified as an underlying mechanism of CRF, either directly or through an effect on inflammatory processes (Bower, 2014).

Cancer-related fatigue among advanced gastric cancer patients one month after gastrectomy

CRF is one of the most common side effects of cancer and its treatment (Paschoin et al., 2011). The prevalence of CRF ranges from 14.03% to 100% (Ma et al., 2020). CRF as a common uncomfortable symptom in gastric cancer, the prevalence of CRF is also quite high, seriously affects the life and quality of life of the patients. In a study of factors related to fatigue in gastric cancer survivors, the prevalence rate of CRF was 51.3% (Hwang et al., 2014).

CRF has brought great interference to patients' physiological, psychological state, social activities and work, which has seriously affected the quality of life of patients (Potthoff et al., 2013). Unlike normal fatigue, CRF cannot be relieved by rest and can last for months or even years after cancer treatment (Bower, 2014). At the same time, most patients think it is one of the most painful symptoms (Thong et al., 2018). CRF tends to last longer than other symptoms, such as pain or nausea, and has a strong impact on daily life and quality of life (Weis, 2011). Therefore, CRF greatly affects the rest of patients' lives and is a strong independent predictor of lower satisfaction and lower quality of life scores for patient (Zhang, 2017).

As an important part of the quality of life, mental health is an important predictive index to reflect the quality of life (AbuRuz, 2018). In a study of cancer patients, half of those who experienced CRF reported sadness (Curt et al., 2000). From a study (Zhang, 2017), it concluded that preoperative CRF had the highest impact on patients' emotion, and postoperative CRF had the following effects on all aspects of life: normal work, activity, walking ability, emotion, enjoyment of life and relationship with others.

Moreover, it leads to reduced interpersonal relationships, employment, and work efficiency (Barsevick et al., 2013; Peoples et al., 2017). A survey of cancer patients by Curt et al. (Curt et al., 2000) showed that the majority of patients, 91% have experienced CRF , thought that CRF interfered their normal life, while 88% of patients thought that CRF disrupted their daily life, and three-quarters of patients quit their jobs or changed jobs due to the influence of CRF. At the same time, fatigue also has strongly related with cancer recurrence and low overall survival rate (Groenvold et al., 2007).

However, in clinical practice, most of health care workers do not pay attention to the harm that CRF brings to patients, but only deal with some acute uncomfortable symptoms of patients, such as pain and nausea (Rau et al., 2020). In this fatigue survey of cancer patients in Taiwan, 45% of patients reported that they did not receive fatigue intervention in time (Rau et al., 2020). So, it's important to help advanced gastric cancer patients reduce fatigue. And it would be easy to solve this problem by addressing the factors related to fatigue with a suitable theory.

Theory of Unpleasant Symptoms

This study applied the Theory of Unpleasant Symptoms (TOUS) to analyze the related factors of CRF among advanced gastric cancer patients one month after gastrectomy, because CRF is an unpleasant symptom that makes patients feel very painful.

TOUS is a middle-range theory, which has been widely applied to many kinds of patients and symptoms (Blakeman, 2019). This theory originated from the fatigue symptom model of Dr. Linda Pugh and the dyspnea symptom model of Dr.

Audrey Gift (Deleruyelle, 2017). In 1995, TOUS was first proposed by Lenz and other experts (Lenz et al., 1995). And It was revised in 1997 (Lenz et al., 1997). When patients face with physical and mental symptoms because of uncomfortable symptoms, nurses can analyze them through this theory and formulate holistic nursing intervention measures with personalized basis (Blakeman, 2019).

Components of the Theory of Unpleasant Symptoms

TOUS has three components, including the symptoms experienced by the patient, the influencing factors that cause or affect the symptoms, and the performance associated with the symptoms (Lenz et al., 1997).

Symptoms

Symptoms are defined as the “perceived pointers of alterations in the normal body functioning that a patient experiences" and are the focal point of TOUS (Fox & Lyon, 2007). Symptoms have four dimensions, including intensity, timing, distress and quality. The intensity component of symptoms is the amount, strength or severity of the symptom that the patient is experiencing or accumulating. The time dimension of symptoms includes the duration of the symptoms, the frequency of occurrence or the situation in which the symptoms occur, or a combination of both duration and frequency. Distress is the extent to which the patient is bothered or responds to the symptom(s). The quality dimension of symptoms refers to the description of the content related to the symptoms, such as the specific location and nature of the symptoms, whether they are relieved after treatment or nursing, and so on. In addition, this theory points out that symptoms can appear singly or in conjunction with other symptoms, and the influence of multiple symptoms on individuals is not a simple additive negative effect, but a multiple increase (Qiu & Xu, 2009).

Influencing factors

The influencing factors of TOUS include three aspects: physiological factors, psychological factors and environmental/situational factors. These factors affect the patients’ predisposition to an unpleasant symptom experiences or how the unpleasant symptom is manifested. Physiological factors are mainly related to the symptoms that cause changes in normal human function, such as sleep, physical status, nutritional status and so on. Psychological factors include patients' emotional

state, understanding, coping and uncertainty for the disease. Situational factors refer to the physical and social environmental factors, such as temperature, light, work, family and social support and so on. The influencing factors of these three aspects are interrelated, so they play a role in the symptoms together (Qiu & Xu, 2009).

Performance

When patients experience unpleasant symptoms, the main performance is the change of functional and cognitive activities. Functional performance roughly includes health status, physical activities, activities of daily life, social interaction and role function and so on. Cognitive performance refers to problem solving ability, mental concentration ability and thinking ability. The performance results of individual symptoms are related to the amount and severity of symptoms, that is, the more the number and degree of symptoms are, the worse the individual's function and cognitive activities are, and the lower the quality of life is (Qiu & Xu, 2009).

Three components interrelated

TOUS emphasizes that there is a bidirectional correlation and influence among the three core concepts of symptoms, influencing factors and performance. That is, when the influencing factors play a role in the symptoms experienced by the individual, the symptoms can also act on the variables in turn. When the symptoms directly affect the performance, the performance can also have a feedback effect on the symptoms and influencing factors.

Application of the Theory of Unpleasant Symptoms

Since the theory of unpleasant symptom was proposed, it has been widely used in symptom related research by many researchers in China and abroad. At present, TOUS as a theoretical framework has been used in a number of studies, involving diseases including colorectal cancer, lung cancer and chronic cough (Feng, 2019; French et al., 2017; LI, 2020). Feng studied factors associated cancer-related fatigue status in colorectal cancer patients, using cancer-related fatigue scale for measuring the degree of fatigue from multiple dimensions, and used the TOUS to explore the physiological factors, psychological factors and situational factors influence on fatigue (Feng, 2019). In the study of the relationship between the symptom group of perioperative lung cancer patients and their quality of life, Li JJ

applied the TOUS to determine the relationship between the symptom group and the quality of life (LI, 2020). French et al. used the TOUS to analyze the causes of chronic cough and its impact on quality of life from physiological, psychological and situational factors (French et al., 2017).

So, TOUS is very suitable to be theoretical guidance for research on CRF in advanced gastric cancer patients one month after gastrectomy in this study. CRF is a symptom that makes patients feel unpleasant. According to the theory, CRF can be analyzed from the three domains influencing factors (physiological, psychological and situational) that affect unpleasant symptoms. In the domain of physiological, gastrointestinal symptoms (Park et al., 2015), pain (Hwang et al., 2014), cancer stage (M. Guo et al., 2019), operation method (Wang, 2018), nutritional status (Paiva & Paiva, 2013), chemo-radiotherapy (Araújo et al., 2017) and sleep quality (Tian et al., 2016) are all related factors of CRF, which have been confirmed in the studies. On the psychological side, anxiety and depression have been linked to CRF by many studies (Hwang et al., 2014; Zhang, 2017). In terms of situational, social support is an important related factor of CRF (Tan & Xia, 2014; Zhang, 2017). After knowing the factors related to CRF, the health care providers can help the patients control and /or reduce CRF.

Factors related to CRF among advanced gastric cancer patients one month after gastrectomy

CRF is the subjective feeling of patients, and there is no gold standard for its definition and mechanisms, mainly because it is affected by many factors. In recent years, many researchers have studied and summarized its related factors, including demographic, medical, behavioral, biological and psychosocial factors (Bower, 2014). Various factors can interact each other, which makes the factors of CRF more complex. The following content will analyze some factors of CRF based on the Theory of Unpleasant Symptom. Fatigue is regarded as a symptom of discomfort, and its related factors will be analyzed from three aspects (physiological, psychological and situational) of the TOUS. Based on the literature review, the CRF among

advanced gastric cancer patients one month after gastrectomy can be affected by many factors such as sleep disturbance, nutritional risk, anxiety and social support.

Sleep disturbance

Sleep is an indispensable and important physiological phenomenon for human beings. Good sleep quality can promote the recovery of people's physiological state, the improvement of their own immunity and the activity of brain thinking. Once sleep quality is poor, there will be a variety of psychosomatic symptoms which can lead to aggravation of CRF (Loh et al., 2018; Wu et al., 2018). For example, when the patients have poor quality of sleep, they may prone to functional disorders such as palpitation, shortness of breath, and sweating, which can induce physical fatigue (Wang & Gong, 2011). When the patients have poor sleep, they are easy to worry about their health state with the negative emotions (anxiety and agitated), which would lead to emotional fatigue (LI, 2017). So, sleep disturbance can lead to aggravation of CRF, such as difficulty in falling asleep, difficulty in maintaining sleep, low sleep efficiency, excessive daytime sleepiness, and early awakening (Roscoe et al., 2007).

In the study of Goldstein et al. (2012), it was shown that breast cancer patients with persistent fatigue had significantly higher total scores on sleep assessment questionnaires at all time points of the disease than other patients ($p <$ .05). The research of Li (2014) on the influencing factors of CRF in lung cancer and its relationship with quality of life showed that if patients have symptoms of sleep disturbance, CRF would increase accordingly ($r = .639$, $p < .05$). In the study of Chen et al. (2020) showed that sleep disturbance was positively associated with CRF in lung cancer patients ($r = .642$, $p < .001$). From a review, insomnia has been shown to increase CRF (Ma et al., 2020). So, the researcher hypothesized that there is positive correlation between sleep disturbance and CRF among advanced gastric cancer patients one month after gastrectomy.

Nutritional risk

Nutritional risk is closely related to food intake, digestion, absorption and metabolism. For advanced gastric cancer patients, the malignancy tumor of the stomach affects the stomach function, which result in a decrease in energy intake and

a sharp increase in energy consumption. This can also lead to malnutrition and weight loss, as a result the patients feel fatigue (Chaonan et al., 2016; Lang et al., 2014). The incidence of gastric cancer-related malnutrition is very high, and the diet for patients with gastric cancer after operation is different according to individual differences (Shi et al., 2015). For gastric cancer after operation, the basic dietary treatment is as follows. The patients can drink a small amount of water on the day of removal of the gastrointestinal decompression tube, which is usually the 1st to 3rd day after gastrectomy. Then, the patients should take liquid diet for around 2 weeks. On the third week after surgery, the patients can gradually add soft foods. And if they don't have any complications with soft diet for around 4 weeks, they can gradually add regular foods (Connie, 2017; Wu, 2017). With this diet situation, this group of patients may cause insufficient calorie uptake and are risk for malnutrition.

