Malnutrition in the older patients: Constructing knowledge, perceptions, and solutions for an intensive Care setting in Vietnam

Le Lam Tuyet Duy

A Thesis Submitted in Partial Fulfillment of Requirements for
degree of Doctor of Philosophy in Health Sciences (International Program)
November 2023

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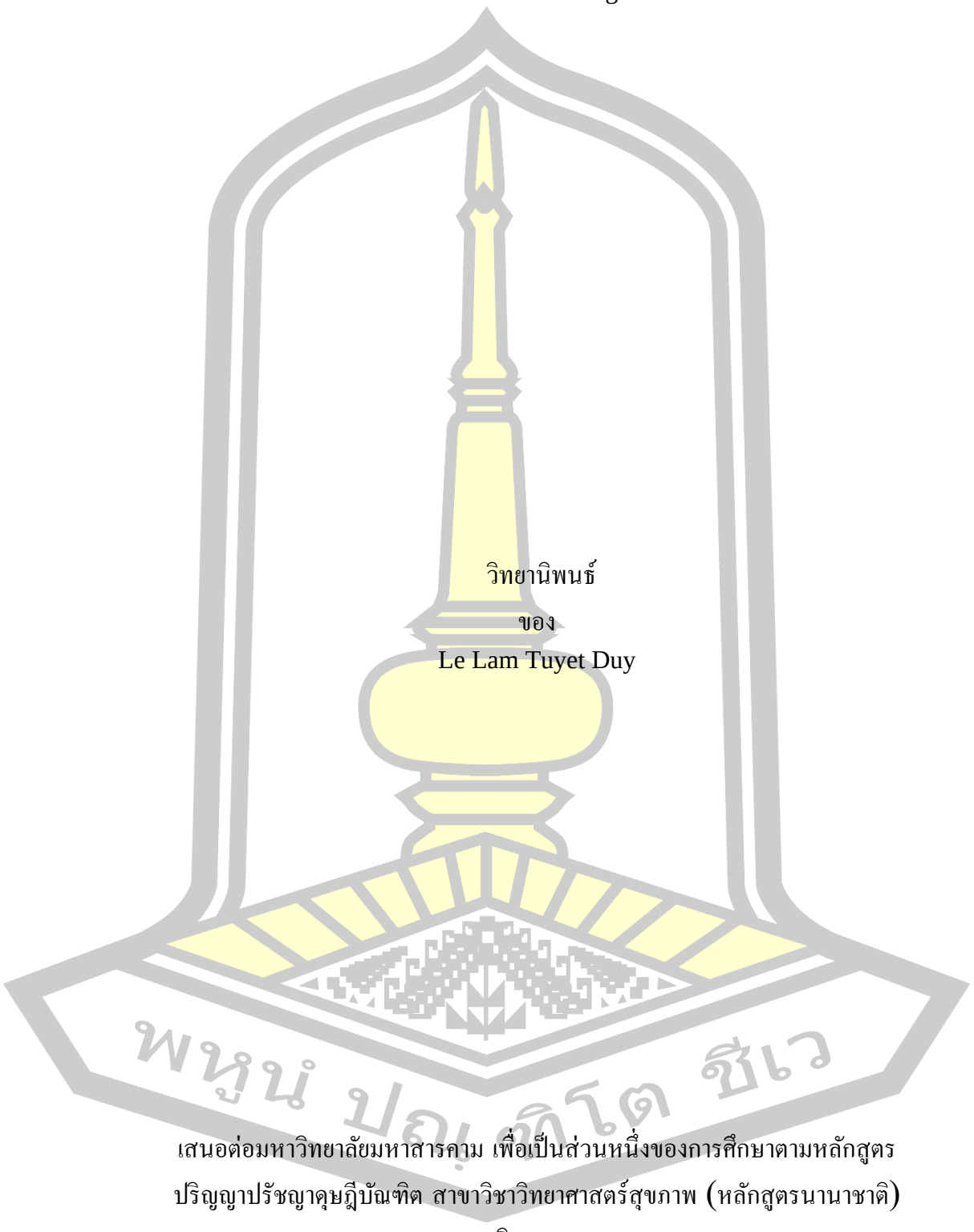

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TITLE Malnutrition in the older patients: Constructing knowledge, perceptions, and solutions for an intensive Care setting in Vietnam

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ABSTRACT

Background and aims: Malnutrition is common in critically ill older patients. The objectives of this study were to explore prevalence of malnutrition among older pateints admitted to an intensive care unit (ICU) and to evaluate the effectiveness of a nutrition education program (NEP).

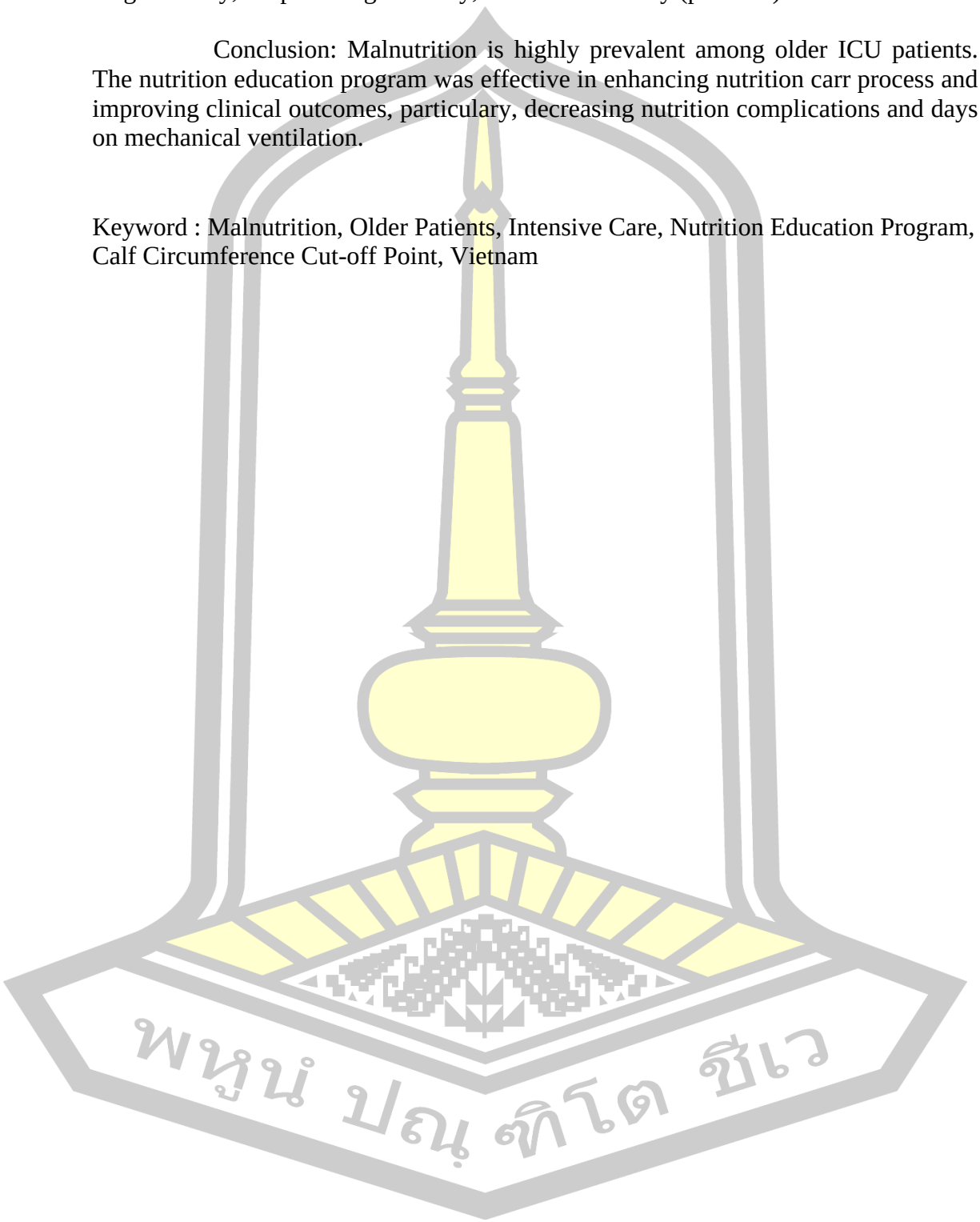
Method: This prospective, non-blinded study was carried out in a 30-bed intensive care unit (ICU) of one general hospital in Vinh Long Province, Viet Nam. There were three phases. In the first phase, the malnutrition prevalence and the nutrition routinely care in ICU were studied in 250 newly admitted older patients along with their caregivers and all ICU staff were evaluated for nutrition-related knowledge, perception, self-efficacy, and practice. Phase two: CC cut-off points of the ICU older patients in phase one (normal nourished group = 224, malnourished group = 26) were examined for both genders. Phase three: another 32 patients and their caregivers, as well as the ICU staff (post-test) were enrolled and observed in an experiment group (EG) comparing with the matcthed control group (CG) along with their caregivers and the ICU staff (pre-test) deriving from phase one. Effectiveness of the NEP was evaluated by means of nutrition status, dietary and energy intakes, as well as clinical outcomes of the older ICU patients.

Results: The prevalences of malnutrition among the ICU older patients based on the mNutric, NRS2002, and SGA scores were 70.8%, 88.4%, and 88.8%, respectively. The CC cut-off points, based on BMI, for malnutrition in male and female older patients were 27.3 cm and 24.1 cm, respectively. The experiment and control groups did not differ in age, APACHE II score, gender, and nutritional status ($p > 0.05$) at baseline. The mean energy intake improved from the first day of admission and the discharge day in both group but the EG group had better improvement (EG 900.0±252.2 and 1,204.8±272.3, $p< 0.000$; CG 884.7±234.9 and 1007.9±332.5, $p < 0.025$). There were significant lower nutrition complications and days on mechanical ventilation in the experimental group (6.3% and 3.7±6.0 days) than the control group (28.1% and

7.3±6.3 days), $p<0.05$. However, these two groups did not significantly differ in ICU length of stay, hospital length of stay, and ICU mortality ($p > 0.05$).

Conclusion: Malnutrition is highly prevalent among older ICU patients. The nutrition education program was effective in enhancing nutrition carr process and improving clinical outcomes, particulary, decreasing nutrition complications and days on mechanical ventilation.

Keyword : Malnutrition, Older Patients, Intensive Care, Nutrition Education Program, Calf Circumference Cut-off Point, Vietnam



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Gửi tới những người quan trọng nhất trong cuộc đời con, cha mẹ và em Phở. Không có từ ngữ nào có thể diễn tả sự biết ơn con dành cho cha mẹ. Nếu không có cha mẹ, sẽ không có con ngày hôm nay. Cả nhà đã động viên con rất nhiều, là chỗ dựa, là tấm gương sáng và động lực để con phát triển bản thân, và hoàn thành chương trình tiến sĩ.

Cảm ơn cả gia đình lớn, đã luôn sát cánh bên con trong từng cột mốc cuộc đời. Ước mơ của chúng ta đã thành sự thật. Con tự hào vì được làm con của cha mẹ!

Lastly, my special thanks also go to Miss Thanaphon Seanongart for her kind and endless support and encouragement.

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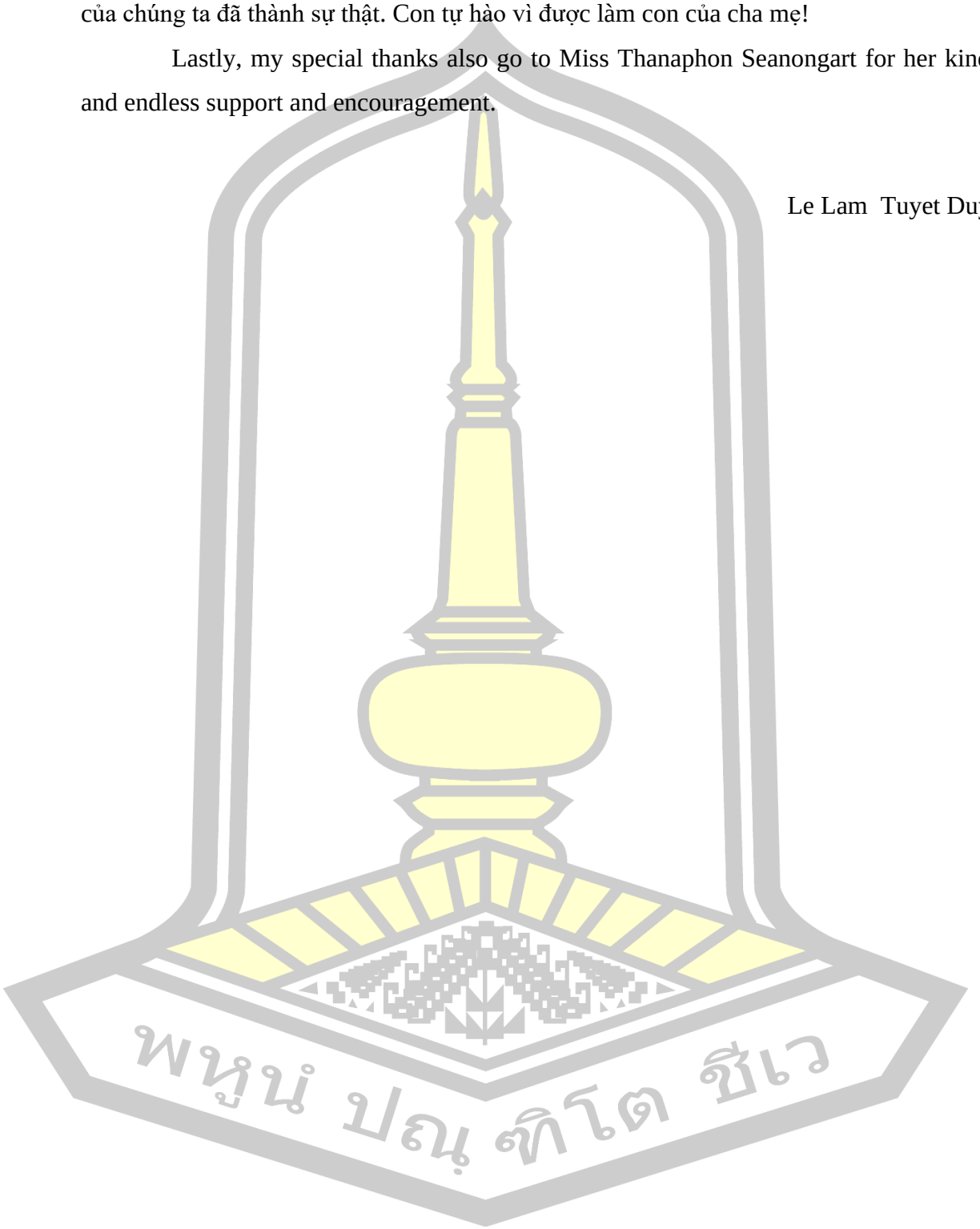

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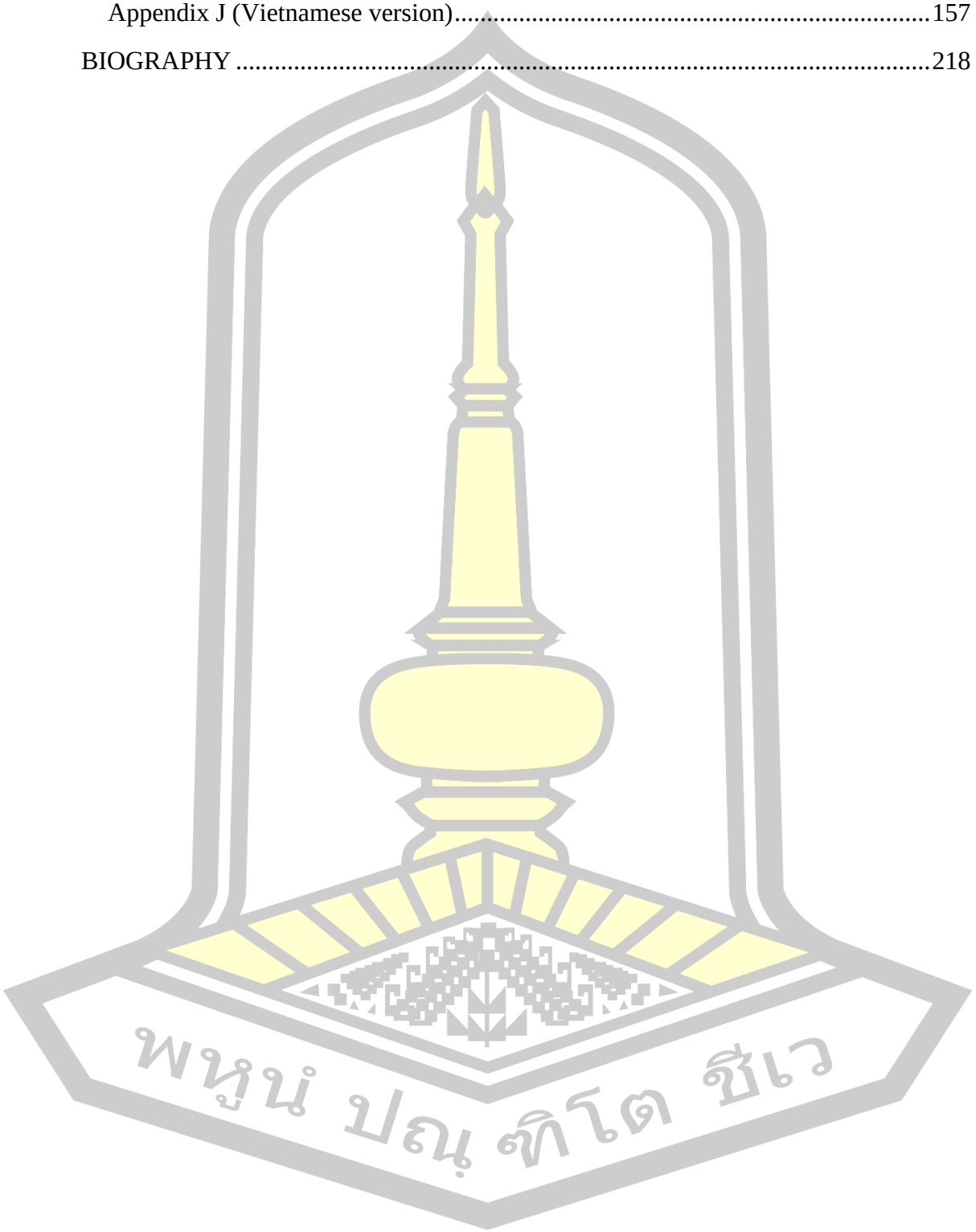

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ABBREVIATION

AND	Academy of Nutrition and Dietetics
APACHE	Acute Physiology and Chronic Health Evaluation
ASPEN	American Society for Parenteral and Enteral Nutrition
BMI	Body mass index
CC	Calf circumference
CCPG	Canadian Clinical Practice Guideline for Nutritional Support
CG	Control group
EN	Enteral Nutrition
EG	Experimental group
ESPEN	European Society for Clinical Nutrition and Metabolism
FFMI	Free Fat Mass Index
ICU	Intensive Care Unit
ICU LOS	Intensive Care Unit length of stay
Hos LOS	Hospital length of stay
MUAC	Mid Upper Arm Circumference
mNUTRIC	Modified Nutric Risk in Critically Ill
NRS 2002	Nutrition Risk Screening 2002
NUTRIC	Nutric Risk in Critically Ill
NE	Nutrition education
PN	Parenteral Nutrition
SCCM	Society of Critical Care Medicine
SOFA	Sequential Organ Failure Assessment
TSF	Tricipital Skin Fold Thicknes

CHAPTER 1
INTRODUCTION

Population aging is a world phenomenon, and older people constitute a larger proportion of the patients admitted to intensive care units (ICUs) with a high mortality rate. This chapter describes the introduction containing: Section 1.1 background; Section 1.2 purposes of the research study; and Section 1.3 significance, scope, and definitions of the research study.

1.1 Background

Currently, population aging is evident in all global regions, with the fastest-growing population in low- and middle-income nations (LMICs) (1). By 2050, it is anticipated that four out of every five older people will reside in developing nations. Currently, two out of every three people aged 60 and older reside in less-developed nations (2). Advances in medical knowledge and technology, improved healthcare, and improved living standards have helped people stay healthy and live longer. Based on the health perspective, health and longevity are seen as the ultimate goals in people's lives. Aging is the accumulation of various harmful changes in cells and tissues that are associated with increased risk of degenerative diseases as people age. Consequently, the larger proportion of older people in the population also increases the number of older people affected by chronic and degenerative mental illnesses.

Adequate nutritional status is an essential element of the health of people of all ages. Malnutrition in older adults is particularly important as it directly affects their health and well-being throughout the aging process. Regularly diagnosing the nutritional status of older adults is beneficial for practitioners to find preventative strategies and to identify solutions for appropriate treatment and education of affected individuals and/or caregivers relevant to existing problems and needs (1).

The prevalence of malnutrition among older population is rising (3). The consequences of nutritional deficiency in the elderly include functional decline,

impairment of muscle function, decreased bone mass, immune disorders, anemia, diminished cognitive function and healing, particularly a sluggish recovery after surgery, and higher hospitalization and mortality rates (3). Many older people in LMICs were currently living alone or living in skipped-generation families, in which grandparents raised the grand-children whose parents were absent from the homes due to shifted socioeconomic and environmental conditions, as well as demographic transition. Obtaining recommended nutrient-dense diets and maintaining good nutrition was significantly more difficult for older adults who lived alone or had fewer social networks. (2). Many critically ill older patients admitted to intensive care units (ICUs) suffer from malnutrition, including undernutrition or overnutrition. In a global survey of intensive care unit (ICU) patients, Snuff et al. (4) found that their calorie and protein intake administration only met 44.0% to 52.0% of the recommended needs. In addition, they discovered that medical staff knowledge of nutrition therapy plays a crucial role in ICU patients' overall care (5). The proportion of older patients admitted to the hospital, particularly intensive care units, increased and accounted for a large proportion of all patients admitted to the hospital. In one retrospective observational study conducted from August 2001 to August 2008 at a large academic tertiary medical center in Boston with 19,510 patients in the Surgical and Medical ICU, the proportion of patients over 65 exceeded 45.0%. (6). This group of older patients had a high prevalence of malnutrition and malnutrition risk, but nutrition care, primarily feeding, is limited. Most of them received less than optimal dietary energy intake, aggravating their health conditions. Malnutrition in older patients is associated with adverse clinical outcomes, including increased hospital length of stay, increased mortality, increased infection likelihood, and healthcare costs (7,8). 71.2% of older patients in the intensive care unit are at risk of malnutrition (9). In an observational study in a gastrointestinal (GI) survey at Bach Mai Hospital in Vietnam, the results of one-week enteral, parenteral, or oral nutrition of 73 adult patients aged 56.1±14.9 years admitted to the surgical ward showed that half of them had moderate and severe malnutrition as their SGA (Subjective Global Assessment) scores fall into categories B and C. Other investigators reported in their study of dietary intake (oral, tube feeding) that the mean daily caloric intake in this patient group was

15.0 kcal/kg/day (recommended caloric intake: 25.0-35.0 kcal/kg/day) and protein 0.61 g/kg/day (recommended protein intake: 1.0–1.5 g/kg/day) during hospitalization (10). Such intakes are much lower than the targets of current worldwide nutritional therapy guidelines. In the critically ill elderly population, 41.3% and 52.3% were malnourished at admission and after day 5, respectively (11). Nutritional status, feeding practices, as well as malnutrition and clinical outcomes such as ICU length of stay, mechanically ventilated days, ICU mortality, and/or complications of malnutrition in Vietnam were not well documented.

Beneficials and outcomes of different types of nutrition feedings, i.e., enteral, parenteral, or combination of the two, coupled with timing for nutrition feeding, i.e., the early and late nutrition feeding, provided to the critically ill older patients in ICUs are still debatable. There were evidenced that mortality rates of the patients with mechanical ventilation in ICU and hospital were reduced among those with early feeding (12,13). Results from one systematic and meta-analysis study based on 15 randomized control trials comparisons between the patients receiving early EN nutrition feeding and those with no or late EN nutrition suggested that the benefits of early EN nutrition may be attributable to risk bias (14). Furthermore, many studies indicated that sufficient nutrition feeding for critically ill older patients leads to positive outcomes, such as reducing mortality and ICU length of stay (15,16).

The Vinh Long General Hospital was the largest tertiary hospital in the Vinh Long province with 600 beds, of which 570 were in general wards and 30 beds were in a medical ICU. The hospital had one Nutrition Department, which comprised one general nurse who received a short course training on clinical nutrition and supportive staff worked cooperatively to provide nutrition care for all patients in a hospital. As a newly launched unit in a hospital, this Nutrition Department put more concentration on providing food appropriate for in-hospital patients based on demands under investigation of the medical practitioners. However, nutrition networking tasks, such as dissemination of nutrition education to the patients both in the in-patient and the out-patient departments were still limited. The hospital had not established nutrition

network among the treatment departments, and that there was limited nutrition knowledge dissemination to health workers, patients, and relatives in this hospital.

Additionally, medical practitioners in the Vinh Long Hospital mainly assessed routine nutrition status of the patients by means of BMI and related biochemistry laboratory testing. The applications of clinical practice guidelines and the more reliable nutritional screening and assessment methods for patients from important organizations such as the guidelines for patients with mechanical ventilation (MV) and for those received organ replacement therapy (RRT), and other related operations were not yet put into practices (12,13).

Since many critically ill older patients admitted to the ICUs in the LMICs suffered from malnutrition before admission, the early nutrition feeding, either enteral feeding or its combination, tended to benefit them with positive outcomes. This current study was aimed to apply practical nutrition assessment tools to examine characteristics, health conditions, and nutritional status of the older patients admitted to ICU. It also sought to examine the effectiveness of early nutrition feeding appropriate for critically ill older patients admitted to ICU setting in Vietnam. The secondary outcomes of interest also cover both the patient-centered outcomes (i.e., causes of ICU admission, underlying health problems, severity, having comorbidities, functional abilities, and quality of life), and the health service utilization outcomes (i.e., ICU- and hospital length of stay, receipt, and duration of mechanical ventilation (MV) and receipt of any organ replacement therapy (RRT), and other related operation).

Two common factors affecting the routine screening of malnutrition in hospital settings included lack of time on the part of medical staff (14), followed by the lack of knowledge and positive attitudes of the medical staff regarding nutrition screening. Provision of nutrition education for ICU staff and nutrition counseling for patients positively impacted on improvement of nutrition knowledge, thereby improving dietary intakes, nutritional status, and functional outcomes. Nutrition shortfalls were undertreated, although nutrition care plan was becoming standard care in a hospital. The healthcare system needed to put more emphasis on hospital nutrition care, adjustment of some of the current nutrition practices, and evaluation of its effectiveness.

This research was grounded from four theoretical concepts, namely the Health Belief Model and five principles of the Alliance Nutrition Care Process Approach. Findings from this research study would provide ways to better enhance roles of the medical staff in ICU to include nutrition care resulting in increased involvement of all healthcare professionals in: 1) recognition of the nutritional problems by application of appropriate screening and assessment methods and tools, 2) having appropriate decision making on and providing solutions/interventions for nutrition care suitable for each patient during a hospital stay, and 3) providing suitable nutrition discharge plan for each patient relevant to his/her problem, need, and cultural background. Additionally, the use of four components (perceived severity and danger of malnutrition, perceived susceptibility or risk of malnutrition, perceived benefits of new behavior to decrease malnutrition risk, perceived barriers of new behavior transforming to prevent malnutrition) in the HBM was important and appropriate for designing and implementing health and nutrition education interventions to prevent malnutrition and improve patients' nutritional status and health outcomes.

Results of this study reflected: the current situation of nutrition care process in a general hospital in southern Vietnam; the calf-circumference cut-off point to identify malnourished older patients; effectiveness of the health and nutrition education program, which included a workshop training and a manual of nutrition screening/assessment, nutrition care, and providing health education on older nutrition care for the ICU medical staff and caretakers of a critically ill older patient, on enhancing practices in nutritional screening, nutrition assessment, nutrition care and treatment on the part of a medical staff, and in providing appropriate nutrition care on the part of a caregiver following the project's guidance. This current study is the leading clinical nutrition study conducted in ICU older patients in a general hospital in southern Vietnam. Findings from this study is expected to provide evidence-based information, guidelines, and solutions for medical and health care authorities in nutritional status screening and assessment, nutrition care, monitoring, and evaluation of the critically ill older patients. Such solutions are expected to additionally provide ways for the policy makers to shape the long term care system of the nation in the future.

1.2 Research questions

1.2.1 What are the current nutritional conditions, feeding practice situation, and their relationship with clinical outcomes of the critically ill older patients in ICU?

1.2.2 What are the current nutrition-related knowledge, perceptions, self-efficacy, nutrition care and feeding practices patterning among the medical staffs and caregivers?

1.2.3 What are the calf circumference cut-off points, and how do they predict malnutrition in ICU older patients in Vietnam based on the BMI assessment?

1.2.4 How nutrition education program improves the nutrition-related perceptions and self-efficacy of the medical staffs and caregivers, as well as improves the dietary intake (i.e., calorie and protein), health and service utilization outcomes of the ICU older patients?

1.3 Purposes of the research study

The overall aims of this research study are to:

1.3.1 Examine current nutrition status and associated risk factors of malnutrition and health conditions among the ICU older patients in one selected tertiary care hospital in southern Vietnam

1.3.2 Determine suitable cut-off points and evaluate the predictive value of the calf-circumference (CC) cut-off points for determining nutrition status of the ICU older patients in Vietnam

1.3.3 Examine knowledge, perceptions, self-efficacy, nutrition care, monitoring and evaluation of the medical staff and caregivers regarding older nutrition

1.3.4 Evaluate the effectiveness of nutrition education program (NEP) on knowledge, perceptions, self-efficacy, nutrition care, monitoring and evaluation regarding older nutrition and feeding practices of the medical staffs and caregivers**,** as well as on improvement of dietary intake (i.e., calorie and protein), health (i.e., nutrition status, complications) and service utilization outcomes (i.e., ICU LOS, Hos LOS, receipt and duration of mechanical ventilation (MV) and receipt of hemodialysis and other related treatments) of the ICU older patients.

1.4 Research hypothesis:

1.4.1 General information such as age, sex, marital status, education, incomes, and family background, as well as health-related factors, including having a chronic illness, disability, alcohol-, and tobacco consumption, affect nutritional status of the ICU older patients upon admission."

1.4.2 The derived CC cut-off points from the older ICU patients are comparable to the existing values of 30.1 cm and 27.3 cm of the Southeast Asian older adult male and female patients, respectively.

1.4.3 The ICU older patients in an experimental group (EG) have better improved nutrition intake, health and service utilization outcomes after receiving the NEP than those in a control group (CG).

1.4.4 The caregivers of the ICU older patients in an EG have better improved nutrition-related perceptions, self-efficacy, nutrition care, monitoring and evaluation after receiving the NEP comparative to those in a CG.

1.4.5 The medical staffs have improved nutrition-related knowledge, perceptions, self-efficacy, nutrition care, monitoring and evaluation after receiving the NEP.

1.5 Definitions of terms

ICU older patient refers to an older patient both men and women aged 60 years or over who are newly admitted to an ICU of a selected tertiary care hospital in southern Vietnam for at least 24 hours after admission.

Caregiver is a person both men and women aged 18 years or over who primarily taking care of an ICU older patient while utilizing hospital service, including the person who has the right to legal representation or who has been authorized by the ICU older patient.

ICU staff refers to the health care officers, including medical doctors, nurses, and nurse's assistant who are currently working in an ICU in one selected tertiary care hospital located in Vietnam.

General information refers to background information of an ICU older patient covering demographic and socio-economic backgrounds, including age, gender, date of admission, principal diagnosis, and medical conditions. Biochemical data refer to serum pre-albumin and albumin of an ICU older patient, with the values less than 3.5g/l of pre-albumin and less than 10mg/dL of albumin being associated with malnutrition.

Food and nutrition-related medical history refers to the reported information on past and current feeding practices of an ICU older patient, including weight change, dietary intake, nutritional habits, allergies, food intolerances, and previous health conditions.

Nutrition screening is a nutrition status identification measurements to assign an individual ICU older patient to be malnourished or at risk of malnourished condition using NRS-2002 score and/or mNUTRIC score, with the score of ≥ 3 being in need of further nutritional assessment.

Nutrition assessment is a comprehensive determination of nutrition status and related conditions to diagnose nutritional problems of an ICU older patients using a combination of anthropometric measurements, health biochemical data, food/nutrition-related and medical history.

Anthropometric information refers to the data on physical conditions of an ICU older patient, including body mass index (BMI), mid-upper-arm circumference (MUAC), and calf-circumference (CC).

BMI is an anthropometric index applied in this study to indicate body mass and fat composition of the ICU older patients, which derives from the body weight in kilograms divided by height in meters squared, where higher BMI associated with vascular mortality, while lower BMI increased deaths from vascular diseases and other chronic diseases such as cancers, respiratory diseases. Of which, the BMI of 18.5-22.9 kg/m2 is considered normal weight, while the BMI below 18.5 kg/m^2 is underweight, and the BMI of 23.0 to 24.9 kg/m^2, 25 to 29.9 kg/m^2, and 30.0 kg/m^2 and above are considered as having overweight, pre-obesity, and obesity, respectively.

MUAC cut-off refers to the length of the midway point between the ulna's olecranon process to the scapula's acromion process, where the values of 23.5 cm and

22.0 cm being considered as normal nutrition among older male- and older female patients, respectively.

CC refers to calf circumference of an ICU older patient measured with a flexible standardized measuring tape (1 mm) at the point of the maximal circumference of the left calf, where patients being in supine position with the knee bent and supported on the bed forming a 90-degree angle, with the CC of 30.1 cm being considered as at risk of malnutrition among men and 27.3 cm among women.

Nutrition education program (NEP) refers to a set of learning experiences designed to facilitate the medical staffs and the caregivers on nutrition screening and assessment, nutrition care, monitoring and evaluation by enhancing their knowledge, perceptions and self-efficacy on older nutrition and feeding practices to improve dietary intake, health and service utilization outcomes of the ICU older patients.

Dietary intake is the number of calories (energy content) an ICU older patient consumed daily, including meal times, number of daily meal, nutrition formula of a commercial product, and food sources, as well as related information regaridng name of liquid, formula, and time usage.

Malnutrition is a depleted or under nutrition status of an older ICU patient in terms of a deficiency of energy, protein, and other nutrients intake causing measurable adverse effects on the body composition, namely body mass index (BMI), and health outcomes.

Complications refers to the health outcome of an ICU patient, which include vomiting, gastroparesis, and gastric residual volume over 500ml/ 4 hours

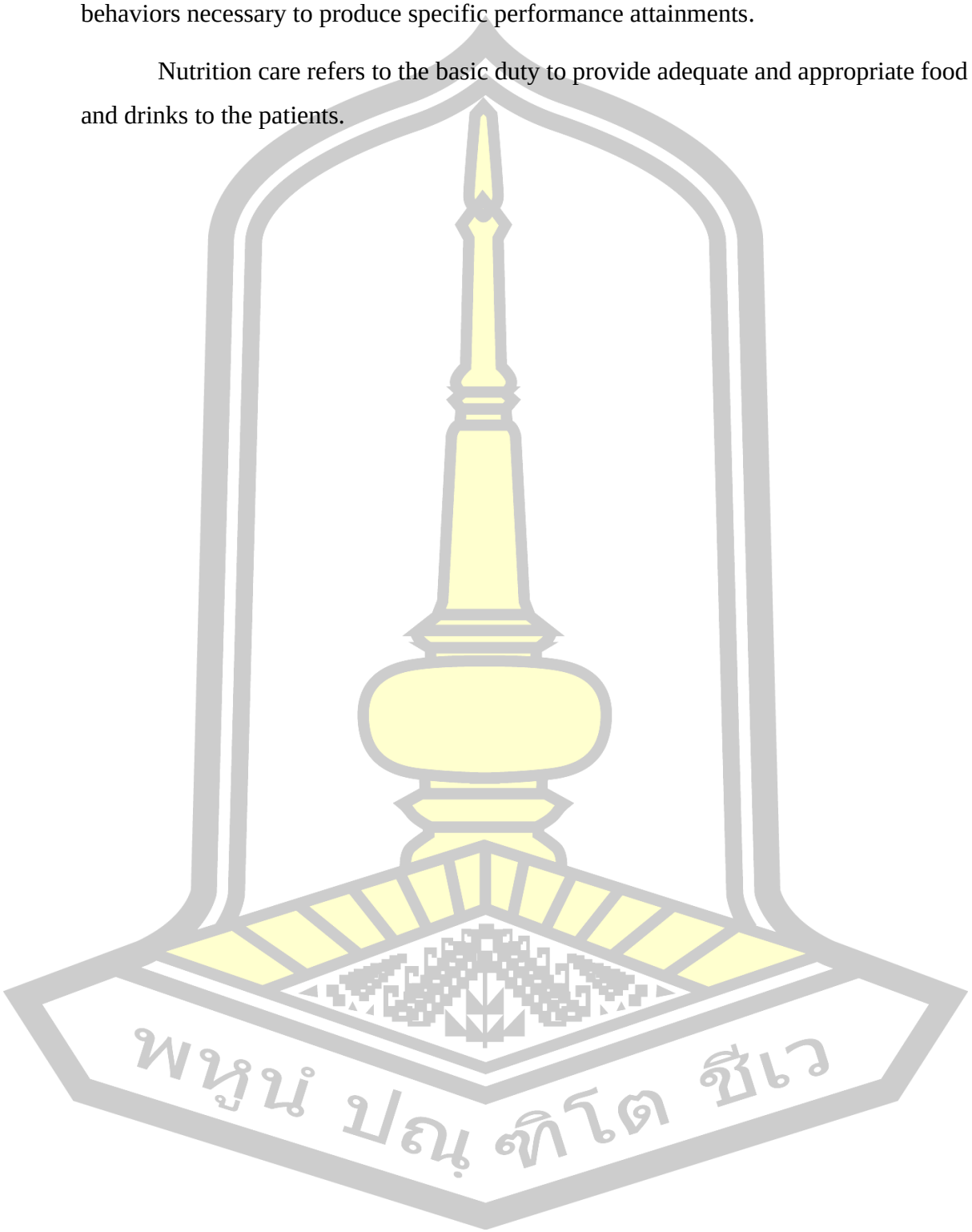
Service utilization outcomes refer to the indicators reflecting the situations of an ICU older patient on included ICU length of stay (ICU LOS), hospital length of stay (Hos LOS), receipt and duration of mechanical ventilation (MV) and receipt of hemodialysis and other related treatments.

Knowledge refers to understanding and awareness of malnutrition in ICU older patient context.

Perceptions refers to the way sensory information is organized, interpreted, and consciously experienced.

Self-efficacy refers to an individual's belief in his or her capacity to execute behaviors necessary to produce specific performance attainments.

Nutrition care refers to the basic duty to provide adequate and appropriate food and drinks to the patients.



CHAPTER 2
LITERATURE REVIEW

Improvement of health conditions and outcomes of critically ill older patients is notable, given they constitute a higher proportion of those admitted to ICUs with a high mortality rate. This chapter provides descriptions of: Section 2.1 demographic transitions and impacts on aging and health in societies and families; Section 2.2 nutritional status, chronic illnesses, and life-threatening conditions among the older population; Section 2.3 prevalence, health care and treatment consequences of critically ill older patients with malnutrition in an intensive care setting; Section 2.4 hospital system and nutrition-dietetics services in hospitals in Vietnam; Section 2.5 theoretical perspectives and guidelines for nutrition assessment for the older population; Section 2.6 studies related to malnutrition of ICU older patients; Section 2.7 gaps of knowledge on malnutrition of older patients admitted to ICU.

2.1 Demographic transitions and impacts on aging and health in societies and families

The aging population has increased globally in the recent years and is expected to continue to rise worldwide. According to the World Health Organization (WHO), the global population aged 60 years and over is expected to increase from 12.0% to 22.0% in 2050. In 2020, the number of older adults was higher than children over five years of age. However, 80.0% of the older people lived in low- and middle-income countries (LMICs). The 2017 Revision of World Population Aging of the United Nations showed that, from 1950-1955, developing countries' life expectancy increased by more than ten years, while the Asian countries increased by nearly 30 years. The average life expectancy of the world population was 72, and women lived longer than men, with 54.0% of the total older population in 2017. In Vietnam, the proportion of an older population was expected to increase from the recent 11.0% of a total population of approximately 97 million to 28.0% in 2050. Increased number of older population was viewed as resulting from a reduction in the birth rate and increased life expectancy of a population (15).

Increased human longevity has reflected both achievement and challenges in healthcare system worldwide. The recent report presented various changes in living arrangements of the older people. For example, decreased family size increased the numbers of older persons living alone and those living in a skipped generation household with children living with their grandparents. Consequently, the high dependency ratio from having an older adult in a family becoming the primary burden for the working-age population in terms of health and living expenses provide for their family members (2).

In high oncome countries, the primary health care concern is emphasizing prevention and control of non-communicable diseases, especially chronic diseases (such as cardiovascular disease, cancer, diabetes, metabolic disorders, Alzheimer's), the leading cause of mortality and reduced quality of life. While the people in the low- and middle income countries (LMICs) manifested with infectious diseases, malnutrition, and some of the non-communicable diseases because the health care system is still in low resources. Older people in Vietnam currently have poor health; on an average, each person had 14 years of Disability-Adjusted Life Year in a total of 73 years of life (16).

2.2 Nutritional status, chronic illnesses, and life-threatening conditions among the older population

Malnutrition tended to increase in older population. Research studies showed 15% of community-dwelling and home-bound older persons, 23% to 62% of hospitalized patients, and up to 85% of nursing home residents suffered from malnutrition (17).

Risks of malnutrition in older adults were resulted from various factors, including decrease in food intake (18) and often associated with susceptible to a disease, either acute or chronic or both, and rising energy needs. The combination of decreased dietary intake and increased energy requirements during illness had led the older persons being at risk. These factors were caused by several other intermediate etiological factors that classify into two groups: personal and organizational.

In personal factors, “anorexia of aging” results from the loss of the sensory abilities of taste and smell state, which was associated with a decrease in food intake

(19,20). On the other hand, the changing of the aging process might also possess malnutrition risk (21). Other risk factors for malnutrition in the older included chronic diseases, organic disorders, drug interactions, physical disability, lifestyle and social factors, and psychological factors such as confusion, dementia, depression, grief, and anxiety (9). Charlesworth and colleagues reported that 12.8 – 39.0% of older persons used more than five drugs and this poly medication usage was associate with changing BMI. Formal information related to poly medication in an older population in Vietnam was limited, however several researchers indicated the uses of more than four drugs.in this population group (22,23) Many acute conditions related to infection and surgery often occur on a background of chronic co-morbidities, such as heart failure, respiratory disease, cancer, renal failure, and increase energy needs and precipitate malnutrition in already vulnerable older people (3).

Besides, external factors such as the quality of meals, atmosphere in meal consumption, and the quality of nutrition and medical care may change dietary intake and contribute to malnutrition, particularly among older persons residing in hospitals and care homes. Increased prices of nutritious, clean and safe food were addressed (24). Malnutrition in older persons in health care setting was multifactorial and complex, but little was leaned about the nutrition care and outcomes patterning among the critically ill older adults utilizing services in an intensive care unit (3).

Admission to the ICU is usually necessary for life-threatening conditions such as acute diseases/injuries or exacerbations/complications of chronic diseases. Both categories were associated with inflammation and reduced energy and protein intake, increased energy expenditure, and protein catabolism (25). As a result of various mechanisms triggered by stress, changes were systematically found during critical illness, including a loss of lean body mass and relative preservation of the fat tissue. Consequently, ICU patients tended to receive less attention in nutrition care during their ICU stay, even when not malnourished before admission. Figure 1 shows the changing of ICU patients' energy expenditure during their stay (26). Figure 2 shows the cycle of complex nutrition risk of older patients in ICU (9,27).

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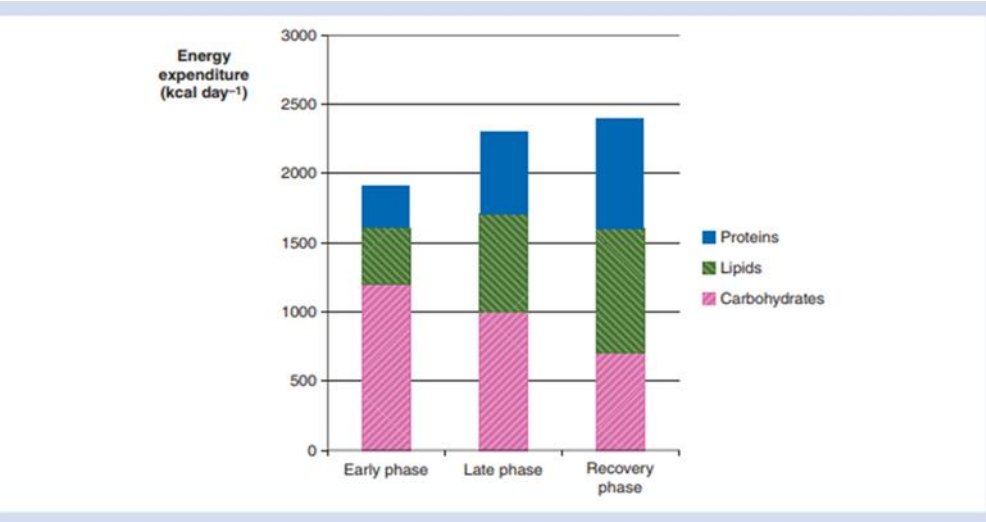

Figure 1 Energy expenditure and the type of energy substrates used during

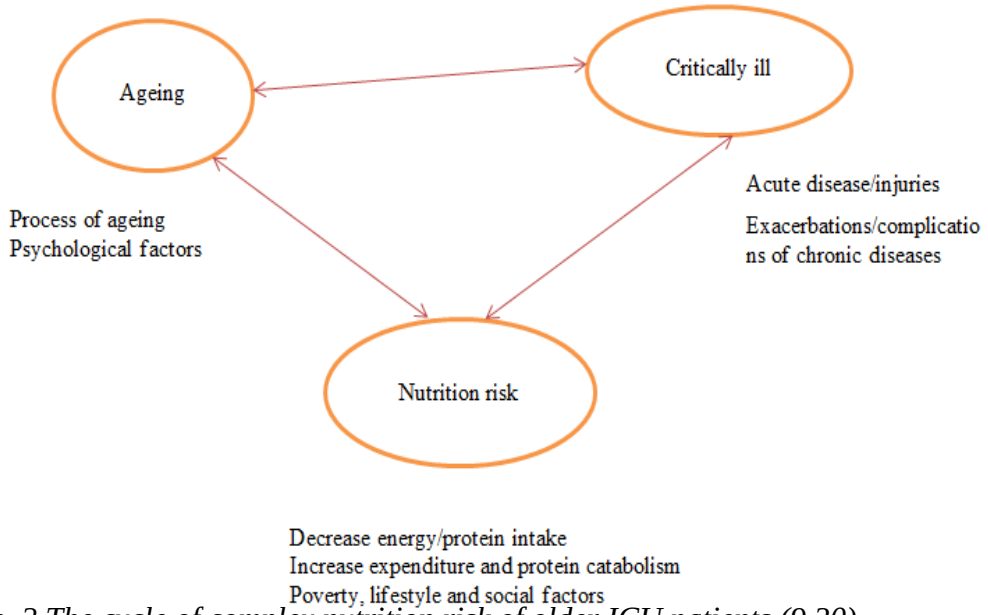

Figure 2 The cycle of complex nutrition risk of older ICU patients (9,30)

2.3 Prevalence, health care and treatment consequences of the critically ill older patient with malnutrition in an intensive care setting

2.3.1 Categories and prevalence of malnutrition, nutrition supports, and health care outcomes patterning among critically ill older patients in the ICU setting

The number of older people worldwide is predicted to rise dramatically in the next 30 years. The proportion of older patients admitted to hospital and particularly in ICU, is increasing and constituting higher proportion. Approximately two-thirds of the

people aged >65 years utilized health services and occupied general and acute hospital beds (28). The number of older persons admitted to ICU has risen. The study in the Netherland showed that the number of older patients aged 75 and over increased by 33% between 1992-1996 and 2002-2006. Many studies in the LMICs reported that the prevalence of older ICU patients varied from 17% to 52.5%, respectively (29,30).

Malnutrition was commonly found among patients in a hospital elsewhere, and affected approximately 50.0% of hospitalized patients around the world (31). In Europe, the study from Belgium showed that 43% of the older hospitalized patient was malnutrition (32). On the other hand, according to a large study of the older population (mean aged over 80) from 12 different clinical settings, two-thirds of study participants were at nutritional risk or malnourished; meanwhile, 38.7% of inpatient diagnosed with malnutrition (33). In South American, Cuba's study reported that 43.0% and 11.0% of inpatient got moderate and severe malnutrition (34). The studies in China reported that 27.0% of inpatients were malnutrition, and 40.0% were anemia. (35,36). The prevalence and incidence of malnutrition or nutrition risk in older ICU patients were high and was largely dependent upon the diagnosis criteria and target groups, ranging from 23.2% to 91.1% (37,38). Malnutrition was independently associated with increased ICU LOS, ICU readmission, infection incidence, and hospital mortality risk (39). These consequences increased the individuals' burden and ultimately increased the economic burden for the health care system. A prospective study in adults aged over 70 reported that adjusted healthcare costs were 714 € per year, and it was greater in patients with malnutrition or malnutrition risk than well-nourished patients, mainly due in part to hospital admission costs (40). Scott Goates (2016) reported that the annual cost of disease-associated malnutrition among older population in the US, was over USD15.5 billion (7). The study by Min Chang Kang (2017) reported older malnutrition was resulted in longer hospitalization and associated lower survival rate (41). Besides that, the study in Albanian showed that older patients with malnutrition risk were more likely to have poor clinical outcomes such as mortality (OR =2.68; 95% CI: 1.72–4.18); increased ICU length of stay >14 days (OR =5.18, 95% CI: 2.43–11.06); higher infections OR=4.37; 95% CI: 2.61–7.31) (9). The study of adult surgical patients in Viet Nam found that malnutrition was associated with increased infection complications. The postoperative infectious complications rate was higher in older

patients with SGA class C, 33.6%, than those with class A, 6%, and B 11%. (42). The prevalence of malnutrition and its associated with clinical outcomes in older ICU patients are shown in Table 2.

In Viet Nam, an observational study at Bach Mai Hospital enrolled 73 patients admitted for GI survey and were provided nutrition via enteral, parenteral, or oral. This illustrates 50% of patients scored a B or C on SGA, 48% had BMI < 18.5. But the mean daily caloric intake was 15kcal/kg/day, and protein was 0.61g/kg/day during hospitalization (10). It is much lower than the goals of current world guidelines of nutrition therapy. Another reported from this hospital, 50% of adult ICU patients had BMI<18.5 (43). In the critically ill older population, 41.3% and 52.3% were malnourished at admission and after day 5, respectively (11). Moreover, according to Hospital Diet Guidelines from the Ministry of Health Vietnam, a hospitalized adult's energy requirement is 35kcal/kg ideal body weight (body weight at BMI 22kg/m^2). The ingredients of the formula will vary depending on the individual patient (44).