The state of malnutrition was a lack of energy metabolism, which can lead to fatigue (Wei & Li, 2018). For cancer patients, cancer and its treatment can lead to nutritional complications and nutritional deficiencies, which causes or aggravates CRF (Inglis et al., 2019). As mentioned above, patients with advanced gastric cancer have gastrointestinal symptoms before and after surgery, such as nausea and vomiting, which will easily lead to water and electrolyte disorders, weight loss, nutritional imbalance and so on. Good nutritional status can improve CRF in cancer patients (Baguley et al., 2017).

Moreover, in a study (Wei & Li, 2018) of the relationship between nutritional risk and CRF in patients with colorectal cancer, there was a significant positive correlation between fatigue and nutritional risk ($r = .325$, $p < .01$). In the study of Hwang et al. (2014), it showed the patients had dysphagia and eating restriction which may result to malnutrition was significantly associated with CRF ($p < .05$). So, maybe there is positive correlation between nutritional risk and CRF among advanced gastric cancer patients one month after gastrectomy.

Anxiety

Anxiety is an emotion characterized by feelings of tension, worrying thoughts and physical changes (American Psychological Association, 2021). Patients have fear and resistance to cancer and treatment, worry and uncertainty about the

choice, effect, risk and complications of treatment, which are characterized by tension, fear and unease (Hong et al., 2015). At this time, patients are prone to varying degrees of anxiety (Zhang, 2017). Meanwhile, impaired daily activities, decreased ability to maintain social and family roles, and economic difficulties related to following treatment might lead to a serious anxiety after surgery for cancer patients(Huang et al., 2020). When the degree of anxiety of patients with advanced gastric cancer one month after gastrectomy is more serious, their emotional consumption will be more, which will make the patients have emotional fatigue (Feng, 2019). On the contrary, advanced gastric cancer patients with CRF after surgery believe that the persistence and aggravation of CRF is the manifestation of the aggravation of disease or ineffective treatment. They should excessively worry about their prognosis, which increase the psychological burden with more anxiety (Feng, 2019).

From the reviews, the mental problem was factors for CRF (Bower, 2014; Ma et al., 2020). There is a study (Li, 2014) showed that the more anxiety cancer patients were, the more fatigue they were ($r = .344$, $p < .05$). A study (Zhang, 2017) in China found that anxiety was the main risk factors affecting CRF ($t = 3.842$, $p < .001$). The research of Tan and Xia (2014) has found that moderate to severe fatigue was associated with anxiety ($r = .324$, $p = .018$). A study (Huang et al., 2015) of fatigue in patients with lung cancer has shown that anxiety was independent risk factors for fatigue (OR: 2.45; 95% CI: 1.13-4.87). So, may be anxiety is positive relationship with CRF among advanced gastric cancer patients one month after gastrectomy.

Social support

Social support refers to the exchange, guidance, and social companionship of useful information from family, friends, or colleagues (Queenan et al., 2010). Family care is an important index to measure family function, and it is an important source of individual social support and spiritual needs. In the recovery process of gastric cancer patients after surgery, if their families can provide careful care, then they do not need to take care of themselves, so they will have less body fatigue. The

emotional fatigue in patients with gastric cancer can be reduced if their families provide moral support and encouragement (Feng et al., 2019).

In an analysis (Zhang, 2017) of factors of perioperative fatigue in gastric cancer, it was concluded that social support was the main factor influencing the degree of postoperative CRF ($r = -.301$, $p < .05$). Research by Tan and Xia (2014) showed that moderate and severe fatigue was strongly related to social and psychological factors, such as social support ($r = -.158$, $p = .038$). Therefore, while facing the pain of the disease, if patients have good family function, emotional support and social support, the pressure they face will be reduced, and the fatigue will be reduced accordingly. So, the researcher hypothesized that there is negative correlation between social support and CRF among advanced gastric cancer patients one month after gastrectomy.

Summary

Overall, the morbidity and mortality of gastric cancer are very high in China, and Wenzhou as one of the eastern coastal areas with a high incidence of gastric cancer, too. For Chinese patients with gastric cancer, most of them are first investigated and diagnosed in advanced gastric cancer. And cancer-related fatigue as a common uncomfortable symptom of advanced gastric cancer, seriously affects the further treatment and quality of life of the patients. But the health care providers are not pay attention to the CRF. Therefore, it would be very necessary to study CRF and its related factors.

According to the literature review, there are not many studies on CRF in patients with advanced gastric cancer, especially those who have not received chemo-radiotherapy after gastrectomy. As noted above, it is particularly important to identify the factors related to CRF before receiving chemo-radiotherapy. Therefore, the researcher found it necessary to study CRF and its related factors in postoperative patients with advanced gastric cancer who do not receive chemo-radiotherapy. This study would fill this gap and provide scientific evidence for nursing practice to reduce CRF and nursing research to improve the successful of further treatments of chemo-radiotherapy and the quality of life of postoperative patients with advanced gastric cancer.

CHAPTER 3
RESEARCH METHODOLOGY

This chapter presented research methodology including, research design, population and sample, research setting, research instruments, psychometric property of the instruments, protection of human subjects, data collection procedures, and data analyses.

Research design

A descriptive correlational research design was used to investigate the relationship between sleep disturbance, nutritional risk, anxiety and social support with cancer-related fatigue among advanced gastric cancer patients one month after gastrectomy in Wenzhou, China.

Population and sample

Population

The population of this study were the advanced gastric cancer patients one month after gastrectomy and before receiving chemo-radiotherapy, who came to receive further treatment in the department of gastrointestinal surgery, the First Affiliated Hospital of Wenzhou Medical University.

Sample

The samples of this study were advanced gastric cancer patients one month after gastrectomy and before receiving chemo-radiotherapy, who came to receive further treatment in the department of gastrointestinal surgery, the First Affiliated Hospital of Wenzhou Medical University. Simple random sampling technique was used after recruitment the sample followed the inclusion criteria include:

1. Age ≥ 18 years old
2. Having some degree of CRF
3. No history of other cancer
4. Able to communicate in Mandarin or Wenzhou dialect
5. No mental health problems by checking from medical record
6. No cognitive disorders by screening with The Mini-Mental State Examination test in Chinese version
7. No postoperative complications (such as: postoperative gastric bleeding, duodenal stump rupture, anastomotic rupture, disturbance of gastric emptying, postoperative obstruction and dumping syndrome)

Termination criteria also was followed:

During collecting data, if the samples had any symptoms of physical discomfort such as tiredness, fatigue, pain, etc., the researcher would stop the collecting data process and provide basic standard nursing care, moreover notify the

nurses to continue providing care according to the standards of the hospital. In this study, no participants experienced any symptoms during data collection. So, none of the participants stopped completing their questionnaires.

Sample size

The sample size of this study was calculated by G*Power software. The researcher reviewed the relationship between cancer-related fatigue and each independent variable. Therefore, the correlation normal model was choosing as type of statistical test in G*Power program with a significance level of .05, statistical power of .80, and an estimated moderate effect size .26 from two similar articles (Kogure & Hara, 2020; Qiu, 2019). According to the formula, this study needed at least 111 participants.

Sampling technique

The samples of this study were recruited by simple random sampling method. The researcher prepared two sheets of paper in the same size with writing down odd numbers and even numbers. Then the researcher put them in a bag. In morning when the researcher went to Inpatient and Outpatient, before collecting data the researcher must take a piece of paper from the bag first. If the researcher drew odd-numbered paper, all patients with odd serial numbers of the patients' ID were included in the sample that day. On the contrary, patients with even serial numbers were included, if the researcher drew even-numbered paper. About 2-4 samples were taken every day.

Research setting

This study was conducted in the inpatient and outpatient department of gastrointestinal surgery, the First Affiliated Hospital of Wenzhou Medical University in Wenzhou, China.

The inpatient department of Gastrointestinal Surgery has 115 beds, with an average of more than 4,500 inpatients annually, and an average of more than 700 cases of gastric cancer operated annually. In 2019, there were 650 cases received surgery of gastric cancer, with 70 percent of patients requiring post-operative chemotherapy. There are 30 surgical doctors and 56 registered nurses in the department. The doctor's main job is to perform surgery and treat for patients. The nurses' main job is to receive new patients, then assess their condition, perform nursing treatment, health education and discharge procedures.

In the outpatient department of the gastrointestinal department, 6-7 doctors from the inpatient department of gastrointestinal surgery work in the clinic from Monday to Friday to investigate new patients or patients who have been discharged and need to be follow up their condition. There are 1-2 doctors receive patients in the clinic on weekends. There are no registered nurses work with the doctors, and only the attendant checks in at the information desk. But, if a doctor prescribes medication,

such as chemotherapy, the patient would go to an outpatient infusion room where registered nurses would administer the treatment.

The postoperative hospitalization time of patients with gastric cancer is generally 10 days to 2 weeks. Follow-up visit is performed one month after surgery at the outpatient department. Because of the shortage of beds at the inpatient department, if a patient needs chemotherapy and there is not available bed, this patient will receive treatment for chemotherapy at infusion room. On the other way, if there is available bed, the patient will go to the inpatient unit for treatment and the researcher will approach this patient on the first 2 hours, after admitted.

Research instruments

1. Screen tool

The Mini-Mental State Examination (MMSE) was first designed by Folstein et al. (1975). This study used the Chinese version of MMSE which was translated by Katzman et al. (1988) to screen the cognitive disorders patients.

This scale consists of 5 dimensions with 30 items, dimensions including orientation, registration, attention and calculation, recall, language and coping. Each correct response is scored as 1 point, while incorrect or unknown is scored as 0 points. Scores range from 0 to 30, the higher the score the better the cognitive function. Among advanced gastric cancer patients one month after gastrectomy, the patient is considered to have a cognitive disorders, if he/she meets the following criteria: 17 points or less for uneducated, 20 points or less for those with 6 or fewer years of education, and 24 or less for those with 7 or more years of education (Katzman et al., 1988).

The Chinese version of MMSE has good reliability with the test-retest was .91 (Katzman et al., 1988).

2. Data collection instruments

The data collection instruments for this study consisted of six questionnaires, including demographic questionnaire, Athens Insomnia Scale (AIS), the Patient-Generated Subjective Global Assessment (PG-SGA), Zung Self-Rating Anxiety Scale (SAS), Social Support Rating Scale (SSRS) and Brief Fatigue Inventory (BFI). Details of the instruments were as follows:

2.1 Demographic questionnaire

This part of the demographic questionnaire was designed by the researcher for this study. The contents of the questionnaire included: age, gender, education, marital status, occupation, income, method of payment for medical expenses, history of smoking and alcohol drinking status, height, weight, comorbidity, operation method, postoperative days, caregivers, diet, ADL scores, exercise and physical symptoms.

The Barthel index (BI) was first designed by Mahoney and Barthel (1965), which was used to measure performance in activities of daily living (ADL). This study used the Chinese version of BI which was translated by Cai et al. (2007) to evaluate ADL of advanced gastric cancer patients.