Table 1 Prevalence of malnutrition and its association with clinical outcomes in the older ICU patients

Authors	N	Age, year	Severity Score	Tools	Malnutrition %	Mortality %	Length of stay, day
Küçükardali Y et al.(45)	342	67	APACHE II 19	NRS-2002	Moderate and severe: 39.4	Total Hosp: 26.9 Well-nourished Hosp: 10.6 Malnourished Hosp: 51.8 P=0.02	Hosp: 6.6 Hosp: 6.4 Hosp: 7.9 P<0.05

Authors	N	Age, year	Severity Score	Tools	Malnutrition %	Mortality %	Length of stay, day
Tripathy et al. (46)	109	75	APACHE II 19 (SD 6.5)	MUST	Moderate: 20.2 Severe: 47.7	Total 28-day: 30.3 Well-nourished 28-day: 17.1 Malnourished 28-day: 37.8 OR: 2.94 (95%CI:1.10-8.00), p=0.01	ICU total 7.1
Shpata et al. (9)	963	74	APACHE II 19	NRS-2002	Malnutrition risk: 71.42	Total ICU mortality: 42.7 Malnutrition risk: 82.65 OR: 2.68 (95%CI: 1.72-4.18), p<0.0001	ICU length of stay of malnutrition risk longer than 14 days compare to well-nourished (OR =5.18,

Authors	N	Age, year	Severity Score	Tools	Malnutrition %	Mortality %	Length of stay, day
							95% CI: 2.43–11.06; P<0.0001)
Pi-Hui Hsu et al. (37)	190	79		m-NUTRIC	HNR :91.1 LNR: 8.9	Total ICU: 16.8, HNR: 17.9,LNR: 5.9 P=0.21 Total Hosp: 27.4, HNR:29.5, LNR 5.9 p=0.04	ICU: 14.7; 14.9; 12.5 P=0.32 Hosp: 26.4; 26.9; 21.5 P=0.03
Sheean et al. (38)	260	74	APHCHE II: 12	SGA MNA	Moderate: 21 Severe: 2 Moderate: 24.4	Total: Hosp: 6.2 Well-nourished: Hosp: 4.8 Malnourished: Hosp: 23.0 Adjusted P value: <.01	ICU: 3.0 2.7 4.1 ICU adjusted P value:0.11 ICU: 3.0

Authors	N	Age, year	Severity Score	Tools	Malnutrition %	Mortality %	Length of stay, day
				MNA-SF NRS-2002	Severe: 10.0 Moderate: 20.0 Severe: 5.8 Mild: 10.6 Moderate: 4.9 Severe: 15.0	Total: Hosp: 6.2 Well-nourished: Hosp: 6.1 Malnourished: Hosp: 16.7 Adjusted P value: .09 Total: Hosp: 6.2 Well-nourished: Hosp: 5.3 Malnourished: Hosp: 21.7 Adjusted P value: <0.01	2.7 3.7 ICU adjusted P value:0.17 ICU: 3.0 2.7 4.1 ICU adjusted P value: 0.06 ICU: 3.0 2.8 3.8 ICU adjusted P

Authors	N	Age, year	Severity Score	Tools	Malnutrition %	Mortality %	Length of stay, day
						Total: Hosp: 6.2 Well-nourished: Hosp: 5.8 Malnourished: Hosp: 19.5 Adjusted P value: 0.03	value: 0.23

2.3.2 Diagnostic tools for identifying malnutrition of the critically ill older aged patients

There is no universally accepted list of indicators for identifying malnutrition in older adults. Many indicators were used to identify malnutrition in general and older ICU patients. The nutritional assessment process includes the collection of data to determine the nutritional status of an individual (47), including nutrition screening and assessment principles:

- Anthropometric measurements: BMI, Body composition, Skinfolds, MUAC, CC
- Biochemical data: such as albumin, pre-albumin, transferrin, and/or retinol-binding protein, total lymphocyte count, creatinine/height ratio.
- Functional status: handgrip strength, respiratory function
- Food and nutrition-related and medical history
- Screening and assessment tools

2.3.2.1 Anthropometric measurements

Anthropometrics referred to the physical measurements of the body. The measurements were used to assess an individual's body habitus and include specific dimensions such as height, weight, and body composition (48).

Body Mass Index (BMI)

BMI was calculated as weight in kilograms divided by the square of height in meters (kg/m2). It was found to be well-correlated with lean mass and fat mass in adults (49,50). BMI is a simple calculation and non-invasive characteristic. WHO recommended BMI as an indicator of the diagnosis of a person nutritional status. However, in a critically ill context, BMI was not sensitive enough to identify malnutrition. For example, in a population with a relatively high BMI, an unintentional dropped of more than 10.0% in body weight did not lead to a decline in BMI that would reflect the malnutrition cut-off value; however, malnutrition could still be existent (51). Furthermore, in some medical conditions with high catabolism, a significant change in body composition (decreased lean mass and increased fat mass, that is, sarcopenia) could possible occur that was not reflected as a change in body weight. Finally, ascites or edema could also mask actual weight loss in some patient groups by increasing total extracellular fluid (52).

Additional, ESPEN promoted new diagnostic criteria for malnutrition as if people also have a BMI < 18.5 kg/m2 or have one of two characteristics: weight loss (unintentional) > 10% indefinite of time, or >5% over the last three months combined with either BMI <20 kg/m2 if <70 years of age, or <22 kg/m2 if ≥ 70 years of age or FFMI <15 and 17 kg/m2 in women and men, respectively (51). Due to critical illness, estimate the height is challenging, so a horizontal assessment is used instead of standing height measurement, such as demi-span (from the sternum cavity to space between the second and third fingers in the outstretched arm) or height from the knee to the heel when seated; BMI can calculate from this data (53).

Body composition

Body composition measures body fat, muscle mass, and bone density. Several measurements of body composition include skin-fold thickness, circumference

measurements, bio-electrical impedance analysis (BIA), or dual-energy X-ray absorptiometry (DXA) scans (54).

Mid-upper arm circumference (MUAC) measures at the midway point between the ulna's olecranon process and the scapula's acromion process. Calf-circumference (CC) counts as the maximum horizontal distance around the left calf as the subject stood upright. The most commonly used cut-offs of MUAC are 23.5 cm for men and 22.0 cm for non-pregnant women; 22.0-24.0 cm for pregnant women; 23.5 cm in older men, and 22.0 cm in older women (55). The study in Malaysia found the CC cut-off points for older men and women at risk of malnutrition were 30.1 cm and 27.3 cm, respectively (56).

The value of body composition measures as skin-fold thickness and circumference measurements as a single diagnostic tool for malnutrition in hospitalized patients is not exact. In some studies, MUAC has high specificity but low sensitivity compared with other malnutrition; thus, it is unlikely to be a good predictor of clinical outcomes (57). MUAC was also found to have a weak agreement with MNA due to its low sensitivity (58). On the other hand, MUA, CC, and skinfolds can identify muscle mass decrease as predictors of all-cause mortality in the older population (59,60).

2.3.2.2 Biochemical Data

Several serum proteins were used as indicators of malnutrition in hospitalized patients, including serum albumin, serum pre-albumin, transferrin, and retinol-binding protein (61). Serum albumin usually reflects the severity of the disease than malnutrition (62,63). Serum albumin levels are affected by many factors other than nutrition, such as a rapid decrease in stress and bacterial infections (64), inflammation, liver disease, burns, osteoporosis (65). Albumin has a long half-life of about 14-20 days, so when measuring albumin levels decreases, a large amount of protein may have been lost a few weeks earlier. Therefore, the diagnostic value of albumin is quite late after the onset of visceral protein reduction. Still, albumin specificity is relatively high, so serum albumin is always an important test and a parameter with the value of nutritional evaluation. The patient is diagnosed with malnutrition if albumin <35 g/l. However, the evidence recommends that albumin be used as a marker for malnutrition in non-

inflammatory cases, such as prolonged hunger. The strength of the evidence needs to be revised.

Consequently, serum albumin should not be as an energy-protein malnutrition diagnostic index at ICU (66). Furthermore, C reactive protein is usually measured concurrently with these serum albumins to assess patients' inflammation status. However, even with the measurement of C reactive protein, serum proteins have a weak association with dietary intake and low sensitivity and specificity to predict hospitalized patients' nutrition status (67). Hezaji (68) postulated that anthropometric measurements were better predictors of our critically ill patients' nutritional outcomes than were biochemical tests.

2.3.2.3 Functional status

In the context of older ICU patients, there are limitations to using such functional status as handgrip strength and respiratory function as indicators for assessing nutritional status, due in part to instrumentation. Therefore, they will be excluded from this project.

2.3.2.4 Food/Nutrition-related and medical history

Interviewing the patient or the caregiver to determine past and current eating practices can be helpful. Besides current weight changed and dietary intake, it also includes nutritional habits, allergies, food intolerances, and previous medical conditions.

The patient’s medical record reflects additional information regarding social, pharmaceutical, environmental, and medical issues. These data help to assess comprehension of the nutritional status of the patients. Drug-nutrient interactions may be identified from the prescribed medications, affecting appetite, gastrointestinal functions, and symptoms leading to potential nutrient deficiencies. Environmental issues point out the difficulties the patient has in procuring, storing, and/or preparing food. The education acquired by the health care provider could determine the potential for understanding and applying nutrition education. The economic status of the patient may also drive individual food choices. Much of the information can help raise

suspicion and guide the investigation further into revealing the patient's nutritional status (54).

2.3.2.5 Nutrition screening and assessment tools:

Nutrition screening determines the risk of malnutrition, whereas nutrition assessment is diagnostic of malnutrition (69). The nutrition screening tools need to be validated, flexible, and taking less time, having less calculation, including no collection of laboratory data, and be non-invasive to identify patients at risk of malnutrition (70). Meanwhile, the nutrition assessment tools are based on a combination of medical, nutrition, social, cultural, and medication histories, physical examination; anthropometric measurements; and laboratory data to determine ICU older patients' nutritional status. Several guidelines recommended that nutrition status should recognize within 24-48 hours after ICU admission (71,72). Table 2 shows the tools used to evaluate the nutrition status of ICU older patients.

There are two commonly used assessment tools worldwide: Subjective Global Assessment (SGA) and Mini Nutrition Assessment (MNA). The SGA has developed and validated for use in adult patient populations, while the MNA has been established and validated for elderly patient populations (73).

Subjective Global Assessment (SGA)

This tool was developed in 1987 in Canada. It involved assessing the patient about their history and physical examination, which correlated with another measurement among 109 gastrointestinal patients. The SGA divides patients into three categories; A, B, C, with A being well-nourished, B being experiencing moderate malnourishment, and C being severely malnourished (74). There were several versions of SGA up to date, such as SGA (7-point SGA) (was developed in 1996, initially for renal patients in the United States and Canada (75). Patient-Generated Subjective Global Assessment (PG-SGA) (was created in 1994, for cancer patients in the United States) (76), modified quantitative SGA (MQSGA) (was developed in 2005 (77) or quantitative SGA (Q-SGA) that was designed for renal patients in 1999 in the United States (78). However, the original SGA has been validated for use in most patient populations and several countries representing most of the continents (79), compared

to other modified versions of the SGA. Validation studies of MQ-SGA are limited and restricted to renal patient populations in Turkey, Nepal, and China (80–82). Vietnam also validated and applied SGA as an assessment tool of nutrition status for hospitalized patients. A high malnutrition rate was found when used SGA in surgical patients; 35.4% and 42.3% of patients were classified as B and C, respectively (42).

Mini Nutrition Assessment (MNA) The researcher needs to cut the content that dose not included in the study.

The Mini Nutrition Assessment (MNA) was developed in 1994 with high sensitivity, specificity, and reliability for elderly populations in the community and hospital setting by Nestlé Nutrition in Switzerland (73). It comprises 18 questions; each question has a score of 0-3 points. With a minimum score of 30, nutrition status has been classified into three categories: <17 points being malnourished, 17-23.9 points being at risk of malnutrition, and ≥24 points being well-nourished. The evaluation of MNA's predictive validity verified its association with an adverse health outcome, social functioning, mortality, and a higher rate of visits to the general practitioner (83). According to MNA, in a randomized trial of older at risk, those given oral supplements increased body weight but not handgrip strength (84).

Although there is no validation on the specific nutrition score of the ICU setting, currently available nutrition screening tools are Nutritional Risk Screening-2002 (NRS-2002) (85), Malnutrition Universal Screening Tool (MUST) (86), and Nutrition Risk in Critically Ill (NUTRIC) (87) to assess nutrition risks of critically ill patients.

Nutritional Risk Screening-2002 (NRS-2002)

NRS-2002 is the screening method proposed by ESPEN based on BMI, weight loss, diet history, the severity of illness, and individual age-related to malnutrition risks. Its predictive validity had been documented by a retrospective analysis of 128 RCTs, which showed that malnourished patients being identified by NRS-2002 were most likely to benefits from received nutritional support. Besides, NRS-2002 contains MUST's dietary components, if NRS 2002 score ≥3: the patient is at risk of malnutrition; NRS 2002 score <3: re-evaluate the nutritious risk weekly (85). NRS 2002 is less time-consuming in clinical practice and requires less qualification of

implementers than other tools (88). Screening for nutritional risk helps identify or predict the risk of developing the disease and the risk of complications, death, and ICU length of stay. A prospective cohort study including 459 older ICU patients in Albania demonstrated that the NRS-2002 was reliable for detecting nutrition risk and predicting clinical outcomes through infection rates, longer duration of ICU stay, and increased mortality (9).

Nutrition Risk in Critically Ill (NUTRIC)

Heyland et al. (87) proposed the method of assessing the nutritional risk score in critically ill patients (NUTRIC Score) in 2011 based on age, number of comorbidities, number of days hospitalized until admission to ICU, the total score for severity assessment (Acute Physiology and Chronic Health Evaluation II (APACHE II) and score for Sequential Organ Failure Assessment (SOFA) within 24 hours of admission. This was considered the first novel nutritional risk assessment tool developed specifically for patients in the ICU setting, using a unique scoring method. Later, Rahman et al. (89) proposed the m-NUTRIC, with the omission of the IL-6 testing because of its limited availability in many hospitals. The systematically applied m-NUTRIC contributed to identify patients at high risk of malnutrition (90). Data related to this scoring system showed that high-risk patients whose NUTRIC was >5 points were able to receive appropriate nutrition support, resulting in positive outcomes such as reducing complications and reducing infection and death rates (91). However, there was a limitation to this measurement score in that no nutritional parameters were included. When the score was compared to traditional screening tools, a large variability was observed. Recently, Arabi et al. (92) failed to confirm the NUTRIC score value in a post hoc analysis showing that permissive underfeeding with full protein intake was associated with similar outcomes among patients with high and low nutritional risk as standard underfeeding. Both the NRS-2002 and NUTRIC/m-NUTRIC scores serve as essential tools for assessing the severity of the disease and are, therefore, used in the screening and evaluation of nutritional status in the ICU setting with the cut of points of ≥5 points being high nutrition risk, and <5 points being low nutrition risk (79, 80). After screening, nutritional assessment of the ICU patients should be performed to identify malnourished conditions. Although the score criteria

for diet history, weight loss, and clinical examination data were often available under such conditions of ICU patients as the severity of illness, having on mechanical ventilation, having edema, etc., there is a need for an appropriate method to determine nutritional status. Therefore, the NRS-2002 and the NUTRIC/m-NUTRIC score are inclusive nutritious risk assessment options (8). However, the dietitian and the clinician must be well-trained and well-equipped with standardized assessment methods (93)

Table 2 Tools used to evaluate the nutrition status of ICU older patient

Tools	Diet-Related and/or Gastrointestinal Symptoms	Anthropometry and/or Physical Assessment	Severity of Illness	Others
Subjective Global Assessment (SGA) (74)	Diet history and gastrointestinal symptoms that lasted >2 weeks	Weight history over the past 2 weeks and 6 months, fat loss, muscle wasting, ascites, and edema	disease and its relation to nutritional requirements (primary diagnosis and metabolic demand)	Mobility and its duration
Mini Nutritional Assessment (MNA) (73)	Diet history over the past 3 months, number of meals and fluids consumed per day, type of feeding	Weight history over the past 3 months, BMI, mid-arm circumference, and calf circumference	Psychological stress or acute disease over the past 3 months, levels of serum albumin, pre-albumin, cholesterol, and	Mobility, neuropsycho logical problems, location of dwelling, consumption of >3 drugs per day, presence of

Tools	Diet-Related and/or Gastrointestinal Symptoms	Anthropometry and/or Physical Assessment	Severity of Illness	Others
			lymphocyte count	pressure sores or skin ulcers, and self-perception of nutrition status and health status
Nutritional Risk Screening-2002 (NRS-2002) (85)	Diet history over the past 1 week	Percentage of weight loss over the past 3 months and BMI	Diagnosis	Age
Malnutrition Universal Screening Tool (MUST) (86)	Diet history over the past 5 days	Percentage of weight loss over the past 3–6 months and BMI	Present of acute disease	
Nutrition Risk in Critically Ill (NUTRIC) (87) / Modified Nutrition Risk in (m-		APACHE II, SOFA, number of comorbidities, and levels of IL6 (m-NUTRIC if	Age, duration of hospitalization before admission to the ICU	

Tools	Diet-Related and/or Gastrointestinal Symptoms	Anthropometry and/or Physical Assessment	Severity of Illness	Others
NUTRIC) (89)		without levels of IL6)		

2.3.3 Existing nutrition support for older ICU patient

2.3.3.1 Nutrition requirement

Energy requirement

Recommended nutritional requirements for Vietnamese healthy adults depended on age, gender, and level of physical activity, according to the National Institute of Nutrition - Ministry of Health (94). ICU patients with severe illness were often thought to consume a lot of energy. However, with the improvement of mechanical ventilation and the control of pain, temperature, and sedation, this group's energy consumption may not be higher than the Resting Energy Expenditure (REE) of these patients. In the past, there was a controversy about how to determine the energy needs; nutrition care provided less energy than needed because there was evidence of the benefits of the underfeeding method (for example, less intolerance of the gastrointestinal tract, fewer infections complications). Underfeeding had become routine in most ICU setting (95). However, in critically ill patients, due to energy and substrate metabolism (such as protein) that varied according to the type of pathology, disease progression, and treatment method, the calculation formulas could lead to a deficiency or excess nutrition associated with increased complications. Therefore, the Resting Energy Expenditure (REE) determine by Indirect Calorimetry (IC) is the “gold standard,” which was based on the measurement of inspired oxygen (VO2) and expired carbon dioxide (VCO_2) (96). Many ICUs in Asia–Pacific and the Middle East, especially Vietnam, had limited resources to access IC based on the cost and well-trained practitioners required. Also, various equations were used for the prediction of REE in critically ill patients, such as the Harris-Benedict, Penn State University, or Mifflin-St. Jeor equations, i.e.…especially as the IC's measurement, are not always

practical; regardless, there was insufficient evidence to recommend using any calculation formula. With experts' consensus, energy requirements can be estimated by a simple formula of 20 - 30 kcal/kg/day (71). According to the EDEN study and the 2016 ASPEN recommendation, the safe starting point for most critically ill patients is around 8-10 kcal/kg/day. After one week, the criteria will reach 25-30 kcal/kg/day is suitable for most hemodynamically stable patients. The goal of providing 35kcal/kg/day is acceptable if the patient is relatively stable and needs to gain weight. Do not attempt to gain weight until the patient is stable and the inflammatory response has regained. For patients preparing intubation should keep the energy supply 25kcal/ kg/day (72).

In an observational study, Heyland et al. (97) showed that, for patients at high risk of malnutrition (score NUTRIC ≥6), the percentage of target energy provided to patients is higher (100% corresponding to energy needs), the mortality significantly decreases. Simultaneously, the death rate was also lowest in people fed via the gastrointestinal tract with energy levels above 80% of their needs. On the other hand, permissive hypocaloric feeding (defined as <20 kcal/kg/day with adequate protein [1.2–2.2 g/kg/day]) was not appropriate for most patients (98). The study compared permissive underfeeding with standard enteral feeding demonstrated no association between underfeeding and mortality in the ICU (92). In this research, the baseline of participants with BMI of two groups was high (BMI 29 kg/m^2), not appropriate for Asian patients (99).

Protein requirement

In ICU practice, a weight-based estimation formula is used to monitor the protein supply situation by comparing protein intake and protein requirements. Protein requirement adjusted according to the pathological status of patients, with mild to the moderate illness protein intake of 0.8 - 1.2 g/ kg/day, severe patients in general 1.2 - 1.5g/kg/day, and from 2g/kg/day for patients with severe burns (100,101). Few randomized controlled trials provided energy protein intake for critically ill patients. But these studies failed to determine the effect of the amount of calorie protein-energy intake to better clinical' outcomes. There is a lack of focus on nutritionally high-risk groups and/or older patient groups. The trial by Rugeles and The Early Goal-Directed

Nutrition in ICU Patients (the EAT-ICU trial) also failed to show a difference in the outcome. Still, the increased protein dose was confounded by increased energy, and the group that obtained more protein received more energy (102,103). Ferrie and colleagues did demonstrate a significant improvement in muscle mass and a trend towards increased handgrip strength in the group that received higher protein, but differences in protein obtained between the two groups were small (1.1 g/kg/day vs. 0.9 g/kg/day) (104). By contrast, observational studies show a negative association of higher calorie protein-energy with worse outcomes. In a large cohort study that carefully examined skeletal muscle during a critical illness where included patients were provided mostly enteral nutrition and received approximately 0.67g/kg/day, Puthucheary and colleagues concluded that increased protein delivery during the first ten days of ICU stay was associated with increased muscle wasting (105). Otherwise, it has been proposed that clinicians should focus on the protein dose delivered either enteral and/or parenteral rather than focusing on total caloric delivery in critically ill patients.

Nutrition therapy formulas

Most patients in an ICU will provided standardized high-protein polymeric procedures (a dose of 1.0 - 1.5 kcal/ml, high-protein 15-20% total energy); otherwise, the use of disease-specific formulas did not recommend for initiation (98). Formulations containing arginine, fish oil, and nucleotides were useful for reducing infections and hospital stay length in surgical patients. Still, there is no significant improvement in clinical outcomes (9). Previous data support the use of formulations with anti-inflammatory lipids proving that omega-3 fish oil provided by continuous feeding has been clinically beneficial in patients with acute lung injury or respiratory depression with mechanically ventilated. Recent studies showed that omega-3 fatty acids' interruptions did not achieve physiological or clinical benefit; some suggest that this approach can be harmful (106–108). Besides, with the problems of continuous or interruptions nutrient delivery, studies of formulas with different anti-inflammatory lipids differ from protocol to protocol (as the control group had more amount protein intake); this may have contributed to different results. Previously, glutamine has been added to feeding supplementation (for doses of 0.5 g/kg/day) in small-sample studies in single-center found benefits for burns or trauma patients (9). However, this strategy

needs to consider since recent trials showing supplementation glutamine for general medical ICU patients are ultimately harmful (109).

Many enteral formulas were designed as disease-specific, but the resulting benefits at the general ICU were not recognized, and these formulas should be used based on an individual patient. The recipes included small peptide, medium-chain triglyceride formulations to enhance the absorption of nitrogen and lipids more effectively in patients with bowel dysfunction, low energy formulas, and high-proteins for obese patients, organ failure regimen for patients with liver disease or acute kidney disease. The physiological basis for feeding with blood glucose control formulas or lung disease did not apply to existing treatment facilities today (71,72). Numerous trials have shown the benefits of providing antioxidants to ICU patients continuously feeding (110). A large RCT recently failed to demonstrate the benefits of a combination of antioxidants, including selenium supplements. However, the dose of selenium used is relatively low, and studies showed the interest of a selenium complex with a higher amount of selenium (107). Taking probiotics that showed effectiveness at the ICU facility when providing commercially available products reduced mechanical ventilation-related pneumonia, possibly with resistant-associated diarrhea, pseudomembranous colitis, and widespread infections (111). The benefits of probiotics seem to vary widely, were species-specific, and may be dose-dependent, all of which need to be considered when deciding which product to use. It was difficult to make more specific recommendations at this time (112). Many metabolically active dependent factors have been proposed for critically ill patients, based on these factors' appropriate physiological effects (113). β-blockers reduce the activation response. Statins have an omnidirectional general impact and may reduce the risk of infection while acting as an antioxidant. Anabolic factors such as insulin, human recombinant growth hormone, glucagon-like peptides, and anabolic steroids were like to have nutritional effects on the gut and/or lean muscle mass. Leucine stimulates protein synthesis, citrulline acted as a substrate for endogenous arginine synthesis and nitric oxide synthesis, and carnitine may help transport long-chain fatty acids into mitochondria oxidation. However, the lack of rigorous, well-designed studies had demonstrated the clinical effectiveness of any metabolic activation-dependent factor. Large RCTs of growth hormone in ICU patients requiring mechanical ventilation

showed increased mortality (114). Thus, using all of these formulas at ICU facilities should be considered empirically and should not be used outside research protocols and are not extrapolated for use in the ICU's general population (113).

2.3.3.2 Nutrition therapy in older ICU patients

Nutrition therapy in older ICU patients provides energy, macronutrients (lipid, protid, glucid), micronutrients via enteral and/or parenteral feeding.

Enteral feeding:

When nutrition therapy initials, the EN is the preferred choice (115,116). Current recommendations support 24-hour nutrition therapy for ICU patients via enteral feeding. The EN supports the structural and functional integrity of the gut by maintaining a tight bond between cells, stimulating blood circulation, and stimulating the release of endogenous agents (e.g., cholecystokinin, gastrin, bombesin, and bile salts), IgA made from immune cells (B cells and plasma cells), intestinal lymphoid tissue (GALT-gut-associated lymphoid tissue) (72). Early EN is likely to reduce the risk of infection and organ failure and positively impact the patient's length of hospital stay, hence the recommendation that EN is initiated as soon as feasible (117). EN versus PN's beneficial effects has been documented in many RCTs in severely ill populations, including trauma, burns, head trauma, major surgery, and pancreatitis (118). Early feeding of the gastrointestinal tract improves resilience to postoperative injury (119). In a recent study, early feeding has been shown to reduce mortality in patients with mechanical ventilation in ICU and hospitals, even beneficial to those with unstable hemodynamics (120,121).