This scale has 10 items, including: Feeding, Bathing, Grooming, Dressing, Bowels, Bladder, Toilet use, Transfers (bed to chair and back), Mobility (on level surfaces) and Stairs. In the items of Bathing and Grooming, they are divided into two grades (0=dependent and 5=independent). In the items of Feeding, Dressing, Bowels, Bladder, Toilet use and Stairs, they were divided into 3 grades (0=unable or incontinent, 5=need help or occasional accident and 10= independent or continent). There are 4 grades (0=unable, 5=major help or wheelchair independent, 10=minor help or walks with help of one person and 15= independent) for items of Transfers (bed to chair and back) and Mobility (on level surfaces). The total scores ranges from 0 to 100, with lower scores indicating greater dependence.

The condition of ADL among advanced gastric cancer patients one month after gastrectomy was described as following: (Min, 2006)

Total score 0-40 points = Severe dependence
Total score 41-60 points = Moderate dependence
Total score 61-99 points = Slight dependence
Total score 100 points = Independent

The Chinese version of BI has good reliability with the Cronbach's alpha is .92 to .93 (Cai et al., 2007).

2.2 The Athens Insomnia Scale (AIS)

The Athens Insomnia Scale (AIS) was first designed by Soldatos in 1995 (Soldatos, 1995). This study used the Chinese version of AIS which was translated by Sun et al. (2011) to evaluate sleep disturbance of advanced gastric cancer patients.

The scale consists of 8 items, and each item is graded as 0 to 3, the number in front of the options represents the corresponding, score from none (0 = no problem at all) to serious (3 = a very serious problem). Add the scores of each question to get the total score of the scale, which is the corresponding result. The total of these eight items ranges from 0 to 24. A score of 0 means there is no sleep problem, while a score of 24 represents the most severe degree of insomnia. The condition of insomnia among advanced gastric cancer patients one month after gastrectomy was described as total score $\geq$ 6 points mean that the patient has sleep disturbance (Sun et al., 2011).

AIS has high reliability and validity, with the Cronbach's alpha is around .90 and the mean item-total correlation coefficient is about .70 (Soldatos et al., 2000). The Chinese version of AIS has been widely verified in cancer patients (Sun et al., 2020; Sun et al., 2011; Wang et al., 2016), and the Cronbach’s alpha is .97 (Sun et al.,

2020). For this study, the Cronbach's alpha was .90 in 30 samples and it was .82 in 111 samples.

2.3 The Patient-Generated Subjective Global Assessment (PG-SGA)

The Patient-Generated Subjective Global Assessment (PG-SGA) was first designed by Ottery in 1996 (Ottery, 1996). This study used the Chinese version of PG-SGA which was translated by Fu et al. (2018) to evaluate nutritional risk of advanced gastric cancer patients.

This scale is divided into two parts, part one is filled in by patients, including recent changes of weight, dietary intake, symptoms and signs, activity and function, and the scores of the four aspects are added up to A which scores range from 0 to 36 points. For this part, patients should choose the appropriate options according to their own situation. Then the researcher calculated the scores for each aspect. Part two is filled in by health care providers, including disease and its relation to nutritional requirements, metabolic demand, and physical exam, and the scores are recorded as B, C and D respectively. For this part, the researcher evaluated the patients immediately after they had completed the first part. For the aspects of disease and its relation to psychological requirements and metabolic demand, the answer could be obtained by asking the patients. Scores of parts B range from 0 to 7 points, and scores of parts C range from 0 to 9 points. Finally, for the aspect of physical examination, including fat, muscle and fluid status, the order of examination is from top to bottom, from head to toe. Because this aspect is a subjective assessment, the researcher should investigate fat, muscle and fluid in more healthy adults and compare them with the researcher’s own situation, and then assessed the patients. The scores of fat, muscle and fluid of the patients were determined according to the conditions of most parts, which was calculated as D with scores range from 0 to 3 points. The total score of PG.SGA is the sum of A, B, C and D. It ranges from 0 to 55 points, and higher score indicates high nutritional risk.

The condition of nutritional risk among advanced gastric cancer patients one month after gastrectomy was described as following: (Fu et al., 2018)

Total score 0-1 points = well-nourished

Total score 2-8 points = suspected mild or moderate malnutrition

Total score ≥9 points = severe malnutrition

PG-SGA is a reliable tool and some studies have shown that internal consistency is acceptable in a variety of patient populations, with the Cronbach's alpha range from .72 to .73 (Xu & Vincent, 2020). The Chinese version of the PG-SGA for gastric cancer patients has been proven to have good internal and external consistency, with the intra-class correlation coefficients of .99 (Fu et al., 2018). The Cronbach's alpha was .82 in 30 participants and it was .80 in 111 participants in this study.

2.4 The Zung Self-Rating Anxiety Scale (SAS)

The Zung Self-Rating Anxiety Scale (SAS) which was designed by Zung in 1971 (Zung, 1971). This study used the Chinese version of SAS which was translated by Wang (Wang, 1984) to investigation anxiety of advanced gastric cancer patients.

This scale contains 20 items based on a 1-4 score and it mainly assesses the frequency of symptoms, “1” means a little of the time, “2” means some of the time, “3” means good part of the time, “4” means most of the time. 15 of the 20 items are stated in negative words and are graded in the order of 1 to 4. The remaining 5 items (5, 9, 13, 17 and 19) are stated in positive words and are scored in reverse order from 4 to 1. And adding up the scores of each of the 20 items is the score of the patient's anxiety. It ranges from 20 to 80 points, with a higher score manifesting a higher level of anxiety. The level of anxiety among advanced gastric cancer patients one month after gastrectomy was described as following: (Wang, 1984)

Total score 20-44 points= Normal

Total score 45-59 points=Mild to Moderate Anxiety Levels

Total score 60-74 points=Marked to Severe Anxiety Levels

Total score 75-80 points=Extreme Anxiety Levels

The scale of SAS has an internal consistency of .83 and a test-retest reliability of .88 (Zung, 1971). The Chinese version of the SAS has been used by experts and it has good reliability, Cronbach’s α coefficient was over .80 (Lei et al., 2012; Yu et al., 2015). The Cronbach's alpha in this try out study with 30 samples was .84 and it was .81 in the main study with 111samples.

2.5 The Social Support Rating Scale (SSRS)

The SSRS published by Xiao Shuiyuan in 1994(Xiao, 1994) was used to evaluate social support in this study, with a total of 10 items. Items 1-4 and 8-10, 1-4 points are selected from numbers 1-4 respectively. Items 5, 6 and 7 are scored differently. Item 5 includes 5 minor subjects of A, B, C, D and E, and the scores are also from 1 to 4 in each subheading which are represented none to full support. Items 6 and 7 are scored as 0 points if the answer is "no sources", and if the answer is "the following sources", the number of sources is the number of points. In items 6 and 7, the highest point is 9 in each item. The total score of the scale is the sum of the ten items, with a maximum score of 66 and a minimum score of 12. The level of social support among advanced gastric cancer patients one month after gastrectomy was described as following: (Xiao, 1994)

Total score ≤22 points = low level perceived social support

Total score 23-44 points = moderate level perceived social support

Total score ≥45 points = high level perceived social support

This scale has been widely used in Chinese population. The Cronbach's alpha coefficient of the total scale and sub-scale is .83-.90 (Liu et al., 2008). For this study, the Cronbach's alpha was .82 in 30 participants and it was .81 in 111 participants.

2.6 The Brief Fatigue Inventory (BFI)

The Brief Fatigue Inventory (BFI) was first developed by Mendoza et al. in 1999 (Mendoza et al., 1999). The Chinese version of BFI which was translated by Wang et al.(Wang et al., 2004) was used to investigate cancer-related fatigue among advanced gastric cancer patients in this study.

It contains 9 items and uses 11-point numerical rating scale, which is easy and fast for participants to accomplish. Each item in the BFI is scored numerically on a scale of 0-10, from 0(no fatigue or influence) to 10(the most severe fatigue or the most severe disturbance you can imagine). The final result is an average score of 9 items. The level of cancer-related fatigue among advanced gastric cancer patients one month after gastrectomy was described as following: (Wang et al., 2004)

0 point = no fatigue
1-3 points = mild fatigue
4-6 points = moderate fatigue
7-10 points = severe fatigue

BFI has established reliability and validity in oncology inpatients, outpatients and healthy person (Mendoza et al., 1999). Its internal consistency was .96 (Mendoza et al., 1999). The Chinese version of the BFI has been confirmed by experts to have good reliability that the Cronbach’s coefficient alpha was .92 for fatigue severity items and .90 for fatigue interference items (Wang et al., 2004). In this try out study with 30 samples, the Cronbach's alpha was .95, and in the main study with 111 samples, it was .94.

Protection of human subjects

The research proposal was submitted for approval from the Institutional Review Board (IRB) of Burapha University (BUU) (G-HS045/2564) and IRB in the First Affiliated Hospital of Wenzhou Medical University, China (2021-096). Only after that, this research was carried out.

The researcher is a registered nurse who collected data after obtaining permission from the hospital and relevant departments. Before collecting the data, all participants were informed of the purpose, steps and content of the study. After obtaining the consent from the participants, the researcher asked them to sign the consent form before inclusion in the study. In the process of data collection, patients' wishes were fully respected, and patients could refuse to answer questions which made them uncomfortable, and they also could withdraw from the study at any time if they would not want to participate in the study. Throughout the study, patients' names were not registered and disclosed, then patients’ privacy was protected, and only codes were used to store participants' data. All data were stored in a safe place where only the researcher could view it and were used for research purposes only. If any

patients want to know the results of the study, they can contact the researcher to provide a report. One year after the study is completed, the data will be destroyed.

Data collection procedures

The data collection of this study was carried out by the researcher as follows:

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

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

3. After obtaining the consent of the director of the nursing department and the person in charge of the department, the study was carried out. As the researcher was one of the nurses in gastrointestinal surgery and was very familiar with the work flow of the department. The researcher also explained the purpose, steps and contents of this study to the colleagues in the department, and obtained understanding and cooperation.

4. The researchers recruited participants using a simple random sampling technique. She prepared two sheets of paper in the same size with writing down odd numbers and even numbers. Then the researcher put them in a bag. Each morning when the researcher was going to collect data, she must take a piece of paper from the bag first. If she drew odd-numbered paper, all patients with odd serial numbers of the patients' ID were included in the sample that day. On the contrary, patients with even serial numbers were included, if researcher drew even-numbered paper.

5. The nurses of the inpatient department to screen the patients according to the inclusion criteria. While in the outpatient department, the doctors who were on duty to screen the patients according to the inclusion criteria. Then the researcher recruited participants.

6. The researcher explained to the patients the purpose, procedure, content, privacy and information about the rights of the study, and then signed the consent form after obtaining the consent, and then conducted the questionnaire (demographic, BFI, PG-SGA, AIS, SSRS, SAS).

7. The questionnaire was self-reported by the participants except part 2 of PG-SGA which was filled by the researcher. When the participants did not understand the meaning of the questionnaire during filling in the form, the researcher should explain the content of the questionnaire to the participants and help them complete the questionnaire.