On the other hand, a systematic and meta-analysis of 15 randomized trials of comparisons between those fed early EN nutrition to no/delayed EN nutrition suggested that early EN nutrition benefits may be attributable to risk bias (122). That means the benefits of early EN feeding might overestimate. However, there was evidence that early EN nutrition for critically ill patients significantly reduces bacterial infections and mortality rates. This approach yielded better results for surgical patients than for internal medicine: surgery patients (e.g., trauma, peritonitis, acute pancreatitis, and burns) were all the focus of the RCT studies and the analytical studies mentioned above,

while patients in internal medicine were mainly assessed by observational studies (122–124).

Contraindications of EN in patients such as hemodynamic instability, hypoxemia, uncontrolled acidosis, uncontrolled gastrointestinal bleeding, overt bowel ischemia, and high-output intestinal fistula if reliable feeding access distal to the fistula was not achievable, abdominal compartment syndrome; and if the gastric aspirate volume is above 500 ml/6h. Early enteral feeding within 48 hours without contraindications, this early feeding should always be below the required amount, and increase until the 4th day, if by the 4th day, the energy provided by the EN does not reach 60% of the goal, a combination of PN should consider, otherwise if patients can eat. It provides>70% of nutrition goal from 3-5 days; oral feeding should be referred (71). When EN indicated, it is necessary to raise the bed's head by up to 45 ° to reduce the choking risk and reduce the incidence of mechanical ventilation-associated pneumonia (125).

EN through the nasogastric tube was the first choice when starting EN nutrition for critically ill patients. EN through the pyloric tube (as in the duodenum) applied in case of high-risk inhalation (such as poor stomach tolerance) (72). Nasojejunal feeding is indicated when it was impossible to feed through the stomach, especially in situations where there was a high risk of inhalation (taking sedatives, antipsychotics) or a high risk of reducing drug-food intolerance (e.g., hypertension vasoconstrictors). In a multicenter RCT to compare early nasojejunal with nasogastric nutrition, Davies et al. (126) found early nasojejunal diet did not increase energy delivery and did not appear to reduce the frequency of pneumonia; therefore, the routine placement of nasojejunal tube feeding in critically ill is not recommended.

Parenteral feeding

PN should initiate when EN is not feasible or contraindicated. For patients with high nutritional risk, supplemental PN could be considered if EN failed to provide more than 60% of nutrition goals (calories and proteins) after three days. Supplemental PN considered all other patients when EN failed to provide more than 60% of nutrition goals (calories and proteins) after seven days (98). Recently, combined PN with EN could be sufficient in achieving 100% energy and protein goals. However, that

combination should be considered optimum due to the causes of metabolic problems such as hyperglycemia, increased osmotic pressure, fluids overload, and increased medical care costs (88). When administering the PN, appropriate intravenous injection access protocols for both central and peripheral access should be followed, as well as infection control practices being upheld. Optimal care should be provided to patients by adhering to evidence-based infection control processes and adequately maintaining and monitoring PN (14). Early PN nutrition within the first 48 hours for short-term relative contraindications to enteral feeding did not change mortality rates (127).

The optimal time to initiate PN nutrition for critically ill patients is unknown. There was evidence suggesting that early PN nutrition may increase infection rates (128–130). An RCT study of 4640 critically ill patients (129) and a meta-analysis of 69 RCTs (131) showed that the infection complication rate increased by 4-5% in PN patients. A combination of PN and EN (to increase energy and protein supply) was also evaluated and produced the following results (130–132); a multicenter RCT study selected 4640 critically ill adults who were fed by EN, supplemented by early PN nutrition (within 48 hours after admitted to the ICU) or late (8 days after entering the ICU) (129). Patients with late PN care had lower infection rates in the ICU than those who received early PN care (22.8% versus 26.2%) and fewer mechanical ventilation and dialysis (relative reduction of 9.7%). A small RCT study of 305 adult ICU patients who received EN nutrition and supplemented with PN nutrition (on day 4-8) found patients with supplementary PN nutrition had a lower incidence of nosocomial infections compared to those receiving only EN nutrition (27% versus 38%) (132). However, there is no difference in the mortality and length of stay in hospital and ICU.

Contraindications for PN nutrition included increased osmotic pressure, hyperglycemia, severe electrolyte disorders. The relative contraindications for PN nutrition are still unclear. However, PN nutrition was often avoided in patients with sepsis, systemic inflammatory response syndrome (SIRS), mild vomiting, gastrointestinal bleeding, short-term mechanical ventilation, and some patients temporarily not provide EN yet, but the prognosis will recover quickly. For patients at risk of "refeeding syndrome," the nutrition therapy should be started slowly and under

monitored. Patients with chronic malnutrition need vitamin B1 supplements before artificial feeding to avoid Wernicke syndrome (133).

2.4 The hospital system and nutrition-dietetics services in hospitals in Vietnam

2.4.1 The hospital system in Vietnam

There were a total of 1189 hospitals in Viet Nam and they were divided into public (80.6%) or private hospitals (19.4%) (134). Hospitals could be further divided into general or specialist hospitals and then categorized into levels one to three based on criteria established by the Vietnamese Hospital Regulations in 1997 (135). These levels (central, local, and other branches) were determined using the medical staff's technical qualifications, equipment, and infrastructure. The regulations for the classification of private hospitals were currently under development by the Vietnamese Government. Vinh Long had four provincial and nine districts and communal facilities level (134). Vinh Long General (VLG) hospital was a level 2 and the biggest provincial general hospital in Vinh Long province.

2.4.2 Nutrition and dietetic services in Vietnam

The establishment of a nutrition department within a hospital was necessary for hospitals categorized as levels one to three. Nutrition and dietetic services were also a criterion for the evaluation of hospital quality. Section C7 of “Criteria set for evaluation hospital quality,” hospital quality is classified based on the hospital's nutrition and dietetic services capacity (136). Nutrition screening and assessment for inpatient were specified in section C7.3 in this document. Hospitals were classified at the lowest category (Category 1) if they did not measure body weight and height, did not implementing screening using other tools, and did not write the medical record results. Hospitals should have the proper equipment at a Category 2 level (for measuring body weight and height) and screening tools. They should carry out these measurements documented in the medical records of 50% of inpatients. At the Category 3 level, together with the criteria in Category 2, hospitals should accurately diagnose the risk of malnutrition/malnutrition in patients within 36 hours of hospital admission. At the Category 4 level, together with criteria from Category 3, hospitals should be providing

nutritional care plans for patients. At Category 5 (the highest level that can be achieved), hospitals should reassess patients' nutrition status during the intervention period with all the above criteria.

Hospital meals were currently not covered by public medical insurance in Vietnam. Patients were therefore required to pay for their own food and drink during hospitalization. Apart from food from Nutrition and Dietetic Departments in some hospitals, meals for patients in Vietnamese hospitals mostly came from several other sources, including home-cooked foods, the takeaway from outside the hospital, food from the hospital canteen, packaged food (usually milk and oral nutritional supplement products) from convenience shops in hospitals, and food as gifts from visitors. Guidance for preparing, buying, or cooking foods/meals mostly comes from medical doctors for conditions or situations that require special nutritional attention. In most cases, patients and their relatives decide on the menu of main meals and mid-meals, rather than this being a part of the treatment plan. Besides, a range of beliefs around restricting certain foods according to disease in Vietnam (137) may also contribute to certain food groups' suboptimal intake in hospitalized patients. In VLG hospital, the ICU older patients were served fours meals/day, where the nutrition department did not provide meals and all meals from the patient’s caregiver. Furthermore, the Vietnamese Ministry of Health announced that by 2020, all hospitals would be required to provide full food services to at least some relevant specialties, including endocrinology, surgical, and oncology, and critically ill patients. This situation created further motivation for establishing systems for the screening and diagnosing patients with malnutrition in a hospital in Vietnam.

2.5 Theoretical framework

During hospitalization, nutrition care activities were considered essential, particularly among patients with malnutrition or those at risk of malnutrition. According to ESPEN, nutrition care activities could help to: improve or at least prevent the deterioration in mental and physical function; reduce number or severity of complication of diseases or its treatment; accelerate recovery from diseases and shortened convalescents; reduce consumption of resources, for example, length of hospital stay and other prescription” (138).

The relationship between different nutrition care activities was presented as the novel care model Alliance to Advance Patient Nutrition (Alliance) developed by a combination of the Academy of Medical-Surgical Nurses (AMSN), the Academy of Nutrition and Dietetics (AND), the American Society for Parenteral and Enteral Nutrition (ASPEN.), the Society of Hospital Medicine (SHM), and Abbott Nutrition in 2013. The Alliance nutrition care process consisted of six principles: [1] create an institutional culture where all stakeholders valued nutrition, [2] redefine clinicians' roles to include nutrition care, [3] recognize and diagnose all malnourished patients and those at risk, [4] rapidly implement comprehensive nutrition interventions and continued monitoring, [5] communicate nutrition care plans, and [6] develop a comprehensive discharge nutrition care and education plan (139).

Besides, we applied the Health Belief Model (HBM) framework to provide nutrition education to patients/caregivers. HBM is the most commonly used health behavior model and emphasizes behavioral change at the personal level, and the model has been established in the United State of America since 1950s (140). The underlying concept of the HBM is that personal beliefs or perception may affect their health behavior. According to this model, 1) the patients/caregivers must perceive the severe and danger of malnutrition on ICU care's negative outcomes, such as the likelihood of higher mortality, complications, more extended hospital, and ICU length of stay, 2) the patients/caregivers must perceive the susceptibility or risk of malnutrition. The assumption was that people had recognized they were at risk of malnutrition; they were willing to do something to prevent it before it happens, 3) the patient/caregiver perceived the benefits of new behavior (appropriate provision of quality and quantity of food) to decrease malnutrition risk. Lastly, addressing the perceived barriers of new behavior(s) transforming to prevent malnutrition was essential because changing one's behavior was not an easy decision making and practice.

This research was grounded from the four perceptions in the Health Belief Model, incorporation with five principles derived from the Alliance nutrition care process approach. In this study, the researcher sought to: redefine clinicians' roles to include nutrition care that all healthcare professionals involving with patient care must be empowered to influence appropriate nutrition decisions; recognize and diagnose all

malnourished patients and those at risk by comprehensively using the nutrition screening and assessment methods; implement comprehensive nutrition interventions, continue monitoring, develop a comprehensive discharge plan for nutrition care by providing nutrition knowledge to the ICU staffs and caregivers. This study put more emphasis on team working, where the ICU staffs, the researcher, and the officer from the hospital nutrition department were working together to communicate nutrition care plans of the ICU older patients. Additionally, HBM is appropriate for designing and implementing nutrition education interventions to prevent malnutrition and improve patients' nutritional status and health outcomes.

2.6 Related studies

Malnutrition is caused by complex factors and worsens health conditions and impacts critically ill patients' survival rate. However, malnutrition is common to occur during ICU stay. Hejazi et al. (68) studied the nutrition status of 125 older patients based on SGA from 8 ICUs in Iran. Results showed that malnutrition prevalence significantly increases on the admission day (28.8%) compared to discharge day (58.62%), $p<0.001$). On the other hand, Zaw et al. (143), in the pilot study of 30 hospitalized patients with neurological problems fed by tube, indicated that the patients and their caregiver were less likely to us the blender diets for tube feeding and had inadequate energy protein intakes comparative to their requirements.

Range of issues affecting the routine screening of malnutrition in hospital settings included lack of time and staff were the most two common barriers for nutrition screening (14), followed by the lack of knowledge and positive attitudes of the medical staff regarding nutrition screening. Only 36% of survey respondents pointed out that their hospitals had a nutrition team, and only 55% of these teams provided daily ICU coverage at the Asia–Pacific and Middle East Working Group on Nutrition in the ICU (98). Laur et al. (141) found that a high percentage of medical staff agreed about the importance of nutrition care for the recovery of patients during their hospital stay, the need to monitor a patients’ weight and to conduct nutrition screening, and the role of all medical staff in improving nutrition care for patients. Besides, nurses in Jordan, for example, believed that being included in a multidisciplinary team was likely to

enhance nutrition therapy in the ICU. Study on physicians' perceptions regarding the detection and management of malnutrition in a Canadian hospital showed a gap between the perception and practice of hospital-related malnutrition (142). That study found a high percentage of physicians believed that nutrition screening should be performed upon admission, during hospitalization, and at discharge. However, most of the physicians felt that these practices were not undertaken regularly. While Karim and colleges (2015) found that a small percentage of healthcare staff did not have adequate knowledge to perform nutrition screening on their patients (from 15.3% to 31.6%) (143). Also, Nguyen et al. (144) showed only 66.8% of hospitalized patients had their weight and height recorded in their medical records (64.6% for patients < 65-year-old and 71.8% for patients > 65-year-old).

Provision of nutrition education for ICU staff and nutrition counseling for patients positively impacted the multi-nutrition parameter of patients. A multi-center study in Korea (145) showed that implementing the enteral educational program positively impacted nurses' perceptions, knowledge, and practices relating to providing enteral nutritional support. In this study, the quasi-experimental and one group pre-test, the post-test design included 205 ICU nurses was used to evaluate the effectiveness of nutrition education program. The nutrition education program contented 2 sessions about enteral nutrition and toke 60 minutes each to finish the training. They used the questionnaire consisted of four issues as ICU nurses' (I) perceptions, (ii) knowledge, (iii) practices to enteral nutrition for ICU patients, and (iv) a demographic survey to show a significant improvement of ICU nurses' knowledge and perceptions. Besides, Castro et al. (146) found that providing medical nutrition education to ICU's physicians could improve the quality of nutritional therapy and decrease intensive care unit length of stay in critically ill patients. Nutrition counseling for patients/ caregivers is essential especially in Southeast Asia nations, due to self-provide caloric during ICU stay.

Therefore, every hospital needed to build a Nutrition Therapy Team and nutrition care process without limit members, including clinical nutrition physicians, dietitians, clinical pharmacists, nurses, physical therapists, and practitioners. Every team member should be encouraged to document and communicate information relevant to a patient's nutritional status to facilitate rapid and optimal dietary

interventions, as necessary, to improve patient outcomes (98). The nutrition care process includes nutrition screening, nutritional assessment and intervention, and nutritional education (140). A study tested about the effectiveness of Quality Improvement Program (QIP) focus on nutrition compare standard care and QIP care on readmission and hospital length of stay found that the QIP was significantly reduced thirty-day readmissions (20% of the standard care vs. 15.6% of QIP) and LOS for malnourished inpatients. In the QIP, the nurses used an electronic medical record-cued Malnutrition Screening Tool (MST), provision of oral nutrition supplements (ONS) within 24 hours, patient/caregiver education, and sustained nutrition support (147). Provision of nutrition education for ICU staff and nutrition counseling for patients positively impacted patients' multi-nutrition parameter, including nutrition knowledge, therefore, improving dietary intakes, nutritional status, and functional outcomes. Nutrition shortfalls are undertreated, although nutrition care plan is becoming standard care in hospital. The healthcare system needed to increase attention to hospital nutrition care, made nutrition practice changes, and tested its effectiveness.

2.7 Existing gaps of knowledge

Through the description and analysis of the literature, there are two identified gaps of knowledge.

Firstly, there is a lack of scientific evidence about the prevalence, associated risk factors, and appropriate screening tools and the consequences of malnutrition on older ICU malnutrition assessment in Vietnam, as well as in the lower-middle-income countries in the Southeast Asia region, as discussed below:

- Most studies on prevalence, associated risk factors, and screening tools for hospital malnutrition were carried out in Western countries and some high-income countries in Asia, such as Singapore and China.

- People of Asian origin had different body compositions compared to people of Caucasian origin. With the same BMI, people of Asian descent had a higher percentage of body fat and a lower percentage of skeletal muscle than Western origin (227). Therefore, it is challenging to apply anthropometric-

related criteria to diagnose malnutrition from Western countries to Asian countries.

• There are also some differences in food and nutrition-related knowledge, beliefs, concerns, and practices of the Vietnamese, the hospital bed usage rate, percentage of medical insurance cover, and patient referral policy and practices in Vietnam. These factors may affect the prevalence and characteristics, and etiology of malnutrition in older ICU patients.

The limitations related to nutrition and dietetics activities in hospitals in Vietnam. The establishment of nutrition and dietetics in hospitals in Vietnam is new, and as such, all resources for its actions are minimal. Instruction and guidelines from the government are preliminary. These issues will affect nutritional care for hospitalized patients specific in older ICU patients Secondly, there is a lack of studies about the nutrition intake and nutrition intervention program for older ICU patients in hospitals in Vietnam, as well as in lower-middle-income countries in the Southeast Asia region, as discussed below:

• Most studies on meal characteristics of hospitalized patients have been carried out in Western countries where the resources for nutrition and dietetic activities in hospitals are high, and hospitals provide meals.

• Most studies on food services in Western countries have focused on food waste, references, patients' satisfaction with hospital meals, and strategies for improving the production and distribution of hospital meals.

• Few studies have investigated food availability, food sources, nutritional quality, mealtime patterns of hospitalized and ICU patients in Vietnam and other lower-middle-income countries in the Southeast Asia region.

• Few studies have investigated the nutrition intervention program, such as providing nutrition care and education plan during ICU stay or discharge.

A well-designed survey among ICU settings of the provincial hospital in Vietnam is required. The prevalence and consequence of malnutrition, characteristics

of patients' meals, evaluation of the effects of a nutrition intervention program are in need. Thus, the results of this research would provide crucial initial information for healthcare authorities in Vietnam. The data would help the hospital administrators and the national policy makers to strengthen nutrition screening, assessment, and interventions in ICU, specifically, the organization and management of patients' meals in hospitals. This current research study would facilitate and consolidate evidence about the importance of hospital meals, the need to cover hospital meals by medical insurance, and the need to control hospital meals in Vietnam. This information also contributes to understanding hospital systems and malnutrition in hospitalized patients, particularly in the context of the LMIC countries in Southeast Asia. Later on need to add the beneficial for the construction of the CC cut-off value

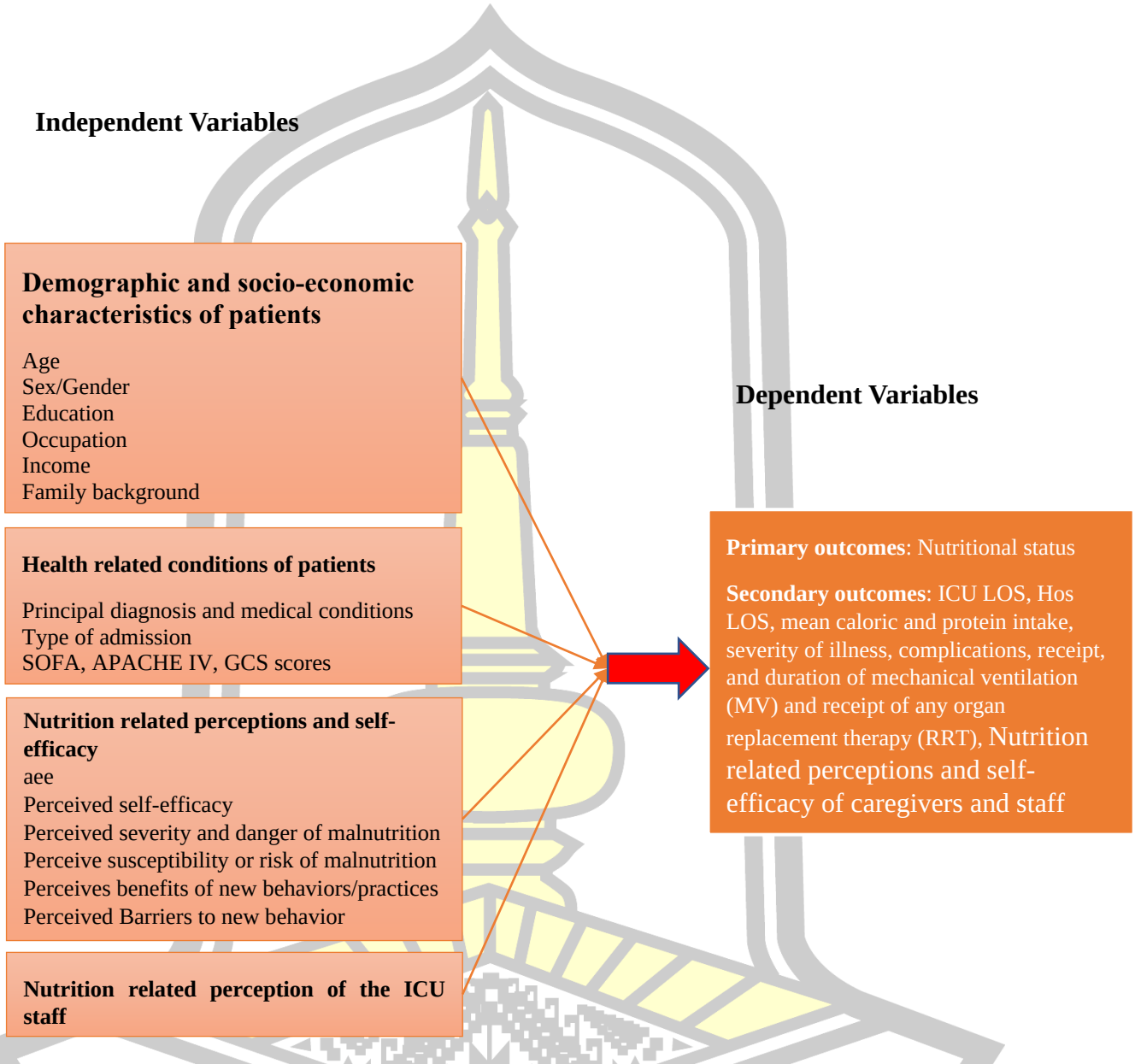

Figure 3 Conceptual framework of the research study

CHAPTER 3
MATERIAL AND METHOD

This chapter describes the research design adopted to achieve the overall aims of the study in regard to examining the current nutrition status and associated risk factors of malnutrition and health conditions of the ICU older patients and to find suitable CC cut-off points to predict nutrition status and appropriate solutions to improve health and service utilization outcomes of the ICU older patients. Section 3.1 provides the design of each study; Section 3.2 presents the study subject and setting; Section 3.3 details sampling design; Section 3.4 measurement; Section 3.5 data collection; Section 3.6 discusses how to analyze the data; Section 3.7 presents the ethical considerations of the research.

The current research divided into three phases. A cross-sectional follow-up study will be applied with a sample number of participants to 1) determine the prevalence of malnutrition in ICU older patients on admission and discharge day in the first and second phases. 2) describe ICU older patients' nutrition practice and identify the factors associated with malnutrition during older patients' ICU stay. 3) then follow-up until discharge to examine the negative consequence associated with malnutrition in older patients in ICU and 4) determine the CC cut-off value and its validation to predict the malnutrition base on SGA of ICU older patients in Vietnam. In the third phase, quasi-experimental presents to provide nutrition education for target group patients/or relatives and practitioners in the ICU; therefore, we evaluate the nutrition education program's effectiveness by comparing the mean caloric intake and clinical outcomes control and intervention groups. The comprehensive research conceptual framework is provided in Figure 3.

3.1 Study design

This study was a quantitative methods approach for the older population in ICU. The multiple phases of the quantitative method approach all address a common objective of assessing and refining the nutrition intervention program. This design would involve primary care providers and staff, patients/caregivers in the research process. Key stakeholders participate as co-researchers in a project, providing input about their needs, ways to address them, and implementing changes. It means that the

researcher provides knowledge about the nutrition of older critically ill patients, the ICU staff and caregiver will change the behavior and attitude, then change the daily practice (148). Phases 1 and 2: the cross-sectional follow-up study identifies malnutrition prevalence on admission and discharges day. The secondary outcome was the associated risk factor of malnutrition and the relationship between older patients' malnutrition and clinical outcomes. In the second analysis, we determine the CC cut-off valuate and its validation to predict the malnutrition base on SGA of ICU older patients in Vietnam. Phase 3: The quasi-experimental method carries out to implement the Nutrition Education program of older malnutrition patients group; we will evaluate the effectiveness of the Nutrition Education program of older malnutrition patients with the primary outcome is compare the mean of caloric intake control and experiment group, the secondary outcome is to compare the clinical outcomes such as ICU LOS, Hos LOS, the severity of illness, complications, receipt, and duration of mechanical ventilation (MV) and receipt of any organ replacement therapy (RRT) between and within two groups.

3.2 Study subjects and setting

3.2.1 Study subjects

3.2.1.1 Study population: The target population for this research is the older patients age 60 and/or over who are admitted to the ICU department, Vinh Long General Hospital, Vinh Long province, Vietnam.

3.2.1.2 Inclusion and exclusion criteria: all studies will be following Table 3.

Table 3 Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Phase 1-2: Age 60 and/or over Stayed in ICU for at least 24 hours Patients/families agree to enroll in the study. They were newly admitted to an ICU.	Scoliosis patients Braindead Patients with limb amputations Patients transferred from other ICUs or readmitted Patients admitted for a short screening test or prognosis dead within 24h.
Phase 3: Age 60 and/or over Stayed in ICU for at least 72 hours Patients/families agree to enroll in the study. They were newly admitted to an ICU.	Phase 3: Scoliosis patients Braindead Refeeding syndrome Patients with limb amputations Patients transferred from other ICUs or readmitted Patients admitted for a short screening test or prognosis dead within 72h.

3.2.2 Study setting

At the time of the study, older patients have registered in the ICU ward, Department of Intensive Care and Anti-Poison, Vinh Long General Hospital, Vinh Long province, Vietnam.

Vinh Long General Hospital was built the first time before 1945 through the war with only ten doctors and 200 staff for 250 beds. Nowadays, this is the highest hospital level (level 2) at Vinh Long Province, with 29 departments include 600 beds and more than 700 staff, where deliver health care and research center not only Vinh Long province population but also neighboring areas (Figure 4). Along with that, the

Department of Intensive Care and Anti-Poison with two wards (Hemodialysis and ICU) contain 50 experts and experience trained staff with modern life-supporting machines such as 30 ICU beds, 15 dialysis beds, ten ventilator machines, and 15 dialysis machines, etc. There was an average of 65% older age in 250 patients over 15 years old monthly be received and treated for life-threatening conditions in the ICU ward. In 2019, there were 3249 patients over 15 years old, in which 2172 older patients were admitted to ICU.

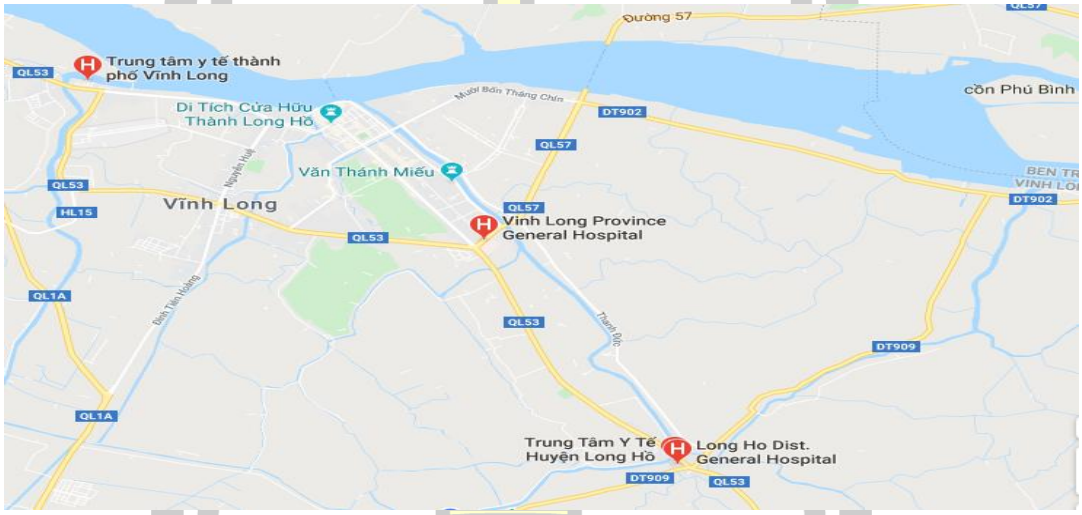

Figure 4 Map of Vinh Long General Hospital, Vinh Long province, Vietnam

3.3 Sampling design

3.3.1 Phase 1:

The study participants were drawn from all eligible individual ICU older patients in the ward, Vinh Long General Hospital. The sample size will be calculated with the following formula (149):

$$n = \frac{N.X}{X + (N - 1)}$$

$$X = \frac{Z^2 p(1-p)}{d^2}$$

Where n = sample size

N is the population of critically older patients admitted to the ICU in the previous year (N = 2,172)

Z is the statistic for a level of confidence, with a 95% confidence level, α = 0.05, Z value is 1.96, which is found in statistical tables where contain the area under the normal curve.

p is the expected proportion of malnutrition attribute in the population. In the previous study shown the prevalence of malnutrition in older patients in ICU was 23% (38). Thus, we desire the proportion of older malnutrition patients in this research is p = 0.23 and (1-p) = 0.77.

d is the desired level of precision; we estimate a ±5% precision

Therefore, the sample size after calculation was: $n \approx 242$

Hence, the minimum sample size of research was 242 ICU older patients and caregivers. The researcher, then included additional 3% of the total required number for incomplete information, therefore keeping the participant to be a total of 250 ICU older patients in this study phase.

3.3.2 Phase 2:

Using the sample of the first study.

Step 1: Determine the cut-off value of CC, the first 50 patients (25 males, 25 females) form the estimation groups and perform the ROC curve by taking SGA as an indicator for predictive validity.

Step 2: Validate the CC cut-off value for malnutrition prediction; we will include all the population of study 1 for validating the newly CC cut-off value by comparing outcomes between 2 groups that fulfilled the new value or not (binary variable).

3.3.2 Phase 3:

The sample size calculation in this study phase used the following formula to compare two group means, (150):

$$n = \frac{2C}{(ES)^2}$$

$$ES = \frac{\mu_1 - \mu_2}{\sigma}$$

Where n = sample size

C is a constant that depends on the values chosen for level of confidence and power, with 95% confidence level, α = 0.05, power 80%, β = 0.2, hence C = 7.85.

σ is the standard deviation

$\mu_1 - \mu_2$ was the different mean of the caloric intake of two groups

Our hypothesis that the "Nutrition Education Program" would change the behavior of delivery nutrition intake enriched the total caloric intake of older ICU patients, therefore preventing older patients' malnutrition during ICU stay and improving their health condition. According to Alberda C, Gramlich L, Jones N, et al. (153), enriched every 1000 calorie amount associated with shorten ICU LOS and decrease mortality. Hence, we expected that our intervention would enrich 1,000 calorie intake. In this study, the researcher followed a normal distribution of dietary intake with a standard deviation of 930 as stated in the greatest estimation proposed by Alberda C et al., a difference of 1000 as in Minard et al., with a 5.0% significance level, and 80.0% power of the test.

Thus, σ = 930, $\mu_1 - \mu_2$ = 1000

When calculating subtracting all components as stated in the formula, the derived sample size was: $n = \frac{15.7}{(ES)^2} \approx 14$

However, the researcher added approproximately 30.0% sample size to exclude those withdrawn or lost to follow up. Hence, the minimum sample size of this study phase was 20 (n = 14 + 14*30.0%) ICU older patients for each group.

According to the sampling design, we selected 32 older patients for each group to satisfy the statistics method.

3.4 Measurement

This study used 3 tools for data collection. Descriptions of each tool data are as follows:

Tool 1: "Survey interview guide on perceptions, self-efficacy and practices regarding appropriate feeding for critical ill older patients of the caregivers". This survey interview guide is aimed to assess for pre-test and post-test of the before and after receiving the Nutrition Education Program (NEP) regarding perceptions, self-efficacy

and practices regarding appropriate feeding for critical ill older patients of the caregivers. The tool comprises 4 parts with a total of 50 questions:

A. General information, background, and relation to the patient on part of the caregiver (8 questions);

B. Perceptions of patient's illness, nutritional status and feeding during the critically ill stage (importance of older feeding in the critical ill stage, type, frequency, quality and quantity of feeding) (15 questions);

C. Self-efficacy of appropriate feeding for older patients during critical illnesses (15 questions).

D. Practices prior to ICU admission and intention to perform feeding practices after discharge from hospital (number of meals, quality and quantity of actual provided meals daily, sources, prices), as well as problems and solutions in provisioning of appropriate feeding meals for the patients (8 questions)

Tool 2: "Nutritional Status and Clinical Assessment Form of ICU older patients

(Pre-test and Post-test)". To investigate nutritional statuses, feeding practice situation related to clinical outcomes of the critically ill older patients in ICU

Description: The recording form used in this study was developed and modified from the current nutrition in ICU guidelines, such as ESPEN, ASPEN, Asia pacific and Vietnam to be applied for nutritional status and clinical assessment of ICU older patients in Vinh Long General Hospital. The form comprises four parts covering patient's general information and family background; nutritional status assessment, received nutritional therapeutic practices; clinical outcomes; laboratory test results on admission day, day 4, day 7 and discharge day.

A. General informations: Patient's basic information and family background include parts of Health quality of life - WHO; information in this part will be collected from the medical record of each patient.

B. Medical information: includes department prior to ICU admission, cause of admission, major diagnosis, vital conditions at time of admission and other clinical

information; information in this part will be collected from the medical record of each patient.

C. Nutrition screening: mNUTRIC score, NRS-2002 will be used for nutrition screening and assessment. Anthropometric measurement such as BMI, calf- and mid-upper arm circumference and other nutrition and clinical conditions are also. Daily target calories (kcal) and received nutritional therapeutic practices: duration of time from ICU admission to EN (hour), received EN within 24 hours of admission, combined PN support, total EN support days, meeting requirement of caloric goal during ICU stay, weight change (kg), amount and ingredients of daily EN intaking (24-hour food recall method) feeding route, delivery methods, use of motility agents also will be investigated in this part.

D. Nutrition and clinical assessment: a assessment of nutrition and clinical outcomes include primary- and secondary outcomes of the study, nutrition status (SGA) and laboratory test results on admission, day 4, day 7 and discharge day. (WBC, lymphocyte, creatinine, albumin, protein, initial SOFA, APACHE II scores).

Tool 3: “Survey questionnaire on perception, attitude, and current practices in nutritional assessment and therapy for older critically ill patients of the ICU Staff (Pre-test and Post-test)”. This survey questionnaire comprises three parts, which was partly adapted from Malnutrition Knowledge, Attitudes and Practices in the study by C Laur, H Marcus, S Ray and HH Keller (2017) and literature review by the researcher, including:

A. General information and background of the ICU staff;

B. Perceptions: Significance of nutrition screening and assessment, provision of nutrition therapy, as well as monitoring and evaluation of clinical outcomes related to malnutrition of the critically ill older patients;

C. Self-efficacy: Nutrition screening and assessment, provision of nutrition therapy, as well as monitoring and evaluation of clinical outcomes related to malnutrition of the critically ill older patients;

D. Practices: Nutrition screening and assessment, provision of nutrition therapy, as well as monitoring and evaluation of clinical outcomes related to malnutrition of the critically ill older patients.

E. Knowledge: Nutrition screening and assessment, provision of nutrition therapy, as well as monitoring and evaluation of clinical outcomes related to malnutrition of the critically ill older patients.

- Demographic, clinical characteristics derived from medical records: age, gender, date of admission, principal diagnosis, and medical conditions (ICD 10, Vietnamese version 2015), type of admission (emergency or hospital wards transfer), SOFA, APACHE IV, GCS scores.
- Anthropometric indices: body weight and height, skinfold thickness, MUAC, CC,… MUAC measure at the midpoint between the tip tips of the shoulder and elbow of the non-dominant arm. A non-stretchable flexible tape and three measurements were taken by trained investigators to the nearest 0.1 cm and averaged (152,153).
- Biochemical blood indicators: such as protein, hemoglobin, CRP, albumin serum, will be derived from medical records.
- Nutritional status: this research used SGA and BMI as assessment tools to define malnutrition in older ICU patients. According to the American Society for Parenteral and Enteral Nutrition (ASPEN), patients were diagnosed with malnutrition if they had two or more of six characteristics: inadequate dietary intake, weight loss, loss of muscle mass, loss of subcutaneous fat, fluid accumulation, and diminished functional status (72). These diagnostic criteria align with the SGA elements; hence, SGA will be used as the diagnostic tool. In the SGA, a rating of “A” is defined as well-nourished, “B” is moderately malnourished, and “C” is severely malnourished. Besides, according to the new diagnostic criteria from the European Society for Parenteral and Enteral Nutrition (ESPEN) (51), patients are diagnosed with malnutrition if they also have a BMI < 18.5 kg/m2 or have one of two characteries: weight loss (unintentional) > 10% indefinite of time, or >5% over the last 3 months combined with either

BMI <20 kg/m2 if <70 years of age, or <22 kg/m2 if ≥ 70 years of age or FFMI <15 and 17 kg/m2 in women and men, respectively. Therefore, participants were defined as malnourished if they were classified as a “B” or “C” on the SGA, or they had a BMI match with the criteria above.

- Nutritional risk: will be screened using the following questionnaires (Appendix) NRS-2002, m-NUTRIC score
- Total calorie and protein requirements: 25 × weight. If BMI 16–25 kg/m2 uses the usual body weight; If BMI > 25 kg/m2 use ideal body weight; If BMI < 16 kg/m2 use current body weight for the first 7–10 days, then use IBW. Based on the SCCM and ASPEN guidelines, recommend the caloric goal in critically ill adult patients as energy and protein requirements are calculated through simplistic formulas (25–30 kcal/kg/day) and 0.8-2g/kg/day, respectively (72).
- Dietary intake: all food consumed daily one to day three at ICU will collect by an interview with the caregiver using a 24-hour recall method and adopted from the medical record. This method presents meal times, amount of each meal in each day, nutrition formula of a commercial product, food source, all liquid from documents, including the name of liquid, formula, and times using (154). Data will be analyzed by Nation institution of Nutrition software Eiyokun (including protein, carbohydrate, fat) (155). The interviewer support using a food picture booklet with the list of food includes bowls, cups, dishes, and spoons to improve recall of giving size. We also examine the days from admission to EN/PN, days of free EN/PN.
- Clinical outcomes: ICU LOS, Hos LOS, complications, receipt and duration of mechanical ventilation (MV), and receipt of any organ replacement therapy (RRT) follow-up until patients discharge or die.
- Nutrition-related perceptions and self-efficacy of caregivers and staff: we will use different questionnaires to assess nutrition literacy/nutrition awareness for each ICU staff and patients’ caregiver.

3.5 Data collection

3.5.1 The steps of data collection

These steps will follow the flowchart below (Figure 5)

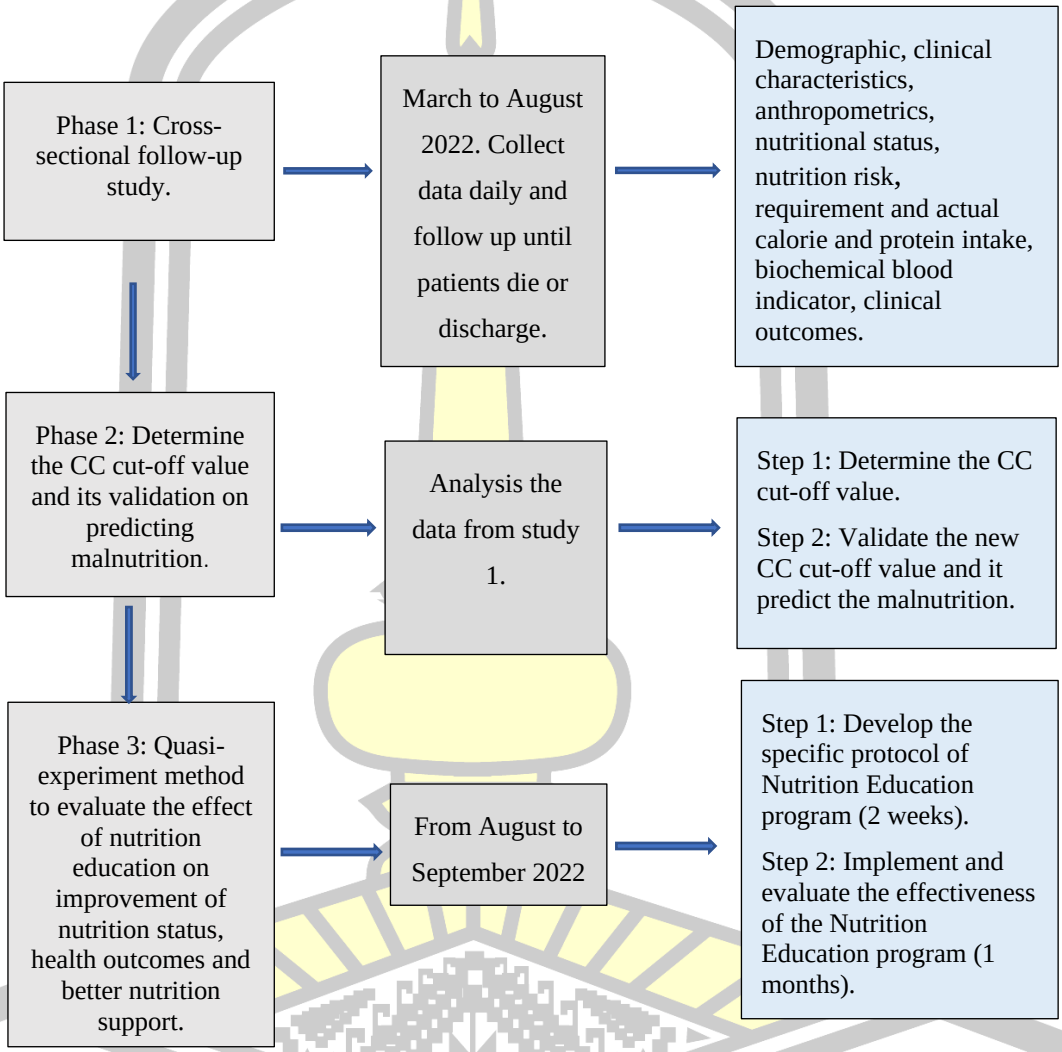

Figure 5 steps of data collection

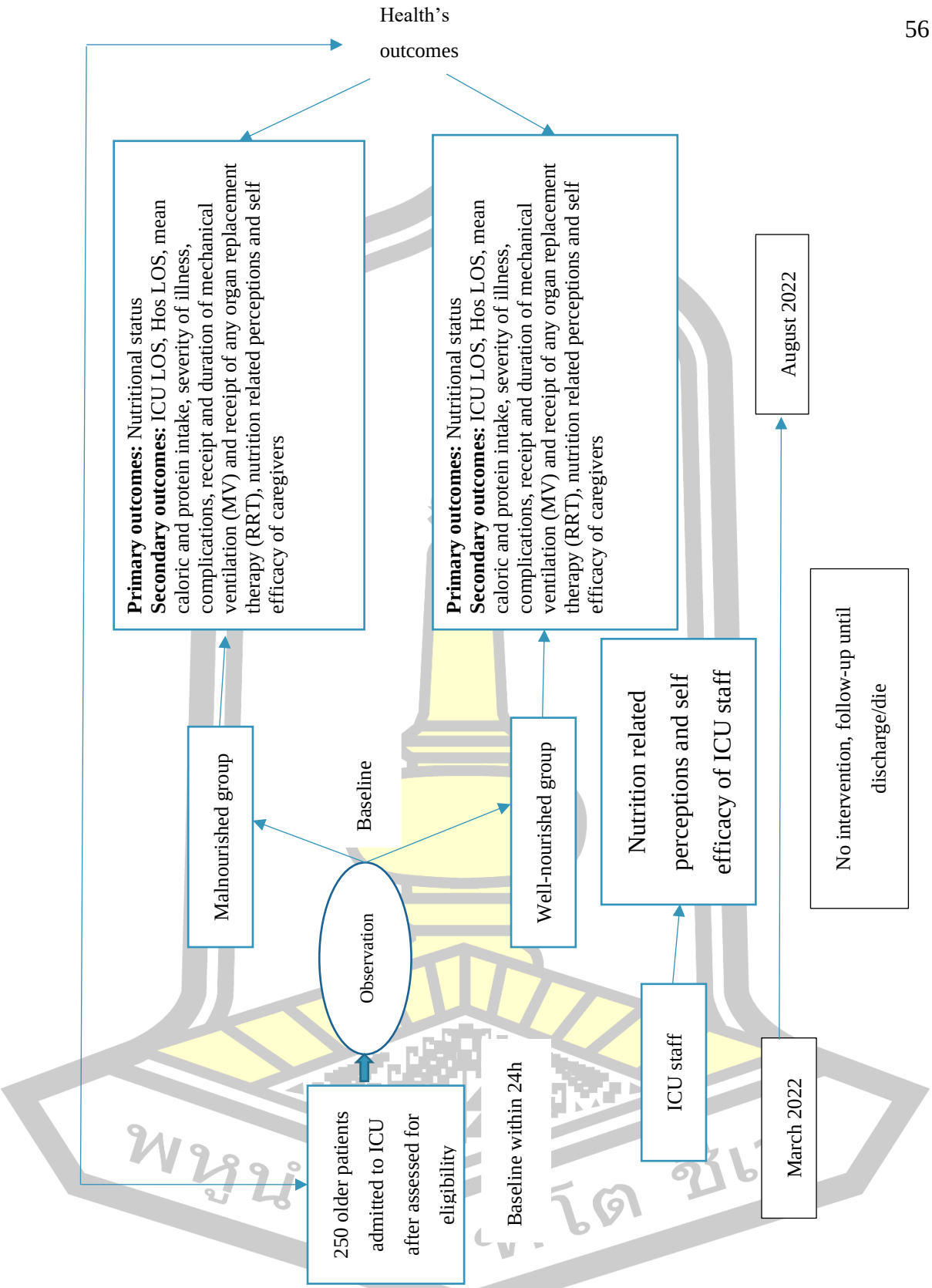

Figure 6 Data collection of the first phase

3.5.1.1 Phase 1

The phase used a cross-sectional follow-up approach to identify the prevalence of malnutrition on the first day of admission, including nutritional conditions, feeding practice situation, and their relationship with clinical outcomes patterning among 250 critically ill older patients in an ICU ward of one general hospital from March to August 2022. In this phase, we collected both quantitative and qualitative data on both admission and discharge day. Figure 6 showed steps in data collection. We collected demographic on admission day, clinical baseline characteristics, anthropometrics, biochemicals from a blood sample, nutritional status, malnutrition risk on admission, and discharge. We used the 24-hour food recall method and data was analyzed by using the Nation Institution of Nutrition software on day one, day two, day three, day four and dischage day during ICU stay to calculate the actual caloric and protein intakes.

3.5.1.2 Phase 2

Step 1: Drawing 50 patients both genders (25 males, 25 females) with binary nutiriton status, including normal noursished- and malnourished conditions form the estimation groups and perform the ROC curve by taking SGA as an indicator for predictive validity.

Step 2: include all the population of study 1 for validating the newly CC cut-off value by comparing outcomes between 2 groups that fulfilled the new value or not (binary variable).

3.5.1.3 Phase 3:

Step 1: Develop the Nutrition education program specific protocol.

An updated nutrition therapy guideline on critically ill older patients' handout includes nutrition information given to ICU staff and patient relatives. We also printed the poster at the patient relatives' resting area. The hand down content provide the nutrition practice in an ICU based on current guideline and evidence research. Documents be sent to 5 experts on Clinical Nutrition to evaluate the contents' accuracy and ability. After that, we provinded out the NEP to ICU staff and the brochure to the patients/ relatives for quick review and awareness of nutrition practice in the ICU.

For ICU staff, a recommendation protocol base on existing guideline will be provided to cover 5 groups of information: 1) Malnutrition and its negative consequence in ICU outcomes; 2) Nutrition risk screening and nutrition status assessment; 3) Nutrition therapy in ICU; 4) monitoring and evaluating nutritional status during/ after treatment; 5) Nutrition therapy in particular critically ill diseases. We held short report meetings to training ICU staff about 1-2 hours to cover 5 issues.

ICU caregiver enrolled in the study divided into two groups as intervention and control groups. The intervention group within 24h admission and every 3 days of ICU stay, the researcher held the cunsultan meeting (face-to-face) for about 15-20 minutes, including nutrition information contents 1) Malnutrition and its negative consequence in the ICU outcomes; energy and protein intake in particular; how to read food label. 2) discuss current nutrition status, estimate the amount of intake, and then set up a plan to improve diet. 3) recipe ideas with a specific technique for adding calories and protein to daily meals. This document aims to ensure adequate nutrition with simple technical and local food reference for ICU older patients.

Nutrition advice is based on individual conditions. The primary goal is to archive calories 25-30kcal/kg/day and protein 0.8-1.5 g/kg/day.

Step 2: Figure 7 shows a data collection of the Quasi-experiment phase.

The quasi-experimental approach identifies the prevalence of malnutrition on admission and discharges day, nutritional conditions, feeding practice situation, and their relationship with clinical outcome in 32 critically ill older patients in the ICU ward, Vinh Long General Hospital from August to September 2022. Firstly, we implemented the NEP, including education and training in service, within 2 weeks. Next, we enrolled in the 32 patients and their caregiver for the experiment group. In this phase, we collected quantitative data and also qualitative data at 9 am daily on admission, day 4, day 7 and discharge/die repeated phase 1.

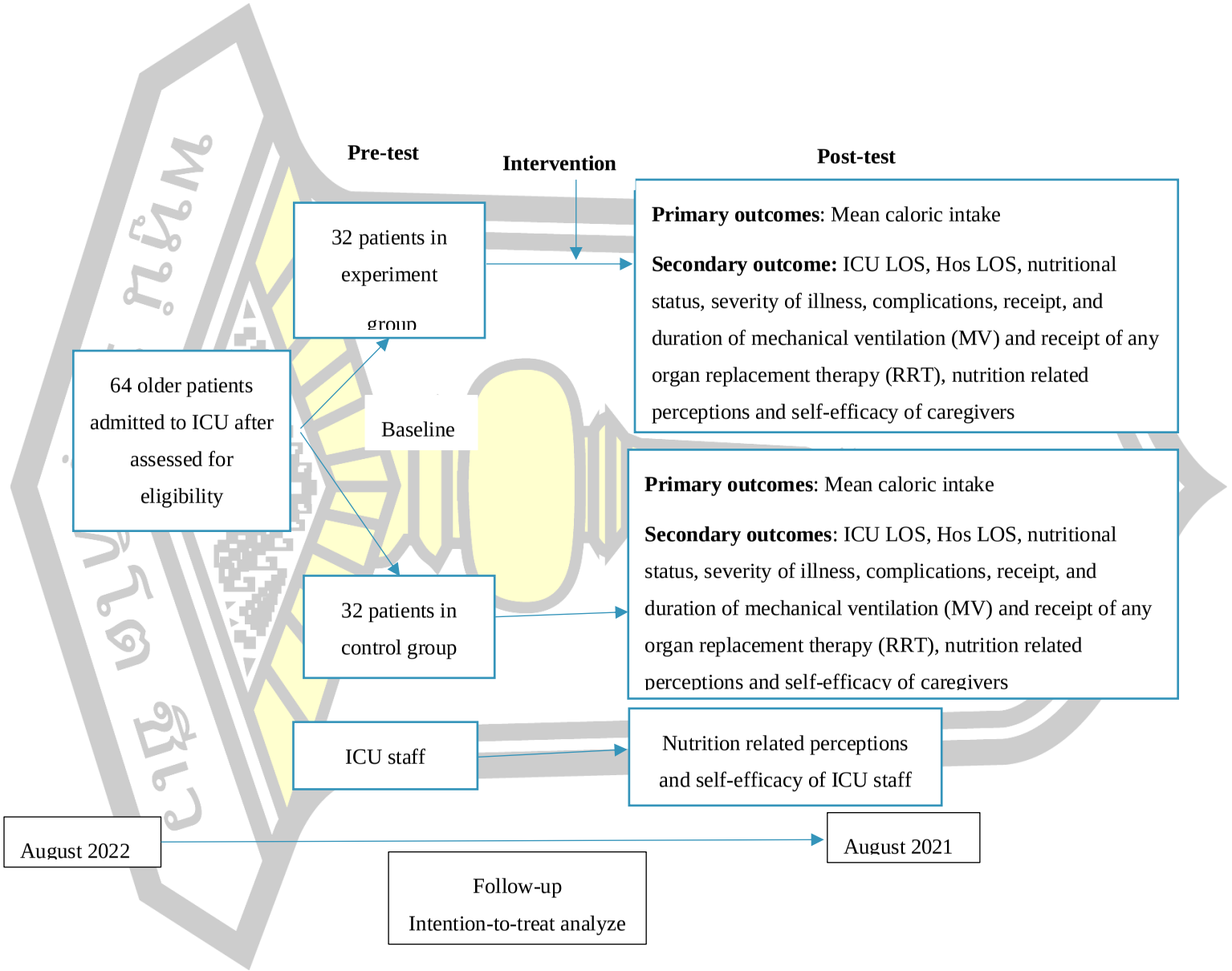

Figure 7 Data collection of the third phase

3.5.2 Error control

3.5.2.1 Training

The research team includes Ph.D. candidate, and research assistants who were medical doctors, nurses, dietitians from Vinh Long General Hospital collected data. The Ph.D. candidate will provide a four-hour training session for all members of the research team. The content covered standard anthropometric measuring and interviewing techniques to achieve consistency and agreement about valuation. Data collection forms randomly checked for accuracy by the principal researchers during the data collection period.