8. The process of collecting data at the inpatient department was carried out at the first 1-2 hours after the patients admitted. And the collecting data process of the

outpatient department was carried out when the patient was waiting for medical treatment. For the completion of the questionnaire, the researcher brought patient into a quiet room to conduct the questionnaire, and took care not to delay the patient's treatment. The privacy of patients was protected, and the principle of non-harm was observed in the whole process.

9. It took about 30 minutes to complete the questionnaire. The researcher checked the completeness of the questionnaire after completion.

10. The guidelines for preventing COVID-19 (including the data collection pattern consistent with)

10.1 The researcher and the participants should wear masks correctly throughout the data collection process.

10.2 A safe distance of at least 1 meter should be maintained between the researcher and the participants.

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

10.4 Items touched by participants should be cleaned and disinfected before being given to the next participant.

10.5 Completed questionnaires kept in a separate archive bag.

11. Repeated the whole work until the sample size met the research requirements.

Data analysis

Data was analyzed by Statistical Package for the Social Sciences, version 25.0 (SPSS Inc., Chicago, IL, USA) in this study. The significance level was set at .05, data analysis included:

1. The descriptive statistics was used to describe frequencies, percentages, means, and standard deviations of demographic data and each variable among advanced gastric cancer patients one month after gastrectomy.
2. The data were tested for normality and homoscedasticity outliers of the variables to verify the assumptions of Pearson’s product moment correlation test.
3. The Pearson’s product moment correlation was used to examine relationship between sleep disturbance, nutritional risk, anxiety and social support with CRF among advanced gastric cancer patients one month after gastrectomy in Wenzhou, China.

CHAPTER 4
RESULTS

This chapter presents the results of the data analysis about Cancer-related fatigue (CRF) and related factors (sleep disturbance, nutritional risk, anxiety, and social support) among 111 advanced gastric cancer patients one month after gastrectomy in Wenzhou, China. The results are divided into three parts. The first part describes the demographic characteristics and health information of the participants. In the second part describes the study variables (sleep disturbance, nutritional risk, anxiety, social support and CRF). Finally, the third part presents the relationships between CRF and sleep disturbance, nutritional risk, anxiety, and social support in the population.

Part 1 Demographic characteristics and health information

1.1 Demographic characteristics

The demographic characteristics of the participants are showed in table 1.

Table 1 Frequency, percentage, mean, and standard deviation of demographic characteristics of the participants (n = 111)

Characteristics	**Number (n)**	**Percentage (%)**
Age		
30-44 years (Young adult)	1	0.9
45-59 years (Middle-aged)	21	18.9
60-74 years (Younger elder)	74	66.7
75-89 years (Elderly)	15	13.5
(*M*=66.2, *SD*=8.1, min=39, max=83)		

Table 1 (Continued)

Characteristics	Number (n)	Percentage (%)
Gender		
Male	79	71.2
Female	32	28.8
Marital status		
Married	93	83.8
Widowed	18	16.2
Occupation		
Employed	39	35.1
Officer	14	12.6
Farmer	14	12.6
Self-employed	11	9.9
Unemployed	45	40.5
Retirement	27	24.4
Education		
Illiteracy	41	36.9
Primary school	55	49.6
Middle school	10	9.0
High school	4	3.6
College	1	0.9

Table 1 (Continued)

Characteristics	Number (n)	Percentage (%)
Income (monthly household)		
¥ 1000-3000 ($158-$473)	22	19.8
¥ 3000-5000 ($473-$789)	39	35.1
¥ >5000 ($789)	50	45.1
Payment for medical expenses		
Self-payment	6	5.4
Insurance	105	94.6

Table 1 The result showed that age of the samples was range from 39 to 83 years old with the average of 66.2 years old (SD = 8.1). The majority of this group was a younger elderly which age between 60-74 years old, approximately 66.7%. The most of participants were male (71.2%) and married (83.8%). 40.5% of the participants were unemployed, while just one-third of the participants were employed (35.1%). 49.6 % of the participants had attended primary school and 36.9 % of them had never been to school. Majority of participants (45.1%) earned monthly household of more than ¥5,000 ($789), and 35.1% of them earned ¥3,000~5,000 ($473-$789). Nearly all of participants (94.6%) had used insurance to pay for the medical expenses.

1.2 Health information of the participants
Health information of the participants consisting of are presented in table 2.

Table 2 Frequency, percentage, mean, and standard deviation of health information of the participants (n = 111)

Health information	**Number(n)**	**Percent (%)**
History of Smoking		
Yes	64	57.7
No	47	42.3
History of Alcohol Drinking		
Yes	61	54.1
No	50	45.9
Co-morbidity		
No	60	54.1
Yes*	51	45.9
Hypertension	43	29.5
Diabetes	16	10.9
Other (heart disease, COPD, cerebral embolism, anemia)	8	5.5
Body mass index (BMI)		
<18.5 (Underweight)	26	23.4
18.5-24.9 (Normal weight)	77	69.4
25-29.9 (Overweight)	6	5.4
≥30 (Obesity)	2	1.8
M= 21.2, *SD* = 3.1, Range 15.7 to 35.5		
Operation method		
Total gastrectomy	42	37.8
Subtotal gastrectomy	69	62.2

Table 2 (Continued)

Health information	Number(n)	Percent (%)
Caregivers		
Children	73	65.8
Spouse	38	34.2
Meal/day		
3-4	8	7.2
5-7	96	86.5
≥8	7	6.3
Type of diet		
Porridge	59	53.2
Noodles	38	34.2
Rice	14	12.6
Amount of diet		
<0.5 bowl/meal	6	5.4
≥0.5 bowl/meal	105	94.6
Activities of Daily Living (ADL)		
41-60 (Moderate dependence)	1	0.9
61-99 (Slight dependence)	19	17.1
100 (Independence)	91	82.0
Exercise		
No	29	26.1
Half an hour once a day	40	36.1
More than half an hour once a day	42	37.8

Table 2 (Continued)

Health information	Number(n)	Percent (%)
Physical symptoms		
No	37	33.3
Yes*	74	66.7
Dyspepsia	39	23.2
Bowel habit change	13	7.7
Abdominal distension	11	6.5
Pain	1	0.6
Xerostomia	6	3.6
Sleep disorder	42	25.1

* The participant can answer more than one answer

As illustrated in table 2, 57.7% of participants were past smoker, while 54.1% of them drank alcohol in the past. Half of the participants (54.1%) did not have any other medical conditions, and in the other half of the participants who had co-morbidity, hypertension was the most common diagnosis (29.5%). More than half of the participants (69.4%) were in normal BMI level (BMI=18.5-24.9), and 62.2% of participants underwent subtotal gastrectomy. All of participants were cared, by children (65.8%) or spouses (34.2%). For the diet, most of them (86.5%) had 5-7 meals per day, while other (94.6%) ate 0.5 or more than 0.5 bowl per meal. Half of them (53.2%) consumed a soft diet with porridge. Most of the participants (82.0%) were able to taking care of themselves (ADL=100). 36.1% of these patients exercised for about half an hour once a day and 37.8% of them exercised for more than half an hour once a day, basically by walking. More than half of the participants (66.7%) were experiencing some physical discomfort in the last week, some of the participants had more than one physical symptom, and the high numbers were sleep disorder and dyspepsia, at 25.1% and 23.2%, respectively.

Part 2 Description of the study variables

2.1 Description of cancer-related fatigue

CRF of the participants are presented in table 3.

Table 3 Frequency, percentage, mean and standard deviation of CRF level (n = 111)

Level of Cancer-related fatigue	Range		Number (n)	Percentage (%)
	Possible score	Actual score		
Mild	1~3	0.11~3.89	89	80.2
Moderate	4~6	4.00~6.67	22	19.8
Severe	7~10	--	0	0
M=2.71, *SD*=1.50, min=0.11, max=6.67				

Table 3 The result showed that the mean score of CRF was 2.71 (*SD* = 1.50) and the actual score rang was 0.11~6.67. Most of samples were at mild level of CRF approximately 80.2% while 19.8% of samples experienced moderate level of fatigue.

2.2 Description of related factors

The descriptions of related factors of CRF which were sleep disturbance, nutritional risk, anxiety, and social support were described in table 4 and table 5.

Table 4 Frequency and percentage of related factors (n = 111)

	Number (n)	**Percentage (%)**
Sleep disturbance		
No sleep disturbance	57	51.4
Have Sleep disturbance	54	48.6
Nutritional risk		
Suspected mild or moderate malnutrition	31	27.9
Severe malnutrition	80	72.1
Anxiety		
Normal	111	100
Social support		
Low level perceived social support	1	0.9
Moderate level perceived social support	95	85.6
High level perceived social support	15	13.5

Table 4 showed that for sleep disturbance, half of the participants (51.4%) had no problem of sleep disturbance, but another half part (48.6%) had. For nutritional risk, majority of the participants (72.1%) had severe malnutrition. For anxiety, all of the participants (100%) reported normal level of anxiety. For social support, most of the participants (85.6%) perceived moderate level social support.

Table 5 Range, mean, standard deviation and meaning of related factors (n = 111)

	Range				
	Possible score	**Actual score**	***M***	***SD***	**Meaning**
Sleep disturbance	0～24	0～17	5.6	3.9	No sleep disturbance
Nutritional risk	0～50	3～21	11.5	4.4	Severe malnutrition
Anxiety	20～80	20～41	28.5	5.4	Normal
Social support	12～66	22～51	36.2	7.2	Moderate level perceived social support

Table 5 It showed that for sleep disturbance, the actual score ranged from 0 to 17 with a mean score of 5.6 (*SD* = 3.9) indicating no sleep disturbance. The mean score of nutritional risk was 11.5 (*SD* = 4.4), ranging from 3-21 showing severe malnutrition. The mean score of anxiety was 28.5 (*SD* = 5.4), ranging from 20-41 showing no anxiety. Mean score of social support was 36.2 (SD = 7.2), indicating moderate level of social support (Actual score 22-51).

Part 3 Relationships between CRF and related factors

The normal distribution of the variables was tested through skewness/standard error, Kolmogorov-Smirnov test and Q-Q Plot. All variables conform to a normal distribution. So, correlation of independent variables with CRF used Pearson's product moment test to analyze.

The Pearson's product moment correlation was used to examine relationship between CRF and sleep disturbance, nutritional risk, anxiety, and social support. The results were presented as the table 6.

Table 6 Correlation coefficients between sleep disturbance, nutritional risk, anxiety, and social support and CRF (n =111)

Variables	**Correlation coefficient (r)**	***P*-value**
Sleep disturbance	.37***	<.001
Nutritional risk	.35***	<.001
Anxiety	.57***	<.001
Social support	-.40***	<.001

*** = <.001

Table 6 indicated that sleep disturbance, nutritional risk, and anxiety had a positive significant correlation at moderate level with CRF (r = .37, r = .35 and r = .57, $p < .001$, respectively). Social support had a negative significant correlation at moderate level with CRF (r = -.40, $p < .001$).

CHAPTER 5
CONCLUSION AND DISCUSSION

This chapter delineates a summary and the discussion of the study results, conclusion, implication, and recommendation for the future research.