3.5.2.2 Translation and equipment

All international tools use in this research will be applied from the Guideline on clinical nutrition in the critically ill patient of Clinical Nutrition Association Ho Chi Minh City (156). Equipment and supplies include: the scales, tape inelastic, the standard World Health Organization independent height scale, and the questionnaires provided by the ICU ward or/and research team. The interview with a caregiver conducted at the ICU ward, and other examinations carried out at the patients' bedside.

3.6 Data analysis

Data entried by Microsoft Excel 365 and analyzed using a particular design format from the SPSS version 20 program.

Phase 1: Continue data as mean ±SD, median (interquartile range) base on normal/ not a normal distribution, and categorical data as actual number and %.

Descriptive statistics of ICU patients general information nutrition status at the admission day. The Pearson correlation coefficients performed to assess the relationship between malnutrition on ICU discharge day and nutrition indicators on ICU admission day, ICU LOS, day from admission to EN/PN feeding, days without EN/PN. Multiple regression was used to assess actual and prescribed caloric-protein intake during ICU stay to predict malnutrition on discharge day (control for confoundings)

Compare the malnourished group and well-nourished group to identify the effect of malnutrition on clinical outcomes: SGA is considered as a binary variable, SGA A is well nourished, SGA B and C as malnutrition. Chi-square test for comparing frequencies between subgroups, student t-test, or non-parametric tests for quantitative variable analysis. Multivariate analysis was using a logistic regression model in which "malnutrition" is used as a dependent variable. The effect of malnutrition on the ICU LOS, Hos LOS, complications, receipt, and duration of mechanical ventilation (MV) and receipt of any organ replacement therapy (RRT). (The correlation between malnutrition and clinical outcomes assessed and adjusted for confounders).

Phase 2: First, 50 patients (25 males, 25 females) form the estimation groups and perform the ROC curve by taking SGA as an indicator of predictive validity. All the population of study 1 validates the newly CC cut-off value by comparing outcomes between 2 groups that fulfilled the new value or not (binary variable).

Phase 3: Descriptive statistics used to present the baseline characteristics of the study. Difference between CG and EG groups using Chi-square for categorical variables and analysis of variance/Mann-white u test for normal/ not normal continuous data. Different within the CG and EG group was using paired t-test and Wilcoxon sign rank test for continuous and ordinal variables.

Table 4 The list of variables, their style, categories and derived in this study

Variables	Type of variable	Categories/derived
Patient code	Continuous	
Patient year of birth	Date	
Gender	Dichotomous	Male and female
Weight in kg	Continuous	
Height in cm	Continuous	
Admission status	Dichotomous	Emergency or hospital wards transfer
Main diagnosis	Text	

ICD 10 code	Text	
Blood biochemical indicator such as protein, hemoglobin, CRP, albumin serum	Continous	
Mealtime	Time	
Caloric intake	Continuous	Calculate from meal information
Food source	Category	Hospital foodservice, home cook, external food shops
Feeding route	Category	Oral, enteral, parenteral, combined
m-Nutric score	Category	Low nutrition risk, high nutrition risk
NRS-2002	Category	Normal, Low nutrition risk, high nutrition risk
SGA	Category	A,B,C
ICU length of stays	Continuous	
MV duration	Continuous	
Derived variables		
Age in year	Continuous	Calculate from the difference between the date of birth and date of admission
BMI	Continuous	Calculate from weight and height

Main diagnostic groups	Category	Use ICD-10 Main diagnostic groups

3.7 Ethical considerations

The study was approved by the Ethics Committee of Mahasarakham University (Ref No. 055-359/2022; Feb 18, 2022) and the Director of Vinh Long Province Ministry of Health. Results of the individual interviews and the clinical and diagnostic tests were kept confidential with assigned codes and pseudo names, and the consent to participate in the study of all participants was voluntary.

CHAPTER 4

RESULTS

The study's findings fell into three categories. The first section described the nutrition status, health, and clinical conditions of critically ill older patients admitted to an intensive care unit (ICU) in Vietnam. The second section addressed the establishment of calf circumference (CC) cut-off values for critically ill elderly patients in Vietnam. The third section included a description of the Nutrition Education Program (NEP) program and its efficacy in enhancing the medical staff's and caregivers' abilities in older nutrition care, as well as in promoting older ICU patients' dietary intakes, nutrition status, and health-related conditions.

4.1 Current nutrition status and health conditions of the critically ill older patients.

This study included 250 older patients who admitted to ICU at a particular tertiary hospital in southern Vietnam. Following were descriptions of general and medical information, nutritional status, and health and clinical conditions.

4.1.1 General- and medical related information of the ICU older patients

More than half of the elderly ICU patients were female, and their ages ranged from 60 to 102, with a mean (SD) of 76.5 (10.2) years. One-third of patients received an elementary education. 74.4 percent of 181 older ICU patients with more than three comorbidities had a pre-existing condition. Most admitted patients (60%) had a respiratory disease, while only 4% were Covid-19 patients. One-third of patients were hospitalized for 0 to 45 days before being transferred to the ICU, with a mean (SD) of 2.12 (5.18) days (Table 5).

Table 5 General – and medical information of ICU older patients

General- and medical information of the ICU older patients

	n	%		n	%
Sex			Major occupation		
Male	106	42.4	No occupation	161	64.4
Female	144	57.6	Agriculturalist	66	26.4
Age			Trading	13	5.2
60-69 years	76	30.4	Fisherman	3	1.2
70-79 years	74	29.6	Retired	7	2.8
80-89 years	71	28.4	Living with other(s)	237	94.8
90 years and above	29	11.6	Having medical insurance	250	100
Marital status			Annual income		
Single	7	2.8	0-24 M VND	185	74
Married	73	29.2	25-48 M VND	43	17.2
Widowed	167	66.8	49-72 M VND	20	8.0
Divorced/separated	3	1.2	73 M and over VND	2	0.8
Others			Principal diagnosis		
Education			Respiratory	150	60
No education	36	14.4	Cardiology	9	3.6
Primary school diploma	97	38.8	Neurology	23	9.2
Junior high school diploma	68	27.2	Shock	31	12.4
High school/certificate	24	9.6	Cancer	1	0.4
Some college education	23	9.2	Sepsis	10	4.0
Others	2	0.8	Kidney disease	1	0.4

General- and medical information of the ICU older patients

	n	%		n	%
Day of hospitalization before ICU admission			Gastrointestinal	11	4.4
Min = 0 days, Max = 45 days,			Covid-19	10	4.0
Mean (SD) = 2.12 (5.18) days			Others	4	1.6
Department prior to ICU admission					
Emergency department	158	63.2			
Others	92	36.8			
Admission status					
Emergency	250	100			
Number of comorbidities					
None	4	1.6			
1	27	10.8			
2	33	13.2			
3	66	26.4			
4	59	23.6			
5 and over	61	24.4			

Abbreviation: ICU – intensive care unit. VND – Vietnamese currency

4.1.2 Current nutrition status, health and clinical conditions of the critically ill older patients

Assessing nutrition based on BMI, there were 26 malnourished people, representing 10.4%, nine overweight/obese people, representing 3.6%, and 215 normal people, representing 86%. According to the NRS2002 nutrition assessment, there are 37 people at risk of malnutrition, or 14.8%, 211 people at high risk of malnutrition, or 84.4%, and two people with no risk of malnutrition, or 0.8%. The mNutric score has a

lower nutritional risk, with 73 (29.2%) people at high risk and 177 (70.8%) with no nutritional risk, as 28 (11.2%) of the patients assessed by SGA were well-nourished, while 222 (88.8%) were at risk for malnutrition or were malnourished. On the first day of admission, nutrition-related data of older ICU patients were displayed in (Table 6).

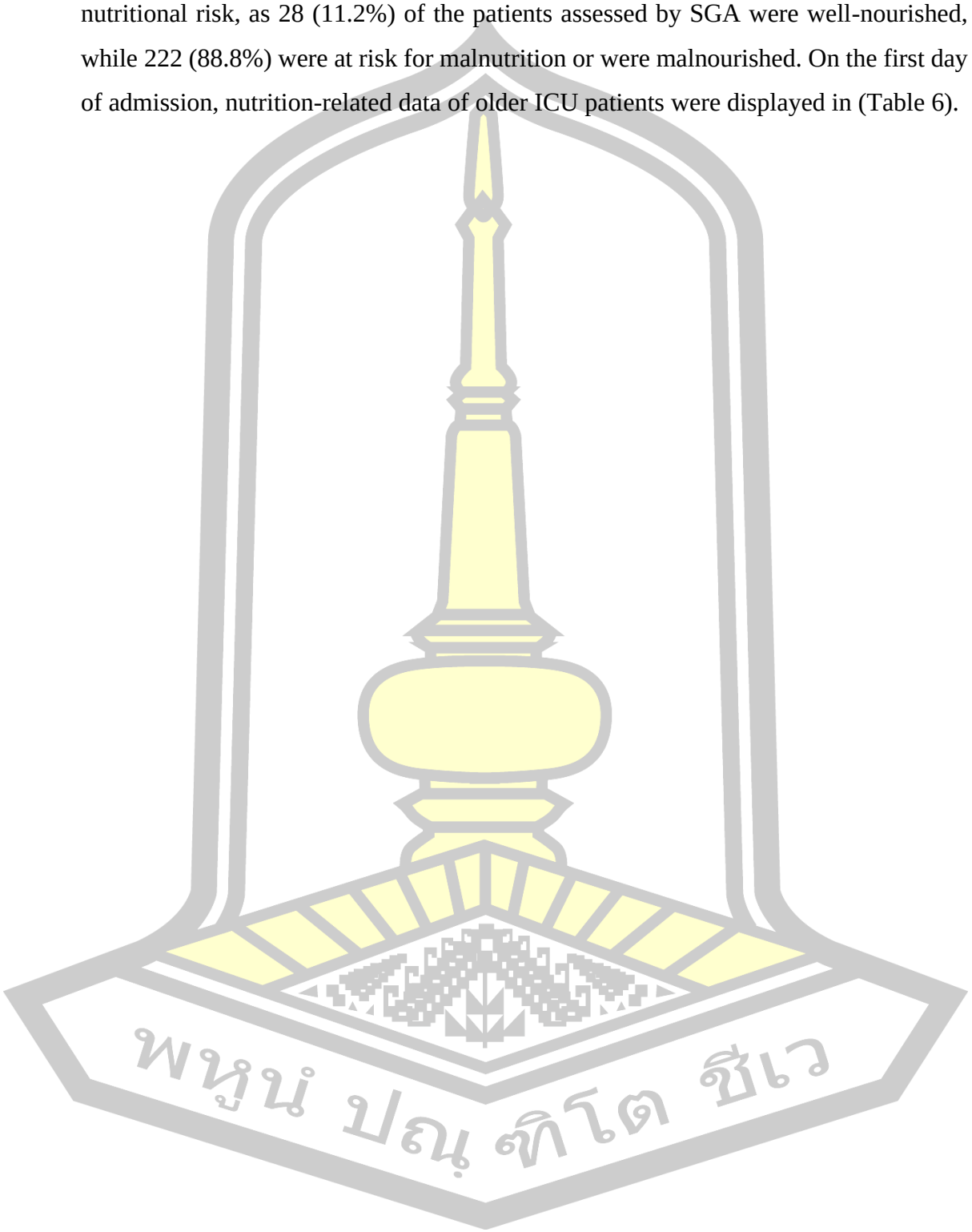

Table 6 Nutrition related information of the ICU older patients from the first day of admission

Variables	Admission n (%)
Body weight (kg)	
Min-Max, Mean (SD)	38-65, 47.4 (5.7)
Height (cm)	
Min-Max, Mean (SD)	1.4-1.7, 1.54 (0.66)
BMI (kg/m^2)	
Min-Max, Mean (SD)	16.6-25.2, 19.9 (1.37)
Mid-upper arm circumference (cm)	
Min-Max, Mean (SD)	19.5-29.5, 22.2 (2.28)
Calf circumference (cm)	
Min-Max, Mean (SD)	23-37, 27.4 (2.71)
Nutrition risk score (NRS 2002)	
Normal	2 (0.8%)
At risk	37 (14.8%)
High risk	211 (84.4%)
SGA Rating	
A (Well-nourished)	28 (11.2%)
B (Mildly/moderately malnourished)	174 (69.6%)
C (Severely malnourished)	48 (19.2%)
mNUTRIC Score (If no IL-6 available)	
Low (0-4 points)	73 (29.2%)
High (5-9 points)	177 (70.8%)
SOFA score (point)	

Min-Max, Mean (SD)	0-13, 4.9 (2.72)

Abbreviation: BMI: body mass index, SGA- Subjective Global Assessment, mNUTRIC- modified nutrition risk in critically ill, SOFA- Sequential Organ Failure Assessment

The results showed that almost older ICU patients received EN within 24 hours of admission. Two-thirds got a gastroenteric feeding tube for EN and a peripheral vein for PN delivery. (Table 7)

Table 7 Nutrition care patterning among the ICU older patients at baseline

Variables	
Receiving EN	
- Received EN within 24 hours of admission	249 (99.6%)
- Duration of time from ICU admission to EN (hour)	
Min-Max, Mean (SD)	1-28 5.16 (2.71)
- EN delivery methods	
Oral	52 (20.8%)
Nasoenteric feeding	198 (79.2%)
Receiving only PN	
- Received only PN support	0 (0 %)
Receiving combined support (n=70)	
- Received combined PN support	70 (28%)
PN delivery methods	
Central	8 (11,4%)
Peripheral	62 (88,6%)
- Total combined PN support days	

Min-Max, Mean (SD)	0-13 1,37 (2,78%)
- 1 product	48 (68,8%)
- 2 products	18 (25,7%)
- 3 products	4 (5,7%)

Abbreviation and symbol: EN-enteral nutrition, PN-parenteral nutrition, SD- standard deviation

Albumin and protein at baseline were 30.8±6.3 and 61.5±9,13 significant decrease compared o discharge day as 29±6,69 and 59,5±8,4, p<0.0001, t= 4.879 [95%CI: 1.0531-2.4788]; t=4.722 [95%CI: 1.1651-2.8325].

Table 8 Nutrition care and health related conditions of the ICU older patients at baseline

Variables	Baseline n (%)
Health related conditions	
Albumin (g/l)	
Min-Max, Mean (SD)	9.4-51.8 30.8 (6.3)
Protein (g/l)	
Min-Max, Mean (SD)	32.5-86.6 61.5 (9.13)
Presence of gastrointestinal intolerance	56 (22.4%)
Number of medications prescribed daily	
Min-Max, Mean (SD)	2-14 7,7 (2,00)
Number of vitamins and mineral prescribed daily	
Min-Max, Mean (SD)	0-3 1,4 (0,86)
APACHE II	
Min-Max, Mean (SD)	3-31 14,2 (5,1)
ICU length of stay (days)	
Min-Max, Mean (SD)	1-30 14,2 (5,1)

Hospital length of stay	
Min-Max, Mean (SD)	2-52 9 (7,5)
Renal replacement therapy (RRT) n (%)	25 (10)
Duration of RRT (times): Min-Max, Mean (SD)	1-6 1,9 (1,27)
Mechanical Ventilator (MV) n (%)	157 (62,8)
Duration of MV (days): Min-Max, Mean (SD)	1-28 4,13 (4,96)
ICU mortality	159 (63,6)
Hospital mortality	171 (68,4)

Abbreviation: APACHE II- Acute Physiology and Chronic Health Evaluation

4.2 Development of the calf circumference (CC) cut-off values for critically ill older patients

Malnutrition is a significant risk factor that aggravates the health of older people. Calf circumference (CC) is a simple measurement that can be used to identify older persons who are at risk of malnutrition. Little needs to be learned about the appropriate CC cut-off values for older people in a healthcare context; therefore, it is essential to develop a population-specific CC cut-off point. Based on two cohorts, Cohort 1 included 250 ICU older patients systematically selected in the first phase, and Cohort 2, a small group of 64 ICU older adults. Half of Cohort 2 was the subsample drawn from Cohort 1, while another half, the researcher (DL) recruited from those who participated in the experimental study.

Cohort 1: Cut-off point for calf circumference (CC)

The Cohort 1 (144 women and 106 men) with a mean age (SD) of 75.7(11.2), a total of 10.8% were undernutrition with a BMI of 18.4 kg/m2 and lower. Almost all of them currently live with family (94.8%). Differences between the group with normal nutrition and undernutrition are shown in Table 9. There were no significant differences by gender, living arrangement, number of comorbidities, and severity of health problems, given their comparable APACHE II scores ($p>0.05$). They also did not differ in terms of hospital utilization, given their hospital length of stay (normal nutrition

9.0(7.5) days, undernutrition 8.8(6.4) days) and their ICU length of stay (normal nutrition 5.5(5.5) days, undernutrition 5.9(5.6) days, p>0.05) were comparable in both groups (p > 0.05). However, they significantly differed in body weight and MUAC (p<0.001). Patients at risk of undernutrition by NRS2002 score (compared to normal status) tended to have 43 times higher odds of malnutrition (95% CI 11.9–161.8, p<0.001). There was also a difference by and within gender regarding CC among men (p < 0.05); data is shown in Table 9.

Table 9 Characteristics of the ICU older patients based on the normal nutrition or depleted malnutrition.

Variables	Normal nutrition n (%)	Undernutrition n (%)	OR [95% CI]	*p*-value
Age (year), Mean(SD)	75.7(11.2)			
Sex			0.465 [0.18-1.15]	0.92
Women	125 (55.8)	19 (73.1)		
Men	99 (44.2)	7 (26.9)		
Living with other(s)			0.62	0.63[c]
No	11 (4.9)	2 (7.7)	[0.13-2.96]	
Yes	213 (95.1)	24 (92.3)		
Number of comorbidity, Mean(SD)	3.4(2.5)	3.6(1.3)	1.072 [0.829-1.387]	0.59
HOSLOS (day), Mean(SD)	9.0 (7.5)	8.8 (6.41)	0.996 [0.942-1.054]	0.90
ICULOS (day), Mean(SD)	5.5(5.5)	5.9(5.6)	1.013 [0.946-1.086]	0.70
Received MV, Mean(SD)	4.1(4.9)	3.8(4.8)	0.829 [0.887-1.101]	0.80
Weight (kg), Mean(SD)	47.9(5.6)	42.4(3.8)	0.756 [0.659-0.866]	<0.001***

Variables	Normal nutrition n (%)	Undernutrition n (%)	OR [95% CI]	*p*-value
Height (cm), Mean(SD)	154.0(0.6)	153.5(0.6)	0.320 [0.001-151.223]	0.71
MUAC (cm), Mean(SD)	22.4(2.2)	20.0(1.6)	0.557 [0.436-0.713]	<0.001***
CC (cm), women, Mean(SD) (n = 144, undernutrition 19)	25.9(1.8)	25.5(0.7)	0.866 [0.648-1.155]	0.327
CC (cm), men, Mean(SD) (n= 106, undernutrition 7)	29.7(2.2)	27.9(2.3)	0.565 [0.431-0.998]	0.049*
Albumin (g/l)	30.8(6.3)	30.7(6.9)5	0.997 [0.935-1.062]	0.91
Malnutrition risk using mNUTRIC score	3.7(1.5)	4.0(1.7)	1.131 [0.874-1.465]	0.34
Malnutrition using SGA			3.42[0.44-26.3]	0.32
Normal or low risk (A)	27(12.1)	1(3.8)		
Moderate risk (B)	151(67.4)	23(88.5)		
High risk (C)	46(20.5)	2(7.7)		
NRS2002, Mean(SD)	5.2(0.7)	6.5(0.7)	43.994 [11.960-161.836]	<0.001***
APACHE II, Mean(SD)	14.1(5.0)	15.0(5.7)	1.042 [0.961-1.130]	0.31

Abbreviation: MV, ; RRT,

Statistics: [a]Chi-square test, [b]*t*-test, [c]Fisher's exact test;

Data is significant at: p<0.05*, p<0.01**, p<.001***

Linear regression was analyzed to construct prediction equations for the CC cut-off point for the ICU older patients, both men, and women. For men, the prediction equation was CC (cm) = 29.62 + 2.26 (Z-score), R^2 = 1. Meanwhile, the final prediction equation with BMI was also analyzed, deriving the CC (cm) = 24.79 + 1.714 (BMI), R^2 = 0.064, p = 0.043. Applying these equations using the Z-score equals negative 1, the BMI was 27.3 kg/m^2, and the cut-off point for men at risk of undernutrition was 29.62 (Table 10). For women, the prediction equation was CC = 25.89 + 1.77 (Z-score), R^2 = 1. In correlation to BMI, the linear regression gave the final prediction equation of CC (cm) = 3.020 -0.114 (BMI), R^2 = 0.153, p<0.001. Based on these equations using the Z-score equal to negative 1, the BMI was 18.20 kg/m^2 and the CC cut-off point for women at risk of undernutrition was 24.12 cm (Table 10).

Table 10 General information, anthropometric, nutrition related conditions of ICU older patients in Cohort 1 and 2.

CC Z score	CC values (cm) [Cut-off points]		BMI classification	BMI (kg/m^2)	
	Men (n = 106)	Women (n = 144)		Men (n = 106)	Women (n = 144)
0	29.62(2.26)	25.89(1.77)	Normal	20.32(1.19)	19.63(1.42)
< -1.0	27.363	24.12	Under nutrition	19.12	18.20
< -2.0	25.09	22.35	Severe malnutrition	17.93	16.77

Parameters	Cohort 1 (N = 250)		Cohort 2 (N = 64)	
	Men (n = 106)	Women (n = 144)	Men (n = 42)	Women (n = 22)
Age (year), Mean(SD)	75.7(11.2)		77.0(9.8)	
Weight (kg), Mean(SD)	52.7(3.5)	43.4(3.2)[a]**	50.4(3.7)	43.0(4.4)[a]**
Height (cm), Mean(SD)	161.1(2.7)	148.0(2.5)[a]**	161.5(3.8)	150.4(4.6)[a]**
MUAC (cm), Mean(SD)	23.1(2.0)	21.5(2.2)[a]**	21.3(2.1)	19.5(2.3)[a]*

CC Z score	CC values (cm) [Cut-off points]	BMI classification		BMI (kg/m^2)	
CC (cm), Mean(SD)		29.6(2.2)	25.9(1.7)[a]*	28.6(1.8)	24.1(2.2)[a]**
BMI (kg/m^2) (n,%)		20.3(1.2)	19.6(1.4)	19.3(1.6)	18.9(1.6)
Normal weight		96(90.6)	119(82.6)	32(76.2)	16(72.7)
Under weight		7(6.6)	19(13.2)	8(19.0)	6(27.3)
Overweight		3(2.8)	6(3.0)	2(4.8)	-
Serum albumin (g/l)		30.9(6.6)	30.7(6.2)	31.7(4.4)	30.2(3.0)
NRS2002, Mean(SD)		5.0(0.8))	5.5(0.7)	5.6(0.9)	5.6(1.0)
Malnutrition risk using mNUTRIC score n(%)		3.6(1.5)	3.9(1.5)	3.6(2.2)	4.5(1.3)
Low risk (0-4 points)		81(76.4)	96(66.7)	14(66.7)	5(45.5)
High risk (5-9 points)		25(10.0)	48(33.0)	7(33.3)	6(54.5)
Malnutrition using SGA					
Normal (A)		15(14.2)	13(9.0)	8(19.1)	4(18.2)
Mild-moderate (B)		75(70.8)	99(68.8)	30(71.4)	14(63.6)
Severe (C)		16(15.1)	32(22.2)	4(9.5)	4(18.2)

*P<0.05**, *p*<0.01**, Significant using independent sample *t*-test[a] or Chi-square test[b].

Cohort 2: Predictive value of CC-cut-off point for nutrition risk

The mean of CC in Cohort 2 was 28.6(1.8) in men and 24.1(2.2) in women (Table 11). The prevalence of malnutrition among ICU older patients in this cohort as assessed by low CC, i.e., < 27.3 cm in men was (n = 7) 16.6% and < 24.1 cm in women was (n = 12) 54.4%. It was found that the mean of the health and service utilization outcomes were significantly lower in the patients with low CC in this critical older

group of patients. The sensitivity and specificity, coupled with the negative predictive value of the derived CC cut-off, were moderate (Table 12 and Figure 8).

Table 11 Characteristics of ICU older patients with malnutrition risk based on calf circumference (CC) group in Cohort 2

Variables	Men 42		OR [95%CI]	Women 22		OR [95%CI]
	Low CC group n = 7	Normal CC group n = 35		Low CC group n = 12	Normal CC group n = 10	
Age (year)	76.1(9.8)			78.9(9.2)		
BMI (kg/m^2)	18.9(1.7)	20.3(1.5)	1.73 [1.01-2.99]*	19.3(1.8)	19.1(1.7)	0.94 [0.57-1.53]
MUAC (cm),	20.2(1.4)	22.9(2.4)	1.91 [1.14-3.21]*	19.6(2.1)	21.3(1.8)	1.53 [0.93-2.51]
Serum albumin (g/l)	29.6(3.7)	31.3(6.2)	1.04 [0.18-1.19]	31.1(4.5)	19.1(1.7)	0.96 [0.80-1.15]
Malnutrition risk using mNUTRIC score	2.4(0.9)	3.9(2.0)	1.69 [0.94-3.02]	4.0(1.4)	4.1(1.3)	1.05 [0.56-1.99]
NRS2002, Mean(SD)	5.5(0.5)	5.2(1.0)	0.69 [0.28-1.68]	5.6(0.9)	5.6(1.1)	0.93 [0.41-2.13]

Variables	Men 42		OR [95%CI]	Women 22		OR [95%CI]
	Low CC group n = 7	Normal CC group n = 35		Low CC group n = 12	Normal CC group n = 10	
APACHE II, Mean(SD)	10.7(2.8)	16.0(5.5)	1.35 [1.02-1.79]*	14.0(4.7)	13.7(3.6)	0.98 [0.79-1.20]

Notes: Low CC group, CC≤ 27.3 cm for men and CC≤ 24.1 cm for women, Normal CC group, CC>27.3 cm (men) and >24.1 (women); p<0.05*, p<.01**, p<.001***, significant using binary logistic regression.

The sensitivity and specificity of CC cut-off points in predicting nutritional status depicted by body mass index (BMI) in Cohort 2 were 60.5 and 64.3 (Table 12)

Table 12 Sensitivity and specificity of CC cut-off points in predicting nutritional status depicting by body mass index (BMI) in Cohort 2

Variable	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
BMI<18.5 kg/m^2 vs BMI ≥ 18.5 kg/m^2	60.5	64.3	50.0	14.0

Notes: PPV, positive predictive value; NPV, negative predictive value

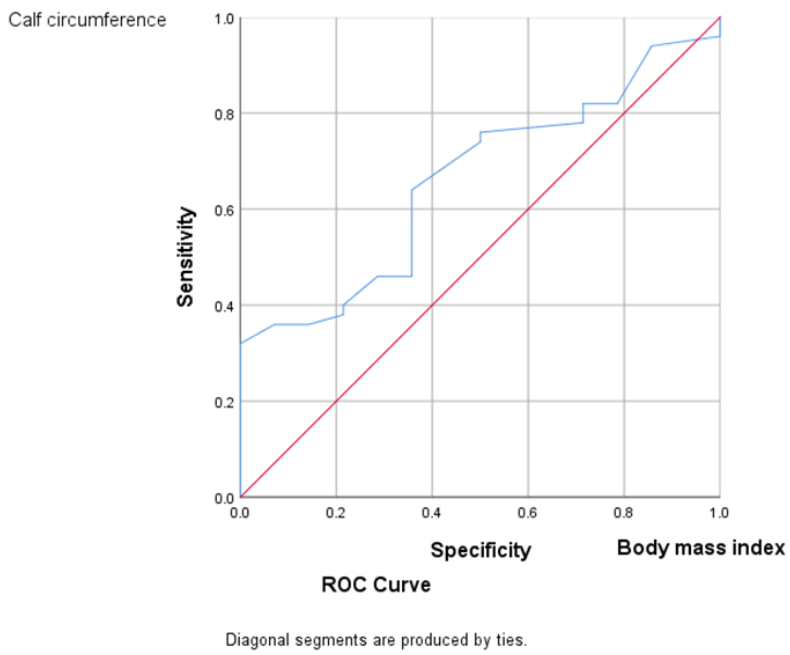

Figure 8 Discriminative ability of calf circumference (CC) to predict undernutrition

4.3 Description of the Nutrition Education Program and its effectiveness

Development of the Nutrition Education Program (NEP) in this study was based on problems and needs derived from the initial part of the study, the pre-test results prior to the program implementation, and the observations of the researcher on practices related to nutrition screening and assessment, provision of nutrition care/therapy, as well as nutrition monitoring and evaluation on the part of the ICU staff and caregivers. The effectiveness of the NEP was assessed using increased capacities of the ICU staff and caregivers in older nutrition care, increased dietary intakes, better nutrition status, and health and related clinical conditions of the ICU older patients.

4.3.1 Development of the Nutrition Education Program (NEP)

Based on the study in an initial phase, results showed that the majority of the ICU older patients were admitted with SGA undernourished condition (88.8%) and high nutritional risk 84.4% based on NRS2002. The result, coupled with an absence of the use of standard tools for nutrition screening, assessment, monitoring, and evaluation, as well as the delay in providing nutrition care for older patients after admitted to an ICU on the part of the ICU staff, had led the researcher to develop the NEP. The NEP was formulated by the researcher based on HBM theory and the

Alliance nutrition care process approach concept to explain that better KAP is associated with better ICU patient outcomes. The program included two sections: "Update ICU nutrition therapy: from guideline to practice" for the ICU staff and "Basic nutrition in ICU" for the caregivers. The researcher completed this two-week program from 10 August to 23 August 2022.

4.3.2 Effectiveness of the NEP

Three categories determined the effectiveness of the NEP. First, a comparison of the pre-and posttest on knowledge, perceptions-, self-efficacy, and practices of the ICU staff (n = 26) on older nutrition, which included nutrition screening and assessment, nutrition care/therapy, and nutrition monitoring and evaluation for ICU older patients. Second, a comparison of the pre-and posttest on perceptions-, self-efficacy, and practices of the caregivers (n = 32) on older nutrition, which included nutrition screening and assessment, nutrition care, as well as nutrition monitoring and evaluation for ICU older patients. Third, a comparison of the progressed outcomes, namely energy intake, ICU LOS, and HOS LOS within- and between groups of the ICU older patients in the experimental group (n = 32) and the control group (n = 32) across the study phases, including baseline on the first day of admission (Day 1 or baseline), follow-up (Day 4), and discharge (Day 5 onward).

4.3.2.1 Comparison of knowledge, perceptions, self-efficacy, and practices of the ICU staff on older nutrition

A total of 9 doctors and 16 nurses were involved. Men and women were equal; two-thirds of the participants were between 20 and 49 years old. Only 23.1% and 7.7% of the ICU staff received nutritional screening and nutritional therapy training, respectively (Table 13).

Table 13 General information of ICU staff

General information	n	%	General information	n	%
Sex					
Male	13	50.0	Received training on Nutrition screening	6	23.1
Female	13	50.0	Received training on Nutrition therapy	2	7.7
Age range			Category of current work		
20-29 years	10	38.5	Registered	22	84.6
30-39 years	10	38.5	Part-time	3	11.5
40-49 years	4	15.4	Contract	1	3.8
50-59 years	2	7.7			
Current position					
Medical doctor	9	34.6			
Nurse	17	65.4			
Time duration of the current position					
< 1 year	4	15.4			
1-3 years	7	7.7			
4-10 years	10	38.5			
>10 years	10	38.5			

Overall, the knowledge of the nutrition of ICU staff was moderate. The knowledge on nutrition assessment and therapy was moderate, while knowledge on nutrition outcome monitoring/evaluation was low (Tables 14 and 15)

Table 14 Knowledge of the medical staff on nutrition assessment, nutrition care, outcome monitoring and evaluation for older patients at pre-test (baseline)

Knowledge	Correct answer	
	n	%
Knowledge on nutrition assessment		
- RMR is the largest component of total energy expenditure (TEE) (Q1)	4	44.4
- Predictive equation is the most common method for assessing energy expenditure (Q2)	5	55.6
- The patient with serum albumin of of 2.8 g/dL and prealbumin of 14	7	77.8
mg/dL is considered having medical history, clinical diagnosis, laboratory signs (Q3)		
- A nonvolitional weight loss is one of the best validated screening indicators for malnutrition risk (Q4)	3	33.3
Knowledge on nutrition care/therapy		
- Maintence of normal gallbladder function, ruduced GI bacterial translocation, more efficient nutrient metabolism are benefit of EN compared with PN or no nutrition (Q5)	9	100
- High-protein hypocaloric EN feeding providing 65% to 70% of energy needs, as determined by IC is recommended for ICU patients with obesity (Q6)	4	44.4

- Determine the cause of diarrhea was suggested for the older ICU patient who in the past week, could tolerate well for a standard 1 kcal/mL enteral feeding formula; had frequent bouts of loose stools; and needed a rectal tube (Q7)	6	66.7
- Infusing reconstituted powdered newly open container is not recommended to minimize contra-indication of enteral feeding formula (Q8)	1	11.1
Knowledge on outcome monitoring		
- CPN is the optimal nutrition support for a malnourished patient when EN is not feasible for a prolonged period (Q9)	6	66.7
- CPN is contraindication in DNR conditions (Q10)	4	44.4
Knowledge on outcome evaluation		
- Increased amino acid concentration will increase solubility of calcium and phosphate in a PN formulation (Q11)	7	26.9
- Hyperglycemia is the most common metabolic complication associated with PN (Q12)	5	19.2

Abbreviation: EN-enteral nutrition, PN- parenteral nutrition, IC- indirect calorimetry, ICU- intensive care unit, Central parenteral nutrition (CP)

Table 15 *Level of knowledge of the medical staff on nutrition assessment, nutrition care, outcome monitoring and evaluation for older patients at pre-test (baseline)*

Level of Knowledge	n	%
Low (1-4 points)	3	33.3
Moderate (5-8 points)	4	44.4
High (9-12 points)	2	22.2

The overall perception of the intensive care staff regarding the nutritional care of older intensive care patients was a high 96.6%. They agreed that there was a risk of malnutrition in the older ICU (76.9%) and that providing adequate nutrition would improve ICU patient recovery (88.5%). Two-thirds of the staff responded that they did not have enough time to examine and assess the nutritional status of elderly patients in the ICU. Half of them must complete the diet screening and assessment tool (Tables 16 and 17).

Table 16 Perceptions of the medical staff on nutrition assessment, nutrition care, nutrition outcome monitoring and evaluation for older patients at pre-test (baseline)

Perceptions	Strongly agree n (%)	Somewhat agree n (%)	Neutral n (%)	Somewhat disagree n (%)	Strongly disagree n (%)
Nutrition assessment					
The majority of critically ill older patients admitted to ICU have risk of malnutrition. (Q1)	20 (76.9)	5 (19.2)	1 (3.8)	0 (0)	0 (0)
Both critical illness and malnutrition can worsen patient outcomes. (Q2)	22 (84.6)	3 (11.5)	0 (0)	1 (3.8)	0 (0)
Adequate amount of food will enhance recovery of the ICU patients. (Q3)	23 (88.5)	3 (11.5)	0 (0)	0 (0)	0 (0)
All patients should be screened for malnutrition at ICU admission. (Q4)	20 (76.9)	6 (23.1)	0 (0)	0 (0)	0 (0)
Malnutrition is a high priority to be further assessed using standard	18 (69.2)	5 (19.2)	3 (11.5)	0 (0)	0 (0)

Perceptions	Strongly agree n (%)	Somewhat agree n (%)	Neutral n (%)	Somewhat disagree n (%)	Strongly disagree n (%)
assessment tool(s) for accurately diagnosis for critically ill older patients at this ICU. (Q5)					
I do not know any of the nutrition screening tool. (Q13)*	4 (15.4)	6 (23.1)	9 (34.6)	2 (7.7)	5 (19.2)
I do not know any of the nutrition assessment tool. (Q14)*	3 (11,5)	4 (15.4)	11 (42.3)	1 (3.8)	7 (26.9)
I do not have time to conduct nutrition status screening for detecting risk of malnutrition of the ICU patients. (Q15)*	4 (15.4)	5 (19.2)	8 (30.8)	3 (11.5)	6 (23.1)
I do not have time to conduct nutrition status assessment for malnutrition diagnosis of the ICU patients. (Q16)*	4 (15.4)	5 (19.2)	8 (30.8)	3 (11.5)	6 (23.1)
Conducting nutritional screening can help me to adjust the patient's treatment plan. (Q17)	18 (69.2)	5 (19.2)	1 (3.8)	0 (0)	2 (7.7)

Perceptions	Strongly agree n (%)	Somewhat agree n (%)	Neutral n (%)	Somewhat disagree n (%)	Strongly disagree n (%)
I know when a patient is at risk of malnutrition. (Q19)	10 (38.5)	10 (38.5)	3 (11.5)	3 (11.5)	0(0)
Conducting nutrition screening using standard tool(s) is necessary for ICU patients. (Q20)	18(69.2)	5 (19.2)	3 (11.5)	0(0)	0(0)
Conducting nutrition assessment for malnutrition diagnosis using standard tool(s) is necessary for ICU patients. (Q21)	19 (73.1)	5 (19.2)	2 (7.7)	0(0)	0(0)
Nutrition care/therapy					
Nutritional care of a patient is the major role of the dietitian. (Q7)	13 (50)	10 (38.8)	1 (3.8)	1 (3.8)	1 (3.8)
All ICU staff should involve in nutritional care for older patients. (Q8)	18(69.2)	5(19.2)	1(3.8)	2(7.7)	0(0)
All malnourished patients require individualized treatment by a dietitian. (Q9)	21 (80.8)	5 (19.2)	0 (0)	0 (0)	0 (0)

Perceptions	Strongly agree n (%)	Somewhat agree n (%)	Neutral n (%)	Somewhat disagree n (%)	Strongly disagree n (%)
All malnourished patients require individualized treatment by a medical doctor. (Q10)	13 (50)	8 (30.8)	3 (11.5)	2 (7.7)	0 (0)
Promoting food intake to a patient is a job of every ICU staff. (11)	16 (61.5)	7 (26.9)	1 (3.8)	1 (3.8)	1 (3.8)
I have an important role in promoting a patient's dietary intake. (Q12)	8 (30.8)	13 (50)	2 (7.7)	2 (7.7)	0 (0)
I know *when* to consult the dietitian for assistance of patient's nutrition therapy. (Q18)	11 (42.3)	8 (30.8)	6 (23.1)	1 (3.8)	0 (0)
Nutrition outcome monitoring and evaluation					
Monitoring food intake is a good way to determine a patient's nutritional status. (Q6)	13 (50)	10 (38.5)	3 (11.5)	0 (0)	0 (0)
I need more training to better support the nutrition needs of the ICU patients. (Q22)	20 (76.9)	6 (23.1)	0 (0)	0 (0)	0 (0)

Remark: * The scores were conversed for the negative question

Table 17 Level of perceptions of the medical staff on nutrition assessment, nutrition care, outcome monitoring and evaluation for older patients at pre-test (baseline)

Level of Perceptions	n	%
Low (1-37 points)	0	0
Moderate (38-75 points)	1	3.8
High (76-110 points)	25	96.6

The level of self-efficacy of ICU staff was moderately high. They neutrally/somewhat agreed that they are confident in performing nutritional screening and prescribing a nutritional plan consistent with medical or nursing care. 50% of the ICU staff felt confident working collaboratively with the dietitian for patient nutritional therapy or care (Tables 18 and Table 19).

Table 18 Self-efficacy of the medical staff on nutrition assessment, nutrition care, outcome monitoring and evaluation for older patients at pre-test (baseline)

Self-efficacy	Strongly agree n (%)	Somewhat agree n (%)	Neutral n (%)	Somewhat disagree n (%)	Strongly disagree n (%)
Nutrition assessment					
I feel confidence to perform nutrition screening using standard tools for patients at ICU admission. (Q1)	5 (19.2)	8 (30.8)	8 (30.8)	3 (11.5)	2 (7.7)
I feel confidence to perform nutrition assessment to diagnose malnutrition for	7 (26.9)	7 (26.9)	7 (26.9)	3 (11.5)	2 (7.7)

Self-efficacy	Strongly agree n (%)	Somewhat agree n (%)	Neutral n (%)	Somewhat disagree n (%)	Strongly disagree n (%)
patients using standard tool(s) soon after ICU admission. (Q2)					
I feel confidence to investigate whether a patient is at risk of malnutrition or not. (Q3)	7 (26.9)	9 (34.6)	7 (26.9)	1 (3.8)	2 (7.7)
Nutrition care/therapy					
I feel confidence to provide appropriate individualized nutritional treatment or care for undernourished older patients. (Q4)	6 (23.1)	8 (30.8)	8 (30.8)	2 (7.7)	2 (7.7)
I feel confidence to prescript nutrition care plan in line with medicine or nursing care (Q5)	6 (23.1)	7 (26.9)	9 (34.6)	3 (11.5)	1 (3.8)
I feel confidence to corporately work with the dietitian for patient's nutrition therapy or care. (Q7)	13 (50)	5 (19.2)	7 (26.9)	0 (0)	1 (3.8)

Self-efficacy	Strongly agree n (%)	Somewhat agree n (%)	Neutral n (%)	Somewhat disagree n (%)	Strongly disagree n (%)
I feel confidence to suggest patient caregivers regarding nutrition care for older patients. (Q8)	10 (38.8)	5 (19.2)	10 (38.5)	0 (0)	1 (3.8)
Nutrition outcome monitoring and evaluation					
I feel confidence to monitor food intake of the patients in ICU to assure they receive adequate amount suitable for bodily requirement. (Q6)	8 (30.8)	9 (364)	6 (23.1)	1 (3.8)	2 (7.7)

Table 19 *Level of self-efficacy of the ICU staff on nutrition assessment, nutrition care, outcome monitoring and evaluation for older patients at pre-test (baseline)*

Level of Self-efficacy	n	%
Low (1-13 points)	1	3.8
Moderate (14-27 points)	9	34.6
High (28-40 points)	16	61.5

15.4% of ICU staff never assess the patient's nutritional risk and never prescribe the total amount of nutrient intake for any ICU patient based on his/her condition. They sometimes visited and checked a patient during mealtime to see his/her feeding ability or diet tolerance (Tables 20 and 21).

Table 20 Practices of the medical staff on nutrition assessment, nutrition care, outcome monitoring and evaluation for older patients at pre-test (baseline)

Practices	Always n (%)	Often n (%)	Sometimes n (%)	Never/NA n (%)
Nutrition assessment				
Check the patient's body weight and height (Q1)	6 (23.1)	11 (42.3)	6 (23.1)	3 (11.5)
Check the malnutrition risk (Q2)	5 (19.2)	11 (42.3)	6 (23.1)	4 (15.4)
Nutrition care/therapy				
Prescript nutrition care plan in line with medicine or nursing care (Q3)	10 (38.8)	9 (34.6)	6 (23.1)	1 (3.8)
Prescript total amount of nutrient intake for each ICU patient based on his/her condition (Q4)	8 (30.8)	7 (26.9)	7 (26.9)	4 (15.4)
Provision of nutrition education to malnourished patient caregivers (Q7)	9 (34.6)	11 (42.3)	5 (19.2)	1 (3.8)
Provision of nutrition education material to malnourished patient caregivers (Q8)	8 (30.8)	9 (34.6)	7 (26.9)	2 (7.7)
Nutrition outcome monitoring and evaluation				
Visit and check a patient during mealtime to see his/her abilities to intake of food or nutrition tolerance (Q5)	8 (30.8)	6 (23.1)	10 (38.8)	2 (7.7)

Practices	Always n (%)	Often n (%)	Sometimes n (%)	Never/NA n (%)
Monitor and evaluation of significance clinical outcome such as time on MV, ICU LOS, albumin, protein (Q6)	7 (26.9)	11 (42.3)	6 (23.1)	2 (7.7)

Table 21 *Level of practices of the medical staff on nutrition assessment, nutrition care, outcome monitoring and evaluation for older patients at pre-test (baseline)*

Level of Practice	n	%
Low (1-11 points)	2	7.7
Moderate (12-23 points)	11	42.3
High (24-32 points)	13	50

There was a significant increase in the mean score of knowledge, perception, and practice of ICU staff in nutrition care for ICU patients (p<000.1) but not in self-efficacy. (Table 22)

Table 22 Comparison of mean scores of knowledges, perceptions-, self-efficacy and practices of the ICU staff on older nutrition at baseline (pretest) and posttest

Variables	Baseline mean (SD)	Posttest mean (SD)	*t*	Effect size
Knowledge (n=9)	6.78 (2.63)	9.44 (1.42)**	-3.491	
Perceptions (n=26)	93.12 (8.37)	97.5 (3.354)***	-3.967	
Self-efficacy (n=26)	29.5 (8.08)	31.92 (12.54)	-.973	
Practices (n=26)	6.78 (2.63)	9.44 (1.42)***	-3.656	

Statistics: Mean scores of the pretest and posttest were compared with paired sample *t*-test; Levels of significance included *p<.05, **p<-01, and ***p<.001.

4.3.2.2 Comparison of perceptions, self-efficacy, and practices of the caregivers on older nutrition

A total of 250 caregivers were included, two-thirds of whom were women, and 35.6% were between the ages of 30 and 39. Most of them were daughter/son and granddaughter/grandson half living in the same house with an elderly patient in the ICU (Table 23).

Table 23 General information of the caregivers of the ICU older patients

General information of the caregivers and the ICU older patients					
	n	%		n	%
Sex			Education		
Male	96	38.4	No education	17	6.8
Female	154	61.6	Primary school diploma	38	15.2
Age			Junior high school diploma	29	11.6
20-29 years	75	30	High school/certificate	94	37.6
30-39 years	89	35.6	Some college education	72	28.8
40-49 years	48	19.2	Annual income		
50-59 years	33	13.2	24 and lower	5	2.0
60 years and above	5	2	25-48	13	5.2
Marital status			49-72	96	38.4
Single	54	24.6	73 and over	136	54.4
Married	165	66	Relation to the patient		
Divorced	16	6.4	Husband or wife	6	2.4
Separated	4	1.6	Daughter/son	108	43.2
Major occupation			Grand-daughter/grand-son	109	43.6

No occupation	12	4.8	Brother/sister	15	6,0
Agriculturalist	56	22.4	Relative	12	4.8
Trading	14	5.6	Living with patient in the same house		
Fisherman	6	2.4	No	130	52.0
Labor in agricultural farm	18	7.2	Yes	120	48.0
Construction labor	12	4.8			
Shop workers	17	6.8			
Factory workers	56	22.4			
Officer	32	12.8			
State enterprise officer	10	4.0			
Government officer	17	6.8			

The caregiver has a moderately high level of knowledge. Most of them were aware of malnutrition's nutritional risk and consequences in older ICU patients. However, two-thirds responded that they do not know how to calculate the daily energy intake and required daily nutrients for older adults. Half of them did not agree that they knew about the recommended food pyramid and how to make mixed foods for ICU patients. 63.6% of participants considered nutritional education for critically ill older adults by ICU staff to be essential (Tables 24 and 25).

Table 24 Knowledge and Perceptions of the caregivers on nutrition related to older patients at pre-test (baseline)

Perceptions	Strongly agree n (%)	Somewhat agree n (%)	Neutral n (%)	Somewhat disagree n (%)	Strongly disagree n (%)
Older nutrition related knowledge					
- ICU older patient generally has risk of malnutrition. (Q1)	56 (22.4)	103 (41.2)	81 (32.4)	10 (4)	0 (0)
- Food and nutrient are important to improve treatment results of critical ill older patients. (Q2)	44 (17.6)	113 (45.2)	74 (29.6)	16 (6.4)	3 (1.2)
- Critically illness and inadequate dietary intake can worsen older patients' outcomes. (Q3)	41 (16.4)	60 (24.0)	28 (11.2)	91 (36.4)	30 (12.0)
- I know that body weight loss is common in older adults. (Q18)	61 (24.4)	110 (44.0)	58 (23.2)	13 (5.2)	8 (3.2)
- I know how to read food label. (Q16)	39 (11.6)	78 (31.2)	115 (46.0)	22 (8.8)	6 (2.4)
- I know that high energy junk food products are not good for older health. (Q17)	32 (12.8)	68 (27.2)	26 (10.4)	112 (44.8)	12 (4.8)
Perceptions on nutrition assessment					
- I know how to calculate the amount of daily energy intake for older adult. (Q4)	18 (7.2)	36 (14.4)	55 (22.0)	131 (52.4)	10 (4.0)

Perceptions	Strongly agree n (%)	Somewhat agree n (%)	Neutral n (%)	Somewhat disagree n (%)	Strongly disagree n (%)
- I know how to calculate the required daily nutrients for older adult. (Q5)	28 (11.2)	31 (14.4)	57 (22.8)	125 (50.0)	9 (3.6)
Perceptions on nutrition care					
- I know about five food groups suitable for older adults. (Q6)	34 (11.6)	53 (21.2)	122 (48.8)	25 (10.0)	16 (5.2)
- I know which food is rich in complex carbohydrate suitable for older adults. (Q7)	22 (8.8)	51 (20.4)	78 (31.1)	86 (34.4)	13 (5.2)
- I know which food is rich in protein suitable for older adults. (Q8)	29 (11.6)	48 (19.2)	95 (38.0)	72 (28.8)	6 (2.4)
- I know which food contains high lipid or fat which is not suitable for older adults. (Q9)	58 (23.2)	82 (32.8)	64 (25.6)	31 (12.4)	15 (6.0)
- I know which food is rich in sodium. (Q10)	57 (22.8)	104 (41.6)	63 (25.2)	19 (7.6)	7 (2.8)
- I know which food is rich in micronutrients and minerals. (Q11)	63 (25.2)	103 (41.2)	38 (15.2)	32 (12.8)	14 (5.6)
- I know which food is rich in fiber that is good for older adults. (Q12)	57 (22.8)	120 (48.0)	28 (11.2)	34 (13.6)	11 (4.4)

Perceptions	Strongly agree n (%)	Somewhat agree n (%)	Neutral n (%)	Somewhat disagree n (%)	Strongly disagree n (%)
- I know which food has high glycemic index. (Q13)	55 (22.0)	98 (39.2)	70 (28.0)	21 (8.4)	6 (2.4)
- I know the recommended food pyramid for older adults. (Q14)	28 (11.2)	41 (16.4)	56 (22.4)	117 (46.8)	8 (3.6)
- I know how to make blenderized food for older adult. (Q15)	30 (12)	52 (20.8)	47 (17.8)	112 (44.8)	9 (3.6)
Perception on nutrition outcome monitoring and evaluation					
- I think nutrition education for critically ill older adults provided by ICU staff is essential. (Q19)	58 (23.2)	101 (40.4)	69 (27.6)	11 (4.4)	11 (4.4)

Table 25 Level of perceptions of the caregivers on nutrition related to older patients

Level of Perceptions	n	%
Low (1-31 points)	0	0
Moderate (32-63 points)	141	56.4
High (64-95 points)	109	43.6

More than half of those surveyed feel they need more confidence to provide adequate food daily to meet the older patient's dietary needs during hospitalization and after discharge. Only 43.6% read food labels correctly (Tables 26 and Table 27).