Summary of the study

This study aimed to describe level of cancer-related fatigue (CRF) and to determine the relationships between sleep disturbance, nutritional risk, anxiety, and social support with CRF among advanced gastric cancer patients one month after gastrectomy in Wenzhou, China. The Theory of Unpleasant Symptoms (TOUS) was used as a conceptual framework to guide this study. Simple random technique was applied to recruit 111 participants from the inpatient and outpatient department of gastrointestinal surgery, the First Affiliated Hospital of Wenzhou Medical University in Wenzhou, China. Data was collected by self-reported questionnaires which include Demographic questionnaire, Athens Insomnia Scale (AIS) (Soldatos, 1995), the Patient-Generated Subjective Global Assessment (PG-SGA) (Ottery, 1996), Zung Self-Rating Anxiety Scale (SAS) (Zung, 1971), Social Support Rating Scale (SSRS) (Xiao, 1994) and Brief Fatigue Inventory (BFI) (Mendoza et al., 1999). The all scales have good reliability that the Cronbach's coefficient alpha was .82, .80, .81, .81, and .94 respectively.

The finding of this study reveals that age of the participants were in the range of 39 to 83 years with the average of 66.2 years (*SD*=8.1), and most of them (66.7%) were younger elderly aged 60-74 years. Majority of the participants were male (71.2%), married (83.8%), unemployed (40.5%), and had a primary school education (49.6 %). Most of participants earned monthly household of more than ¥5,000 ($789), and nearly all of participants (94.6%) had used an insurance to pay for the medical expenses.

Inside of health-related information, half of the participants had history of smoking (57.7%) and alcohol drinking (54.1%). 45.9% of the participants had comorbidities with most frequency in hypertension (29.5%). Most of the participants were in normal body mass index (69.4%), underwent subtotal gastrectomy (62.2%), took care by themselves (82.0%) with the score of activities of daily living was 100.

All the participants had caregivers. For the diet, almost of them (86.5%) had 5~7 meals per day, while 94.6% ate 0.5 or more than 0.5 bowl per meal and half of them (53.2%) ate liquid diet. One-third of the participants exercised for more than half an hour once a day, basically by walking. 66.7% of them experienced some physical symptoms with the high numbers of symptom reported were sleep disorder (25.1%) and dyspepsia (23.2%).

The mean score of CRF was 2.71 (*SD* = 1.50), showing that the participants had a mild level of CRF. The mean score of sleep disturbance was 5.6 (*SD* = 3.9) indicating no sleep disturbance. For nutritional risk, the mean score was 11.5 (*SD* = 4.4) showing severe malnutrition level. For anxiety, the mean score was 28.5 (*SD* = 5.4) showing normal. Mean score of social support was 36.2 (*SD* = 7.2) indicating the participants perceived moderate level of social support.

There was a positive significant correlation between sleep disturbance, nutritional risk, and anxiety with CRF (r = .37, r = .35 and r = .57, $p < .001$, respectively). There was a negative significant correlation between social support with CRF (r = -.40, $p < .001$).

Discussion

The findings were discussed based on the objectives and hypotheses of this study. The first objective was to describe level of CRF and the second was to determine the relationships between sleep disturbance, nutritional risk, anxiety and social support with CRF among advanced gastric cancer patients one month after gastrectomy in Wenzhou, China.

Cancer-related fatigue

In this study, 100% of the participants reported CRF. The mean score of CRF among advanced gastric cancer patients one month after gastrectomy was 2.7 out of 10 (*SD*=1.5), which was at mild level. However, 80.2% of the participants were at mild level of CRF, 19.8% of them were at moderate level. This is consistent with previous studies, Zou et al. (2018) found the incidence of CRF was 91.6% at severe level among preoperative and postoperative gastric cancer survivors. In addition, the preoperative CRF was found to be 85% at mild level and the postoperative CRF was up to 99.2% at moderate level in the study of Zhang (2017). Moreover, the study of

Qiu (2019) found that the incidence of CRF in patients with gastric cancer was as high as 80.56%, with moderate to severe fatigue predominating. In the systematic review of CRF in cancer patients, Ma et al. (2020) reported the prevalence of CRF was 14% to 100% and an average prevalence rate was 56%, with was at mild level 18% and moderate level 23% and severe level 15%. From what has been discussed above, the incidence of postoperative CRF was significantly high, consistent with the results of this study. However, the participants in this study had reported relatively mild levels of CRF.

In this study, 80.2% of the participants were the elderly (age > 60 year), thus reporting a high rate of CRF. There are many studies point out that the older patient is more intense the fatigue feeling (Bødtcher et al., 2015; Feng, 2019; Serdà I Ferrer et al., 2018; Zhang, 2017). This is mainly due to the fact that with age growth, the body's physiological indicators all decline to varying degrees and the body's tolerance decreases, and the participants just experienced stomach surgery that their immunity and ability to recover after treatment is reduced compared to younger people, makes elderly patients more prone to symptoms such as fatigue, restless sleep and forgetfulness (Bødtcher et al., 2015; Feng, 2019; Serdà I Ferrer et al., 2018; Zhang, 2017), that caused them face with CRF.

In this study, about one-third of the participants had never been to school and half of the patients had only primary school level education. It is evident that they were less educated which result higher incidence of CRF, that is consistent with previous study (Feng, 2019). This may be because the educated the patients are easier to use their knowledge and skills to seek information about the disease, and to have a greater sense of control over their disease (Ebede et al., 2017). In addition, the high incidence of CRF in this study was also associated with the low level of BMI, accounting for nearly one third of the cases were underweight (BMI<18.5), which is consistent with previous studies that CRF was negatively associated with BMI (Al Maqbali, 2021).

In addition, 71.2% of the participants in this study were males. Males are physically stronger than females why males have lower level of severity of CRF (Gillen et al., 2021). Moreover, all of the participants in this study had caregivers and most of them (64.9%) were not required to work, which gave the patients more time

to rest that resulted in lower level of CRF (Al Maqbali, 2021). 73.9% of patients had daily walking exercise, and Su et al. (2018) concluded that aerobic exercise could effectively improve cardiopulmonary function, increase their activity endurance, and relieve fatigue in oncology patients.

In this study 62.2% of participants underwent subtotal gastrectomy, may be the reason why they feel less fatigue. Compared to patients after total gastrectomy, that patients after subtotal gastrectomy with a gastric reservoir which facilitates food intake, digestion and absorption (Eom et al., 2018; Hwang et al., 2014; Yang, 2019). For the diet in this study, 86.5% of the participants had 5-7 meals per day, while 94.6% ate 0.5 or more than 0.5 bowl per meal. This means that majority of patients were getting enough nutrition to reduce fatigue (Baguley et al., 2017). Taken together, these phenomena explain well why the participants reported mild degree of CRF.

However, the participants got severe malnutrition from the scores of PG-SGA in this study. This may be due to the fact that it is only one month after surgery and the food intake may not be enough. Because this population, they had already experienced weight loss and nutritional deficiencies before surgery due to various digestive problems (Wu, 2017). After surgery, they were allowed to consume liquid food for around 3 weeks. Secondly, it may be related to absorption disorders and metabolic changes (Eom et al., 2018).

Factors related to Cancer-related fatigue

The findings of this study revealed that CRF among advanced gastric cancer patients one month after gastrectomy in Wenzhou, China was related with sleep disturbance ($r = .37$, $p < .001$), nutritional risk ($r = .35$, $p < .001$), anxiety ($r = .57$, $p < .001$), and social support ($r = -.40$, $p < .001$) which is consistent with the research hypothesis.

Sleep disturbance

In consistent with the hypothesis of the study, sleep disturbance is positively associated with CRF among advanced gastric cancer patients one month after gastrectomy in Wenzhou, China. This result was similar to previous studies which show that sleep disturbance was positively correlated with CRF among cancer patients (Chen et al., 2020; Li, 2014; Tian et al., 2016; Zhu et al., 2021).

The relationship between sleep disturbance and CRF can be explained by the TOUS. CRF is an unpleasant symptom which the patient is experiencing. Sleep disturbance belonged to physiological influencing factor domain which affect the unpleasant symptom of CRF. If participants had poor quality of sleep, then their CRF would be enhanced (Chen et al., 2020; Li, 2014; Tian et al., 2016; Zhu et al., 2021). In this study, the mean score showed the participants had no sleep disturbance, however, 48.6% of the patients reported they had sleep disturbance. Even if patients suffering from malignant tumors, the fear for cancer and the pain from anti-cancer treatment put patients under great psychological pressure for a long time, which seriously affects their sleep quality, mainly manifesting as poor mental state, early waking, dreaminess, restless sleep at night, irritable temper and other symptoms (Loh et al., 2018; Wu et al., 2018; Zhu et al., 2021).

First of all, sleep disturbance can lead to reduced physical strength in the daytime, which in turn affects the amount of daytime activity, causing symptoms such as loss of appetite, shortness of breath, and constipation (Li, 2014; Zhu et al., 2021). Sleep disturbance also affects autoimmune function, then that all aggravate fatigue (Li, 2014; Zhu et al., 2021). Secondly, sleep disturbance disrupts the circadian rhythm, disrupts the immune system and endocrine disorders, which seriously hinders the body's self-recovery function and aggravates the symptoms of fatigue (Li, 2014; Zhu et al., 2021). So, this is consistent with this study that sleep disturbance has the relationship with CRF.

Nutritional risk

Consistent with the hypothesis of the study, nutritional risk is positively associated with CRF among advanced gastric cancer patients one month after gastrectomy in Wenzhou, China. This result was consistent with many studies which found that nutritional risk was positively associated with CRF (Baguley et al., 2017; Inglis et al., 2019; Wei & Li, 2018).

In the TOUS, nutritional risk is a physiological variable which affect the unpleasant symptom. Advanced gastric cancer patients with high risk of nutritional status performed high level of CRF than those with low nutritional risk (Baguley et al., 2017; Inglis et al., 2019; Wei & Li, 2018). In this study, 100% of patients were in moderate and severe malnutrition status according to PG-SGA scores, with the mean

score was 11.5 (*SD* = 4.4). The level of CRF was significantly positively correlated with nutritional risk (r = .35, $p < .001$). Consistent with the study by Wei and Li (2018), PG-SGA identified severe malnutrition in 94.29% of 70 postoperative colorectal cancer patients and had correlation with CRF (r = .33, $p < .01$).

For gastric cancer patients, they consume a lot of energy from their body when patients are coping with cancer (Kühl et al., 2018). Then surgical stress increases protein metabolism, resulting in a negative nitrogen balance (Wei & Li, 2018). In addition, postoperative reconstruction of the gastrointestinal tract in gastric cancer patients results in a prolonged period of liquid food consumption (Zhang & Sun, 2011). From above all, those all lead to a lack of energy and protein, resulting in malnutrition and increased fatigue (Wei & Li, 2018). So, this is consistent with this study that nutritional risk has the relationship with CRF.

Anxiety

The result of this study is consistent with the hypothesis of the study, anxiety is positively associated with CRF among advanced gastric cancer patients one month after gastrectomy in Wenzhou, China. The study by Li (2014), similarly identified anxiety as one of the factors that in positively correlation with CRF in cancer patients (r = .34, $p < .01$).

Base on TOUS, anxiety is a psychological factor affecting unpleasant symptom of CRF. In this study, the mean anxiety score of patients with advanced gastric cancer was 28.5 (*SD* = 5.4), which was positively associated with CRF (r = .57, $p < .01$). Overall, patients with more anxiety, the higher levels of fatigue they were.

In this study, participants had not higher anxiety scores, and they also had lower levels of CRF. However, the results of the correlation analysis in this study, which found a significant positive association between low level of anxiety and lower level of CRF. Research results in this paper are closely related to Chinese traditional culture. In China, once a patient is diagnosed with cancer, most families choose to hide the patient’s illness because they believe that negative emotions would accelerate the progress of the disease (Du & Yang, 2021). Therefore, the patient's family will try to reduce the patient's anxiety by hiding the illness and by providing companionship and support to help the patient recover better and faster. At the same time, a study has

shown that negative emotions increase the degree of physical exertion of patients, reduce their resistance, lead to serious dysregulation of the body's secretion system, and increase fatigue sensitivity (Du & Yang, 2021). So, this is consistent with this study that anxiety has the relationship with CRF.

Social support

Consistent with the hypothesis of the study, social support is negatively associated with CRF among advanced gastric cancer patients one month after gastrectomy in Wenzhou, China. This result was consistent with many studies which found that social support was negatively associated with CRF (Feng, 2019; Tan & Xia, 2014; Yuan et al., 2021; Zhang, 2017).

According to TOUS, social support belongs to situational factors includes one's social support network and interpersonal relationships, which affect the unpleasant symptom of CRF. In this study, 85.6% of patients were in moderate level of social support, with the mean score was 36.2 (*SD* = 7.2). Moreover, social support was significantly negatively correlated with CRF (r = -.40, $p < .001$). In the study by Yuan et al. (2021), it showed that social support is negatively correlated with CRF in cancer patients (r = -.32, $p < .01$) which was very similar with this study. In conclusion, patients who reported higher level of social support, they were in the lower level of CRF.

Due to the trauma of surgery, patients need the assistance of others for a long period of time after surgery (Zhang, 2017). In the strong Chinese culture of kinship, once someone gets sick, other family members take on the responsibility of caring for the patient. All patients in this study had caregivers with higher level of social support, then they can got more help and support, felt less isolation and less symptomatic distress, and had lower levels of CRF (Zhang, 2017). Therefore, the help from family members can help patients jump out of the negative cognitive mode, relieve negative emotions, actively face their own situation, better cooperate with treatment, thus reducing physical and mental distress accordingly (Qin et al., 2022). So, this is consistent with this study that social support has the relationship with CRF.

Conclusion

This study found that all of the advanced gastric cancer patients one month after gastrectomy in Wenzhou, China reported mild level of cancer-related fatigue. Sleep disturbance, nutritional risk, and anxiety were significant positively associated with CRF among participants. While social support was significant negatively associated with CRF in these participants.

Implications

In terms of nursing practice, the results of this study provide a basis for nursing staff to further understand CRF among advanced gastric cancer patients one month after gastrectomy. Also, the results of this study can be used to develop appropriate nursing interventions to reduce CRF in patients with advanced gastric cancer by improving sleep quality, enhancing nutrition, reducing anxiety and providing more social support. The ultimate goal is to improve patients' health status and quality of life for the rest of their lives.

It can be used in nursing education for nurse educator to enhance nursing students' knowledge on CRF among advanced gastric cancer patients one month after gastrectomy. It also can be useful to help nursing students understand the characteristics and related factors of CRF in patients with advanced gastric cancer.

Recommendation for future research

1. This study is only established correlations between sleep disturbance, nutritional risk, anxiety, social support and cancer-related fatigue; causality needs further study.

2. Further intervention studies are needed to develop appropriate nursing interventions to improve sleep quality, enhance nutrition, reduce anxiety and provide more social support to enable advanced gastric cancer patients after gastrectomy to reduce cancer-related fatigue.

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APPENDICES

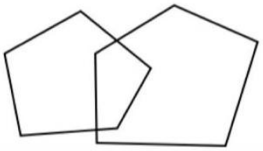
APPENDIX A

Questionnaires in English version

Screening toll

*This scale is used to screen patient's cognitive disorders.

MINI MENTAL STATE EXAMINATION (MMSE)

ONE POINT FOR EACH ANSWER / DATE				
ORIENTATION Year Month Day Date Time	____/5	____/5	____/5	____/5
Country Town District Hospital Ward	____/5	____/5	____/5	____/5
REGISTRATION Examiner names 3 objects (eg apple, table, penny) Patient asked to repeat (1 point for each correct). THEN patient to learn the 3 names repeating until correct.	____/3	____/3	____/3	____/3
ATTENTION AND CALCULATION	____/5	____/5	____/5	____/5
RECALL	____/3	____/3	____/3	____/3
LANGUAGE	____/2	____/2	____/2	____/2
.....	____/1	____/1	____/1	____/1
.....	____/3	____/3	____/3	____/3
.....	____/1	____/1	____/1	____/1
Ask the patient to write a sentence. Score if it is sensible and has a subject and a verb.	____/1	____/1	____/1	____/1
COPYING Ask the patient to copy a pair of intersecting pentagons: 	____/1	____/1	____/1	____/1
TOTAL	____/30	____/30	____/30	____/30

Questionnaire

Dear Patient:

Hello! In order to promote your health and know the following aspects of the content, please fill in according to the true situation, we promise to provide the information strictly confidential, please do not have any concerns, thank you for your cooperation!

* Instructions for completing the form: Please tick the option or number that matches your choice.

PART I The general situation

1. **Age**_____
2. **Gender** □Male □Female
3. **Occupation** □Clerk □Farmer □Self-employed □Retirement □Unemployed
4. **……**
5. **……**
6. **……**
7. **……**
8. **……**
9. **……**
10. **……**
11. **……**
12. **……**
13. **……**
14. **……**
15. **……**
16. **……**
17. **……**
18. **Exercise** □No □half an hour one day □more than half an hour one day

    Type of motion_____

19. **Physical symptoms** □Dyspepsia □Bowel habit change □Abdominal distension □Pain □Xerostomia □Sleep disorder

PART II BRIEF FATIGUE INVENTORY (BFI)

Throughout our lives, most of us have times when we feel very tired or fatigued.

Have you felt unusually tired or fatigued in the last week? Yes ☐ No ☐

1. Please rate your fatigue (weariness, tiredness) by circling the one number that best describes your fatigue right NOW.

0	1	2	3	4	5	6	7	8	9	10
No Fatigue										As bad as you can imagine

2. …….

3. …….

4. ……

A. ……
B. ……
C. ……
D. Normal work (includes both work outside the home and daily chores) 0 1 2 3 4 5 6 7 8 9 10 Does not interfere Completely interferes
E. Relations with other people 0 1 2 3 4 5 6 7 8 9 10 Does not interfere Completely interferes
F. Enjoyment of life 0 1 2 3 4 5 6 7 8 9 10 Does not interfere Completely interferes

PART III PATIENT-GENERATED SUBJECTIVE GLOBAL ASSESSMENT (PG-SGA)

History (Boxes 1-4 are designed to be completed by the patient.)

1. Weight (See Worksheet 1)
In summary of my current and recent weight:
I currently weigh about _____ pounds
I am about _____ feet _____ tall
One month ago I weighed about _____ pounds
Six months ago I weighed about _____ pounds
During the past two weeks my weight has:
□decreased (1) □not changed (0) □increased (0) Box1(___)

2. Food Intake: As compared to my normal intake, I would rate my food intake during the past month as:
□unchanged (0)
□more than usual (0)
□less than usual (1)
I am now taking:
□normal food but less than normal amount (1)
□little solid food (2)
□only liquids (3)
□only nutritional supplements (3)
□very little of anything (4)
□only tube feedings or only nutrition by vein (0) Box2(___)

3. Symptoms: ……
Box3(___)

4. Activities and Function: ……
Box4(___)

Additive Score of the Boxes 1-4(___)

The remainder of this form will be completed by your doctor, nurse, dietitian, or therapist. Thank you.

Worksheet 1 - Scoring Weight (Wt) Loss

.....

5. Worksheet 2 - Disease and its relation to nutritional requirements

.....

6. Work Sheet 3 - Metabolic Demand

.....

7. Worksheet 4 - Physical Exam

Physical exam includes a subjective evaluation of 3 aspects of body composition: fat, muscle, & fluid status. Since this is subjective, each aspect of the exam is rated for degree of deficit. Muscle deficit impacts point score more than fat deficit. Definition of categories: 0 = no deficit, 1+ = mild deficit, 2+ = moderate 3+ = severe

Muscle Status:				
temples (temporalis muscle)	0	1+	2+	3+
clavicles (pectoralis & deltoids)	0	1+	2+	3+
shoulders (deltoids)	0	1+	2+	3+
interosseous muscles	0	1+	2+	3+
Scapula (latissimus Doris, trapezius, deltoids)	0	1+	2+	3+
thigh (quadriceps)	0	1+	2+	3+
calf (gastrocnemius)	0	1+	2+	3+
Global muscle status rating	**0**	**1+**	**2+**	**3+**

Fluid Status:				
ankle edema	0	1+	2+	3+
sacral edema	0	1+	2+	3+
ascites	0	1+	2+	3+
Global fluid status rating	**0**	**1+**	**2+**	**3+**

Fat Stores:				
orbital fat pads	0	1+	2+	3+
triceps skin fold	0	1+	2+	3+

Numerical score from Worksheet 4(_____) D

Total PG-SGA score(_____)

(Total numerical score of A+B+C+D above)

(See triage recommendations below)

fat overlying lower ribs	0	1+	2+	3+
Global fat deficit rating	**0**	**1+**	**2+**	**3+**

Clinician Signature_____ RD RN PA MD DO Other_____ Date_____

Global PG-SGA rating (A, B, or C) =(_____)

Worksheet 5 - PG-SGA Global Assessment Categories

	Stage A	Stage B	Stage C
Category	Well-nourished	Moderately Malnourished	Severely Malnourished
Weight	No wt loss **OR** Recent wt gain	< 5% wt loss in 1 month (or 10% in 6 mos.) **OR** Progressive wt loss	> 5% wt loss in 1 month (or >10% in 6 mos.) **OR** Progressive wt loss
Nutrient intake	No deficit **OR** Significant Recent improvement	Definite decrease in intake allowingadequate intake	Severe deficit in intakeimprovement
Nutrition Impact	None **OR** Significant recent improvement	Present of nutrition impact symptoms (PG-SGA Box 3)	Present of nutrition impact Symptoms symptoms (PG-SGA Box 3)
Functioning	No deficit **OR** Recent improvement	Moderate functional deficit **OR** Recent deterioration	Severe functional deficit **OR** recent significant deterioration
Physical Exam	No deficit **OR** Chronic deficient but recent improvement	Evidence of mild to moderate loss of muscle mass / SQ fat / muscle tone on palpation	Obvious signs of malnutrition (e.g., severe loss muscle, SQ tissue, possible edema)

Nutritional Triage Recommendations: Additive score is used to define specific nutritional interventionsincluding patient & family education, symptom management including pharmacologic intervention, and appropriate nutrient intervention (food, nutritional supplements, enteral, or parenteral triage).
First line nutrition intervention includes optimal symptom management.

Triage based on PG-SGA point score

0-1 No intervention required at this time. Re-assessment on routine and regular basis during treatment.

2-3 Patient & family education by dietitian, nurse, or other clinician with pharmacologic intervention asindicated by symptom survey (Box 3) and lab values as appropriate.

4-8 Requires intervention by dietitian, in conjunction with nurse or physician as indicated by symptoms (Box 3).

≥ 9 Indicates a critical need for improved symptom management and/or nutrient intervention options.

PART IV ATHENS INSOMNIA SCALE (AIS)

This scale is intended to record your own assessment of any sleep difficulty you might have experienced. Please, check (by circling the appropriate number) the items below to indicate your estimate of any difficulty, provided that it occurred at least three times per week during the last month.

1. SLEEP INDUCTION (time it takes you to fall asleep after turning-off the lights)
   0 No problem 1 Slightly delayed
   2 Markedly delayed 3Very delayed or did not sleep at all
2. AWAKENINGS DURING THE NIGHT
   0 No problem 1 Minor problem
   2 Considerable problem 3Serious problem or did not sleep at all
3. ……
4. ……
5. ……
6. ……
7. ……
8. SLEEPINESS DURING THE DAY
   0 None 1 Mild 2 Considerable 3Intense

PART V SOCIAL SUPPORT RATING SCALE (SSRS)

The following questions are asked to describe the support from your family and the society. Please answer them by the best judgment you can make and circle the chosen answer(s). Thanks for your cooperation.

1). How many friends do you consider to be close enough to you that can rely on them for help when you need it?

1. None
2. 1 - 2
3. 3 - 5
4. 6 or more

2). In the last year, you: (Choose only one item)

1. Stayed away from others and lived alone
2. Moved a lot, and mostly lived with strangers
3. Lived with colleagues, friends, or classmates
4. Lived with your family

3). ……

4). ……

5). ……

6). ……

7). ……

8). ……

9). When you have difficulties/troubles, you… (Choose only one item)

1. Rely on yourself and do not accept help from others
2. Rarely ask for help
3. Sometime ask for help
4. Always look for help from family members, relatives, and organizations

10). Your participation in activities organized by political or religious organizations, unions, and student associations, etc., can be described as follows: (Choose only one item)

1. Never
2. Rarely

3. Frequently

4. Always and playing an active role in these activities

PART VI ZUNG SELF-RATING ANXIETY SCALE (SAS)

For each item below, please place a check mark (√) in the column which best describes how often you felt or behaved this way during the past several days.

Place check mark (√) in correct column.	**A little of the time**	**Some of the time**	**Good part of the time**	**Most of the time**
1 I feel more nervous and anxious than usual.				
2 I feel afraid for no reason at all.				
3 I get upset easily or feel panicky.				
4 ……				
5 ……				
6 ……				
7 ……				
8 ……				
9 ……				
10 ……				
11 ……				
12 ……				
13 ……				
14 ……				
15 ……				
16 …….				
17 ……				
18 ……				
19 I fall asleep easily and get a good night's rest.				
20 I have nightmares.				

APPENDIX B

Letter asking permission to use instruments

Permission letter to use the Athens Insomnia Scale (AIS)
From: kiki <370081935@qq.com>
Date: April 27, 2021 at 11:01:47 PM GMT+8
To: clin <clin@tmu.edu.tw>
Subject: Ask for permission to use AIS
Dear Dr. Chia-Chin Lin
Hello! I'm a master's student study at Burapha University and now I'm doing my thesis proposal, which is related to cancer-related fatigue among advanced gastric cancer patients. One of the research variables is the sleep disturbance. From the study "Validation of the Taiwanese Version of the Athens Insomnia Scale and Assessment of Insomnia in Taiwanese Cancer Patients", I know you and your colleague have studied this scale. I'm really interested in this scale, so I'm full of gratitude if I could get your permission to use the scale for my study. Your quickly responses would be highly appreciated. Thank you so much, and I'm looking forward your reply~

Best regards,
Kiki(杨翔)

Re: Ask for permission to use AIS
From: Chen Yi-Rou <b8805062@tmu.edu.tw>
(由 annity0205@gmail.com 代发)
时　间：2021 年 4 月 28 日（星期三）下午 3 : 36
收件人：kiki <370081935@qq.com>
抄　送：lincc2010 <lincc2010@gmail.com>

Dear KiKi,
Thank you for your interest in using the AIS-T.
You have Professor Lin's permission to use the Taiwanese version of the Athens Insomnia Scale (AIS-T) to collect data for your master thesis.
Good luck with your project.

Best regards,
Yi-Rou Chen
Research assistant, Taipei Medical University

Chia-Chin Lin <lincc2010@gmail.com> 於 2021 年 4 月 28 日 週三 上午 8:02 寫道
Warm regards,
Chia-Chin

Permission letter to use the Patient-Generated Subjective Global Assessment (PG-SGA)

Subject: Ask for permission to use PG-SGA
From： kiki <370081935@qq.com>
Date: 2021 年 4 月 21 日（星期三）下午 6 : 10
To: shihp <shihp@vip.163.com>
尊敬的教授您好：

我是中泰联合培养（温州医科大学与泰国东方大学）的一名研究生，现在在做关于胃癌患者癌因性疲乏的因素分许。因为在本研究中营养作为一个重要的自变量，我将会使用到营养评估量表。由于关注到您对于 PG-SGA 有着深入的研究，在“Validity of the Chinese Version of the Patient-Generated Subjective Global Assessment (PG-SGA) in Gastric Cancer Patients”一文中将此量表进行汉化并进行信效度的研究，因此特询此量表的原始版本以及使用授权。期待您的回复！不胜感激！

杨翔
温州医科大学

Re: Re: Ask for permission to use PG-SGA
From： David Fu <davidfuzming@163.com>
Date: 2021 年 4 月 25 日（星期日）下午 11 : 23 纯文本 |
To: shihp <shihp@vip.163.com>
To: kiki <370081935@qq.com>

Dear all,
No problem at all!
BR
David

在 2021-04-25 22:30:03，"石汉平" <shihp@vip.163.com> 写道：

您好，杨同学 没有任何问题，请与付老师联系。汉平

Permission letter to use the Zung Self-Rating Anxiety Scale (SAS)

From： Brittany Wormuth <brittany@statisticssolutions.com>
Date: 2022 年 2 月 24 日（星期四）上午 0 : 56
To: kiki <370081935@qq.com>
Hello 翔,

To obtain the survey instrument, visit the page for the survey on our site here and scroll down to where it says "Obtaining the Scale."

Thank you, and best of luck with your project!

Warm regards,
Brittany Wormuth
Statistics Solutions
727-442-4290

Permission letter to use the Social Support Rating Scale (SSRS)

社会支持评定量表使用申请
发件人：kiki <370081935@qq.com>
时　间：2022 年 2 月 22 日（星期二）下午 11 : 52
收件人：xiaosy <xiaosy@csu.edu.cn>
附　件：1 个 (SSRS.pdf)
尊敬的肖水源教授：
　　您好！我是中泰联合培养（温州医科大学与泰国东方大学）的一名护理研究生，非常感谢您在百忙之中阅读我的邮件。我毕业论文的内容是关于胃癌患者癌因性疲乏的因素分析。因为在本研究中社会支持作为一个重要的自变量，我将会使用到社会支持评定量表。在查阅了相关文献之后，发现您设计的社会支持评定量表（SOCIAL SUPPORT RATING SCALE，SSRS）非常适合我的研究。因此特询此量表的使用授权。期待您的回复！不胜感激！
祝您生活愉快！

杨翔
温州医科大学

Re: 社会支持评定量表使用申请
发件人：肖水源 <802377@csu.edu.cn>
时　间：2022 年 2 月 24 日（星期四）上午 9 : 42　纯文本 |
收件人：kiki <370081935@qq.com>

没问题

Permission letter to use the Brief Fatigue Inventory (BFI)

DocuSign Envelope ID: F10BFB25-6D2D-4D95-B41C-C591B5D1592A

SYMPTOM ASSESSMENT TOOL LICENSE AGREEMENT

This Symptom Assessment Tool License Agreement (the "Agreement," including both Part I License Information and Part II Terms & Conditions) is entered into as of the Effective Date by and between The Board of Regents ("Board") of The University of Texas System ("System"), an agency of the State of Texas, whose address is 201 West 7th Street, Austin, Texas 78701, on behalf of The University of Texas M. D. Anderson Cancer Center ("MD Anderson"), a member institution of System and the Licensee (identified below). Board and Licensee may each hereinafter be individually referred to as a "Party" and collectively as the "Parties."

Board owns the Symptom Assessment Tool. Licensee desires to obtain the right to use, reproduce, and/or distribute copies of, the Symptom Assessment Tool for the Permitted Use described herein.

NOW, THEREFORE, in consideration of the promises, conditions, covenants and warranties herein contained, the Parties agree as follows:

PART I LICENSE INFORMATION

1.	**Licensee**	Name:	The First Affiliated Hospital of Wenzhou Medica
		ATTN:	Yang Xiang
		Address Line 1:	Faculty of Nursing, Burapha University, 169
		Address Line 2:	Longhadd Bangsaen Rd. Saensuk, Maung,
		Address Line 3:	Chonburi, Thailand
		Address Line 4:	N/A
		Email Address:	370081935@qq.com
2.	**Permitted Use** Student research (thesis, dissertation)		
3.	**Symptom Assessment Tool** BFI- Chinese-Simplified		
4.	**License Fee:** $100.00		

IN WITNESS WHEREOF, the parties hereto have caused their duly authorized representatives to execute this Agreement.

Licensee *(see Item 1, above)*

Signed: Yang Xiang (signature of representative)

Name: Yang Xiang (printed name of representative)

Title: Nurse and student (position within Licensee organization)

Date: June 10, 2022 (date signed by representative)

Board of Regents of The University of Texas System, on behalf of The University of Texas M.D. Anderson Cancer Center

Signed: DocuSigned by: 17DF6A654D82458... (signature of representative)

Name: Andrew Dennis (printed name of representative)

Title: Managing Director (position within MD Anderson)

Date: 6/13/2022 | 4:13 PM CDT (date signed by representative)

Part II Terms & Conditions are available at the following URL:
https://www.mdanderson.org/content/dam/mdanderson/documents/about-md-anderson/about-us/Office-of-Technology-Commercialization/Terms-Conditions-BFI,AASIS,TNAS,v9,NMD951.pdf

{Worldox #00034649.DOCX 9}

APPENDIX C

Responses to Participant information sheet and consent form

เอกสารชี้แจงผู้เข้าร่วมโครงการวิจัย
(Participant Information Sheet)

IRB approval number: .....
Title of study (**โครงการวิจยั เรื่อง**): … Factors related to cancer-related fatigue in advanced gastric cancer patients one month after gastrectomy in Wenzhou, China

Dear participants

I am Mrs. Xiang Yang, a student in Master of Nursing Science (International Program) Faculty of Nursing, Burapha University Thailand. My study "Factors related to cancer-related fatigue in advanced gastric cancer patients one month after gastrectomy in Wenzhou, China". The objectives are to describe cancer-related fatigue and determine the relationships between sleep disturbance, nutritional risk, anxiety and social support with cancer-related fatigue among advanced gastric cancer patients one month after gastrectomy in Wenzhou, China.

This study will be a survey study. Participating in this study is voluntary. If you agree to participate in this study, you will answer the following questionnaires, which will take approximately 30-40 minutes. During the data collection period, the researcher will clarify any questions posed by the participants for clarity regarding the language or content. You will not get any direct benefits by participating in this study. However, the information you provide will be help nurses develop nursing intervention to help advance gastric cancer patients cope with and control fatigue, so as to maintain the optimal physical, functional and psychological state. Then let the patient be in the best condition to receive further treatment and improve patients' well-being and quality of life for the rest of their lives. There will be no identified physical and psychological risk to the person participating in the study and no risk to the society.

You have the right to end your participation in this study at any time, and no necessary to inform the researcher, and it will not hamper their professional career. 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 collected will be placed in a locked safe and in a locked archive room that only the researcher has a key to access. All data will be accessible only by the researcher and research advisor which will be destroyed one year after publishing the findings. You will receive a further explanation of the nature of the study upon its completion, if you wish.

The research will be conducted by Mrs. Xiang Yang under the supervision of my major-advisor, Associate Professor Dr.Niphawan Samartkit. If you have any questions, please contact me at mobile number: + 8615858561331 or by email

370081935@qq.com and/or my advisor's e-mail address nsamartkit@gmail.com. Or you may contact Burapha University Institutional Review Board (BUU-IRB) by email address buuethics@buu.ac.th, or telephone number +66-38-10-2620. Your cooperation is greatly appreciated. You will be given a copy of this consent form to keep.

Xiang Yang

เอกสารแสดงความยินยอม

ของผู้เข้าร่วมโครงการวิจัย (Consent Form)

IRB number: .....

Title of study: … Factors related to cancer-related fatigue in advanced gastric cancer patients one month after gastrectomy in Wenzhou, China

Date of data collection .....Month.....Year .....

Before giving my signature below, I have been informed by researcher, Mrs. Xiang Yang, 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 hamper my treatment and disease prognosis.

The researcher Mrs. Xiang Yang has explained to me that all data and information of the participants will be kept confidential and only be used for this study. I have read and understood the information related to participation in this study clearly and I am signing this consent form.

Signature

……..……..

Participant

(…….)

参与者信息表

(Participant Information Sheet)

研究代码: _____

研究题目：中国温州地区进展期胃癌患者术后一月癌因性疲乏的相关因素研究

尊敬的参与者：

您好！我叫杨翔，是一名泰国东方大学护理学院护理科学硕士(国际项目)的学生。我的研究“中国温州地区进展期胃癌患者术后一月癌因性疲乏的相关因素研究”的目的是描述中国温州市进展期胃癌患者在胃切除术后一个月的癌因性疲乏的状况，并确定进展期胃癌患者胃切除术后一个月的睡眠障碍、营养状况、焦虑和社会支持与癌因性疲乏之间的关系。

本研究将是一项调查研究，所有参与人员均是自愿参加本项研究。如果您同意参加本次研究，您将回答以下问卷，大约需要 30-40 分钟。在数据收集期间，研究者将会解释清楚参与者提出的任何关于语言或内容的问题。参与本研究不会给您带来任何直接的好处。但是，您提供的信息将有助于护士制定护理干预措施，帮助胃癌患者提前应对和控制疲劳，从而保持最佳的身体、功能和心理状态。然后让患者处于最佳状态，接受进一步的治疗，在余生中提高患者的幸福感和生活质量。参与本研究不会直接对您造成身体和心理的风险，也不会对社会造成风险。

您有权在任何时候终止参与本次研究，不需要通知研究人员，也不会妨碍他们的职业生涯。从本次研究中收集的任何信息，包括您的身份，都将被保密。编码将被分配给你，你的名字将不会被使用。研究结果将以一组参与者的形式呈现，不会披露任何单个参与者的具体信息。收集到的所有数据将被放在加锁的保险柜内并放置在加锁的档案室内，并且只有研究者有钥匙可以开启。所有的数据只有研究人员才能获得，这些数据将在发表研究结果一年后被销毁。如您愿意，我们会在研究完成后，进一步解释研究的性质。

该研究将由杨翔女士进行，并在我的专业导师副教授 Niphawan Samartkit 的指导下进行。如果您有任何问题，请联系我:手机:+ 8615858561331，或者电子邮件:370081935@qq.com 和/或我的导师的电子邮箱:nsamartkit@gmail.com。或者您也可以联系 Burapha 大学机构审查委员会(BUU-IRB)通过电子邮件地址 buuethics@buu.ac.th 或电话+66-38-10-2620。非常感谢您的合作。本同意书会发给你一份副本供你保存。

杨翔

เอกสารแสดงความยินยอม

ของผู้เข้าร่วมโครงการวิจัย (Consent Form)

知情同意书

研究代码: _____

研究题目：中国温州地区进展期胃癌患者术后一月癌因性疲乏的相关因素研究

资料收集时间：_____年_____月_____日

在我签字之前，研究人员杨翔女士已经向我详细说明了参与本次研究的目的、方法、程序、益处和可能存在的风险，我对这些解释都很了解。本人自愿参与本次研究。我明白，我有权随时离开研究，而不必担心这会影响我的治疗和疾病预后。

研究人员杨翔女士向我解释，所有参与者的数据和信息将被保密，只用于本次研究。我已清楚阅读和理解参与本次研究的相关信息，并签署此同意书。

签名

……..

参与者

(……)

APPENDIX D

Ethical approval letter and data collection letter

สำเนา

ที่ IRB3-089/2564

เอกสารรับรองผลการพิจารณาจริยธรรมการวิจัยในมนุษย์

มหาวิทยาลัยบูรพา

คณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์ มหาวิทยาลัยบูรพา ได้พิจารณาโครงการวิจัย

รหัสโครงการวิจัย : G-HS045/2564

โครงการวิจัยเรื่อง : Factors related to cancer-related fatigue in advanced gastric cancer patients one month after gastrectomy in Wenzhou, China

หัวหน้าโครงการวิจัย : MRS.XIANG YANG

หน่วยงานที่สังกัด : คณะพยาบาลศาสตร์

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

Therefore, the research protocol is approved (See attached)

1. Form of Human Research Protocol Submission Version 3 : 22 July 2021
2. Research Protocol Version 1 : 20 May 2021
3. Participant Information Sheet Version 3 : 22 July 2021
4. Informed Consent Form Version 2 : 10 July 2021
5. Research Instruments Version 1 : 20 May 2021
6. Others (if any) Version - : -

วันที่รับรอง : วันที่ 29 เดือน กรกฎาคม พ.ศ. 2564

วันที่หมดอายุ : วันที่ 29 เดือน กรกฎาคม พ.ศ. 2565

ลงนาม *นางสาวรมร แย้มประทุม*

(นางสาวรมร แย้มประทุม)

ประธานคณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์ มหาวิทยาลัยบูรพา

ชุดที่ 3 (กลุ่มคลินิก/ วิทยาศาสตร์สุขภาพ/ วิทยาศาสตร์และเทคโนโลยี)

温州医科大学附属第一医院临床研究立项批件

项目名称	温州地区进展期胃癌患者术后一月癌因性疲乏的相关因素研究	院内编号	2021-zz-075
项目来源	研究者发起	经费（万）	0 万
研究类型	□回顾性 ☑前瞻性/☑观察性 □干预性	研究目的	□文章发表 □纵向课题 ☑自主研究 □合作课题
负责人	杨翔	科室	胃肠外科
合作单位	☑否　　□是，合作单位名称_____		
审查材料	医学临床科研项目及伦理审查申请表，v1.0版； 伦理批件 2021-096； 临床研究方案，v1.0版，2021.05.21； 受试者知情同意书，v1.0版，2021.05.21； 研究者团队成员目录（职责）； 主要研究者、团队成员简历及GCP证书，v1.0版； 研究者责任声明； CRF/临床观察表样板，v1.0版。		
审查意见	同意项目开展		
临床研究管理委员会主任		审核日期	2021.5.26

备注：

1、临床研究科研项目的合同签订参照《温州医科大学附属第一医院临床研究项目管理办法（试行）》，具体经费使用参照《温州医科大学附属第一医院临床研究项目管理办法（试行）》和合同约定执行。

2、临床研究科研项目应按照合同/任务书约定按时完成研究计划，项目完成后，须提交项目完成报告给临床研究管理部门。

MHESI 8137/1574

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

August 9th, 2021

Dear President of The First 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 Mrs. XIANG YANG to collect data for for testing the reliability of the instruments.

Mrs. XIANG YANG ID 62910077, a graduate student of the Master of Nursing Science program, major in Adult Nursing Pathway, Faculty of Nursing, Thailand, was approved her thesis proposal entitled: "Factors Related to Cancer-Related Fatigue in Advanced Gastric Cancer Patients One Month After Gastrectomy in Wenzhou, China" under supervision of Assoc. Prof. Dr. Niphawan Samartkit as the principle advisor. She proposes to collect data from 30 advanced gastric cancer patients one month after gastrectomy and did not receive chemo radiotherapy before surgery in Inpatient and Outpatient Department of Gastrointestinal Surgery, The First Affiliated Hospital of Wenzhou Medical University.

The data collection will be carried out from August 15th, 2021 - August 30th, 2021. In this regard, you can contact Mrs. XIANG YANG via mobile phone +86-1585-8561-331 or E-mail: 370081935@qq.com

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

Sincerely yours,

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

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

MHESI 8137/1575

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

August 9th, 2021

Dear President of The First 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 Mrs. XIANG YANG to collect data for conducting research.

Mrs. XIANG YANG ID 62910077, a graduate student of the Master of Nursing Science program, major in Adult Nursing Pathway, Faculty of Nursing, Thailand, was approved her thesis proposal entitled: "Factors Related to Cancer-Related Fatigue in Advanced Gastric Cancer Patients One Month After Gastrectomy in Wenzhou, China" under supervision of Assoc. Prof. Dr. Niphawan Samartkit as the principle advisor. She proposes to collect data from 100 advanced gastric cancer patients one month after gastrectomy and did not receive chemo radiotherapy before surgery in Inpatient and Outpatient Department of Gastrointestinal Surgery, The First Affiliated Hospital of Wenzhou Medical University.

The data collection will be carried out from September 1st, 2021 - October 15th, 2021. In this regard, you can contact Mrs. XIANG YANG via mobile phone +86-1585-8561-331 or E-mail: 370081935@qq.com

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

Sincerely yours,

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

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

BIOGRAPHY

NAME	Xiang Yang
DATE OF BIRTH	09 Nov. 1991
PLACE OF BIRTH	Wenzhou city, Zhejiang province, China
PRESENT ADDRESS	No.109, Haian Big Street, Wenzhou city, Zhejiang province, China
POSITION HELD	Nurse Practitioner
EDUCATION	2009-2012 College Degree of Nursing, Wenzhou Medical University, Wenzhou city, China 2014-2016 Bachelor of Nursing, Wenzhou Medical University, Wenzhou city, China 2019-2022 Master of Nursing Science (M.N.S), Faculty of Nursing, Burapha University, Chonburi, Thailand