Table 26 Self-efficacy of the caregivers on providing appropriate feeding for older patients at pre-test (baseline)

Self-efficacy	Strongly agree n (%)	Somewhat agree n (%)	Neutral n (%)	Somewhat disagree n (%)	Strongly disagree n (%)
I feel confidence to provide enough amount of food daily suitable for dietary needs of the older patient while in hospital. (Q1)	16 (6,4)	65 (26,0)	95 (38,0)	74 (29,6)	0 (0)
I feel confidence to provide nutritious food daily suitable for nutrient intake of the older patient while in hospital. (Q2)	30 (12)	72 (28,2)	81 (32,4)	65 (25,2)	4 (1,6)
I feel confidence to cook standard blenderized food suitable for older patient daily while in hospital. (Q3)	50 (20,0)	59 (23,6)	87 (34,8)	47 (18,8)	7 (2,8)
I feel confidence to choose quality food for older patient from correctly reading food labels. (Q4)	45 (18)	64 (25.6)	89 (35.6)	40 (16.0)	12 (4.8)

Self-efficacy	Strongly agree n (%)	Somewhat agree n (%)	Neutral n (%)	Somewhat disagree n (%)	Strongly disagree n (%)
I feel confidence to cook enough amount of food suitable for daily nutrient intake of an older adult after discharge. (Q5)	47 (18.8)	59 (23.6)	70 (28.0)	63 (25.2)	11 (4.4)
I feel confidence to help an older patient to eat suitable complex carbohydrate daily after discharge. (Q6)	51 (20.4)	64 (25.6)	88 (35.2)	38 (12.5)	9 (3.6)
I feel confidence to help an older patient to eat enough protein daily after discharge. (Q7)	44 (17.6)	68 (27.2)	84 (33.6)	44 (17.6)	10 (4.0)
I feel confidence to help an older patient to eat less fatty food daily after discharge. (Q8)	46 (18.4)	68 (27.2)	69 (27.6)	57 (22.3)	10 (4.0)
I feel confidence to help an older patient to eat less sodium daily after discharge. (Q9)	34 (13.6)	74 (29.6)	82 (32.8)	44 (17.6)	16 (6.4)
I feel confidence to help an older patient to eat high fiber food daily after discharge. (Q10)	51 (20.4)	64 (25.6)	91 (36.4)	33 (13.2)	11 (4.4)

Self-efficacy	Strongly agree n (%)	Somewhat agree n (%)	Neutral n (%)	Somewhat disagree n (%)	Strongly disagree n (%)
I feel confidence to check body weight loss of an older patient after discharge. (Q11)	43 (17.2)	72 (28.8)	69 (27.6)	56 (22.4)	10 (4.0)
I feel confidence to enhance the appetite of an older patient after discharge. (Q12)	43 (17.2)	64 (25.6)	93 (37.2)	41 (16.4)	9 (3.6)
I feel confidence to help older patient to eat food suitable for his/her chronic disease. (Q13)	38 (15.2)	71 (28.4)	82 (32.8)	4 (17.6)	15 (6.0)
I feel confidence to avoid giving high energy commercial food products such as snack to older patient. (Q14)	46 (18.4)	77 (30.8)	73 (29.2)	46 (18.4)	8 (3.2)
I feel confidence to provide support to enhance nutrition status of an older patient. (Q15)	44 (17.6)	66 (26.4)	91 (36.4)	41 (16.4)	8 (3.2)

Table 27 Level of self-efficacy of the caregivers on providing appropriate feeding for older patients at pre-test (baseline)

Level of Self-efficacy	n	%
Low (1-25 points)	1	0,4
Moderate (26-50 points)	140	56

High (51-75 points)	109	43.6

Table 28 Nutrition related practices of the caregivers provided to older patients prior to admission and intention to practices after discharge at pre-test (baseline)

Nutritional related practices	Always n (%)	Often n (%)	Sometimes n (%)	Never/NA n (%)
I (intend to)* read the food labels before purchasing food for the patient. (Q1)	33 (13.2)	38 (12.5)	141 (56.4)	38 (15.0)
I (intend to)* cooked food for the patient. (Q2)	22 (8.8)	13 (5.2)	76 (30.4)	139 (55.6)
I (intend to)* checked the patient's "body weight." (Q3)	28 (11.2)	58 (23.2)	134 (53.6)	30 (12.0)
I (intend to)* checked the patient's appetite. (Q4)	27 (10.8)	49 (19.6)	137 (54.8)	37 (14.8)
I (intend to)* provided food to the patient based on his/her preference.(Q5)	32 (12.8)	42 (16.8)	137 (54.8)	39 (15.6)
I (intend to)* provided food to the patient suitable for his/her disease condition. (Q6)	37 (14.8)	54 (21.6)	125 (50.0)	34 (13.6)
I (intend to)* provided food to the patient suitable for his/her daily energy intake. (Q7)	19 (7.6)	22 (8.8)	111 (44.4)	98 (39.2)
I (intend to)* provided food to the patient suitable for his/her daily nutrient intake. (Q8)	12 (4.8)	24 (9.6)	166 (66.4)	48 (19.2)

Table 29 Level of nutrition related practices of the caregivers provided to older patients prior to admission and intention to practices after discharge at pre-test (baseline)

Level of practice	n	%
Low (1-11 points)	16	6.4
Moderate (12-23 points)	219	87.6
High (24-32 points)	15	6.0

Table 30 Comparison of mean scores of perceptions-, self-efficacy and practices of the caregivers on older nutrition at baseline (pretest) and posttest

Variables	Control (SD)	Experimental (SD)	*t*	Effect size
Perceptions	58.2 (9.22)	60.9 (14.11)	-0.912	
Self-efficacy	46.5 (6.21)	49.81 (10.71)	-1.151	
Practices	16.3 (2.81)	16.6 (4.29)	- 0.38	

Abbreviation: e = Experimental group, c = Control group

Statistics: Mean scores of the pretest and posttest were compared with paired sample *t*-test; Data is significant at *p<0.05, **p<0.01, and ***p<0.001.

4.3.2.3 Comparison of health and service utilization outcomes between the ICU older patients in a control group and an experimental group after the NEP implementation

This part compared general information and the study outcomes between an experiment group (EG) and a control group (CG), a subgroup of ICU older patients systematically selected from the big group (n = 250) recruited in the previous study phase whose caregivers received routine advice on older nutrition care. Each group equally had 32 older ICU patients.

Differences in personal background health and related conditions between the experiment group (men = 65.6%, mean age±SD = 77.2 ± 9.6, junior high school =

34.4%, ever married = 37.5%, live with others = 90.6%), number of comorbidities = 3.7 ± 2, APACHE II = 14.9±5.4) and the control group (men = 65.6%, mean age±SD =77.0±9.8, junior high school = 25%,, number of comorbidities = 3.2 ± 1.6, APACHE II = 14.4 ± 4.8) were analyzed. No significant differences were found between groups at baseline before the intervention in gender, age, education, occupation, income, number of comorbidities, BMI, APACHE II, mNUTRIC, $p>0.05$ (Table 31)

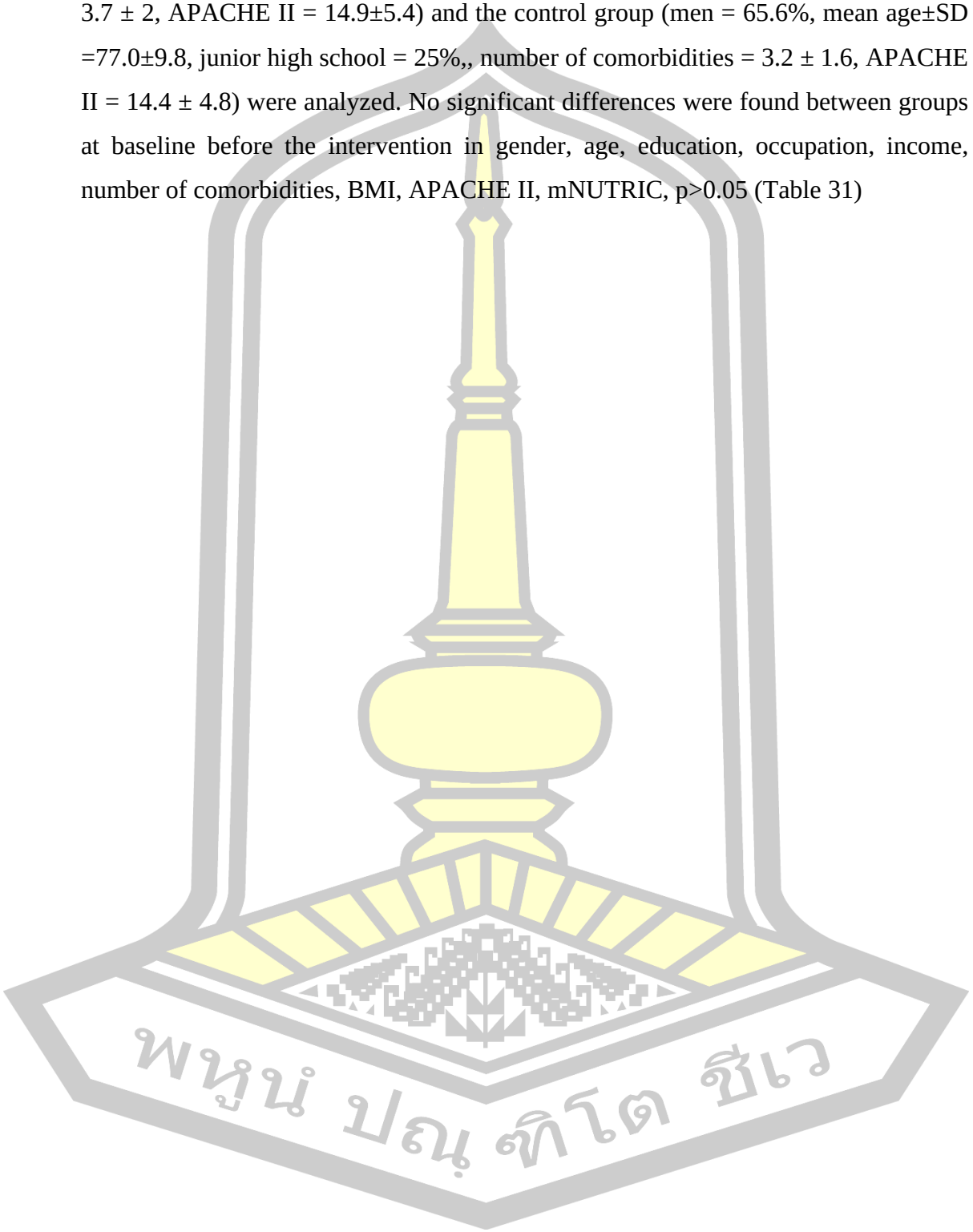

Table 31 Comparison of general information, health, and nutrition related conditions upon ICU admission between experiment (EG) and control groups (CG)

Variables	Total (N = 64) n (%)	EG (N = 32) n (%)	CG (N = 32) n (%)	*p*-value
General information				
Gender				1.000[a]
Male	42(65.6)	21(65.6)	21(65.6)	
Female	22(34.4)	11(34.4)	11(34.4)	
Age (years)				
60-69	20(31.3)	11(34.4)	9(28.1)	
70-79	11(17.2)	6(18.8)	5(15.6)	
≥80	33(51.5)	15(46.8)	18(56.2)	
Mean (SD)	77.1(9.6)	77.2(9.6)	77.0(9.8)	0.929[b]
Min-Max	60-95	62-94	60-95	
Marital status				0.095[a]
Married	18(28.1)	12(37.5)	6(18.8)	
Others (i.e., single, and ever married)	46(71.9)	20(62.5)	26(81.3)	
Education				0.134[c]
No school attainment	5(7.8)	2(6.3)	3(9.4)	
Primary	22(34.4)	7(21.8)	15(46.8)	
Junior	19(29.7)	11(34.4)	8(25.0)	
Senior high and higher	18(28.1)	12(37.5)	6(18.8)	
Living with other(s)				0.613[c]
No	4(6.3)	3(9.4)	1(3.1)	

Variables	Total (N = 64) n (%)	EG (N = 32) n (%)	CG (N = 32) n (%)	*p*-value
Yes	60(93.8)	29(90.6)	31(96.9)	
Occupation				0.157[a]
No	47(73.4)	26(81.2)	21(65.6)	
Yes	17(26.6)	6(18.8)	11(34.4)	
Income (VND/month)				0.278[b]
Mean (SD)	11.7(16.0)	13.9(18.7)	9.6(12.6)	
Min-Max	0.0-62.2	0.0-62.2	0.0-60.0	
Health and nutrition related conditions				
Number of comorbidities				0.283[b]
Mean (SD)	3.4(1.8)	3.7(2.0)	3.2(1.6)	
Min-Max	0-8	0-8	0-7	
APACHE II				0.699[b]
Mean (SD)	14.7(5.1)	14.9(5.4)	14.4(4.8)	
Min-Max	5.0-31.0	16.0-23.0	16.0-23.0	
Body mass index (BMI) kg/m^2				0.178[a]
Underweight (≤18.4)	14(21.9)	4(12.5)	10(31.3)	
Normal weight (18.5-22.9)	48(45.0)	21(65.6)	27(84.4)	
Overweight (23.0-24.9)	2(3.1)	1(3.1)	1(3.1)	
Malnutrition risk using mNUTRIC score				0.292[b]
Low risk (0-4 points)	42(65.6)	19(59.4)	23(71.9)	
High risk (5-9 points)	22(34.4)	13(40.6)	9(28.1)	

APACHE II, Acute Physiology and Chronic Health Evaluation II, APACHE II score = acute physiology score + age points + chronic health points, with minimum score = 0, maximum score = 71, increasing score is associated with increasing risk of hospital death; mNUTRIC, a "modified NUTRIC" nutritional risk assessment tool to quantify the malnutrition risk of critically ill patients developing adverse event, with the score ranging from 0-9 (if no IL-6).

Statistics, [a]Chi-square test, [b]t-test, [c]Fisher's exact test;

Data is significant at: p<0.05*, p<0.01**, p<.001***

The study results in Table 32 indicated that the older ICU patients in the experimental group significantly improved their dietary energy intake (p<0.001). However, it was notable that the ICU older patients in the control group had significantly improved in their dietary energy intake (p<0.001)

A comparison between the groups indicated that the older ICU patients in both groups differed significantly in their changes after the NEP program implementation, particularly in energy intake (p<0.0.001) but not in protein intake (p=0.136).

Table 32 Comparison of mean scores of nutrition and health outcomes on ICU admission day1, day 4, and discharge day within- and between-groups

Outcomes	Group	ICU admission-discharge			Within-group comparison		Between-group comparison	
		Day1 Mean(SD)	Day4 Mean(SD)	Discharge Mean(SD)	*p*-value	Effect size	*p*-value	Effect size
Health and Nutrition outcomes								
-Body mass index (kg/m^2)	EG	19.2(1.7)	19.5(1.7)	19.5(1.6)	0.000	0.221	0.007	0.113
	CG	20.4(1.6)	20.5(1.6)	20.7(1.6)	0.002	0.186		
- Nutrition risk score	EG	5.6(0.9)	5.6(1.0)	5.6(1.0)	0.693	0.012	0.043	0.064
(NRS2002)	CG	5.2(0.9)	5.1(0.9)	5.0(1.0)	0.377	0.031		
- mNUTRIC Score	EG	3.9(1.9)	4.0(1.8)	4.1(1.9)	0.460	0.025	0.405	0.011
(No IL-6 category)	CG	3.6(1.5)	3.9(1.4)	3.5(1.2)	0.088	0.750		
Nutrition care								
-Total energy intake	EG	900.0(252.2)	1,120.2(208.0)	1,204.8(272.3)	0.000	0.563	0.000	0.201
(kcal/day)	CG	884.7(234.9)	946.6(201.1)	1007.9(332.5)	0.025	0.115		
-Total protein intake	EG	40.3(18.1)	54.9(20.1)	58.4(21.2)	0.000	0.334	0.136	0.036
(gm/day)	CG	41.8(19.5)	47.2(20.3)	48.4720.3)	0.002	0.192		
-Percentage of meeting	EG	75.0(19.2)	93.9(16.2)	84.1(17.3)	0.000	0.458	0.002	0.147
caloric intaking goal	CG	70.5(19.1)	75.3(15.9)	67.4(26.0)	0.019	0.123		

Statistics: Two-way repeated measures ANOVA

Data is significant at: p<0.05*, p<0.01**, p<.001***

Table 33 Comparison of proportion of health and nutrition outcomes and mean scores of service utilization outcomes within- and between-groups.

Outcomes	Total N = 64	EG n = 32	CG N =32	*p*-value
Nutrition related outcomes	n (%)	n (%)	n (%)	
- Having complication(s) on nutrition care				0.034[c*]
No	53(82.8)	30(93.8)	23(71.9)	
Yes (i.e., diarrhea and gastroparesis)	11(17.2)	2(6.3)	9(28.1)	
- Prevalence of malnutrition using Subjective Global Assessment (SGA)				0.054[c]
Normal	12(18.8)	6(18.8)	6(18.8)	
Mild to moderate	44(68.7)	22(68.8)	22(68.8)	
Severe	8(12.5)	4(6.4)	4(6.4)	
		Mean(SD)	Mean(SD)	
- Duration of time for initial enteral feeding after ICU admission (hours)		4.5(2.4)	5.4(2.2)	0.120[b]
- Duration of time for initial parenteral feeding after ICU admission (hours)		1.2(1.2)	1.7(3.4)	0.575[b]
Service utilization outcomes				
-ICU length of stay (days)		7.2(5.6)	9.1(6.8)	0.236[b]
-Hospital length of stay (days)		9.2(5.8)	11.5(7.1)	0.173[b]
-Received mechanical ventilator-MV (days)		3.7(6.0)	7.3(6.3)	0.040[b]*

Outcomes	Total N = 64	EG n = 32	CG N =32	*p*-value
-Received renal replacement therapy-RRT (Times)		2.2(1.7)	3.0(0.0)	0.576[b]
	n (%)	n (%)	n (%)	
- ICU mortality rate				0.248[a]
No	16(25.0)	10(31.1)	6(18.8)	
Yes	48(75.0)	22(68.8)	26(81.2)	

Abbreviation: MV, ; RRT,

Statistics: [a]Chi-square test, [b]*t*-test, [c]Fisher's exact test;

Data is significant at: p<0.05*, p<0.01**, p<.001***

CHAPTER 5
DISCUSSION AND CONCLUTION

5.1 Discussion:

5.1.1 Current nutritional conditions, feeding practice situation, and their relationship with clinical outcomes of the critically ill older patients in ICU

5.1.1.1 General- and medical information of the ICU older patients

Regarding the age of the study participants, the mean age was 76.5 (10.2), the lowest being 60 years old and the highest being 102 years old; 112 subjects aged < 75 years, representing 48.8%, and aged > 75-year-olds accounted for 55.2%. This result is higher than in the study by ShpataV et al. (2015) in Albania, the proportion of patients aged 75 years is 25.1% (9), since the subjects of the study ShpataV were 18 years or older, while in this study they included patients aged 60+. The age of the study was also higher than that of Nguyen Huu Hoan in Bach Mai Hospital's intensive care unit. The age group over 75 accounted for only 27%. In this study, males accounted for 42.4%; females dominated at 57.6%; this result differs from the results of ShpataV where male made up 58.8%. The older population has a difference in gender structure, as female life expectancy is higher than males, leading to an increase in the rate of women in the older community (157). Hence, women still make up a more significant proportion when the study participants are older. Most patients who lived with others and did not have a job (64.4%) had 100% health insurance. Because of the retirement age in Vietnam is 60, and the government supports insurance for the older. People are over 80 years old and over can avail of free medical services.

The elderly patient had a pre-existing condition prior to admission to the ICU. The group with three or more diseases had a very high rate of 74.4%, with the group with three diseases having the highest rate at 66%; all these groups had a higher proportion than the group with only one or no disease was 12.4%. Consistent with the characteristics of the disease pattern of older people in previous studies in Vietnam and worldwide (157). Older people have multiple comorbidities, and the older they are, the more they have comorbidities. Studies show that more than 50% of older people suffer from three or more chronic diseases (158). This finding was similar to Salive's 2013 study in the United States, 50% of people under the age of 65 had two or more diseases;

this number rose to 62% in those 65-74 years old and 81.5% of people 85-year-olds have multiple comorbidities (159) and many other studies (160,161).

The most common disease groups in older people were respiratory, shock, and neurological diseases, with 60%, 24.4%, and 9.2%, respectively. Respiratory diseases are at the top of this list as the Covid-19 pandemic and long-term Covid-19 symptoms are breaking out rapidly in Vietnam and worldwide. In addition, patients entering the ICU often had APACHE 14.2 ± 5.1, so the proportion of patients requiring respiratory support, mechanical ventilation, and intubation is also significant.

Multiple illnesses mean that older people must take many medications at the same time. In this study, the ICU patient received 7,7 ± 2 medications while vitamins/minerals got only 1,4± 0,86 daily. According to statistics worldwide, the state of using many drugs (from 5 drugs or more) occurs in 12.8-39%, which affects the body's BMI (22).

5.1.2 Current nutrition status, health, and clinical conditions of the critically ill older patients

BMI was 19,9 ± 1,37 lower than in Nguyen Thi Trang's study conducted in 2010 in the older ICU patient (general average BMI 21.7 ± 3.3). Research showed that 10.4% of patients suffer from a long-term lack of energy. The chronic energy deficiency in this study was lower than that of Nguyen Thi Cam Nhung, with a malnutrition prevalence of 15%. In addition, this result is also lower than the result of a study conducted in 2005 on 120 patients aged 60 years at Hong Kong Rehabilitation Hospital (16.7%) and lower than a study on 76 patients aged 60 years in India (27.6%) (162). This difference is due to the health status of the patient. The different pathological features for research in Hong Kong and India. Even if BMI is < 20 kg/m2 and < 22 kg/m2 according to the Standard on Depression Nutrition published by ESPEN in 2015 in the elderly under 70 years and over 70 years, the prevalence of malnutrition of intensive care patients was higher than 10.4 %. The overall prevalence of high nutrition risk was 84.4% higher than in the study by VShpata et al. (2015) with 71.24% (9) and higher than the study by Sule Ozbilgin et al. (2016) with 80.3% (163). (163).

The study's results showed that the average nutritional risk rating modified Nutric Score is 3.77 ± 1.5. This result was lower than the research of Amartya Mukhopad-hyay with the severe disease with a mean mNutric Score average of 4.9 ±

1.9(164). Also, in research by Amartya Mukhopadhyay group of low-risk patients as assessed Nutric Score is 45.4% lower than the result results of this study (70,8%). This difference may be due to the medical condition of the two groups of study subjects are not similar in copper.

In the context of this study, early EN and early PN were initial. The percentage of patients fed by nasogastric tube was the highest at 51.2%, oral was 20.8%, and combined EN and PN at 28%. The benefits of enteral nutrition are the reduced length of hospital stay, reduced risk of sepsis, lower drug costs, lower blood glucose levels, and maintenance of intestinal mucosal integrity and immune function. The study found that the percentage of patients fed early within <24 hours was 99.6%, with no patients fed after 48 hours. The pragmatic clinical trial showed that early EN compared to delayed EN, was associated with improved clinical outcomes in MV patients with circulatory shock. In a recent study, early nutrition reduced mortality in mechanically ventilated patients in the ICU and hospital (121). However, this study showed that the time from ICU admission to PN was early, with an average of 1.37 + 2.78. Late initiation of parenteral nutrition was associated with faster recovery and fewer complications compared to early initiation. Feeding via a nasogastric tube is generally well tolerated in most ICU patients. Enteral nutrition should be preferred, but supplemental parenteral nutrition is necessary, as ICU patients are most at risk of malnutrition and cannot obtain adequate enteral protein and energy support. A single-center study of 305 adults with severe disease who received enteral nutrition and supplemented parenteral nutrition (on days 4–8) showed that people receiving supplemental parenteral nutrition had a lower incidence of nosocomial infections than those receiving parenteral nutrition alone (27% vs. 38%) (132). Furthermore, there were no differences in the number of days hospitalized, the number of days in the ICU, and all-cause or ICU mortality.

Seventy people received PN supplementation, glucose (7 people) accounted for 10%, lipids (22 people) 31.4%, and protein (66 people) accounted for the highest rate of 95.7%, representing the highest protein percentage declared Infusion is for two main reasons: Prescribing protein infusion can be a familiar cue to physicians when they determine that the patient's nutritional status is poor, the patient's edema is increasing,

and albumin is decreasing, or to the dietician when determining that dietary protein intake is insufficient for the calculated needs of each patient.

According to mNutric, the proportion of patients in age 75 or over the years is a high risk by 4,2 times the patient age group under 75 age (p<0,001). This result is similar to Orlandoni et al. (2017) (165), but in the study, the proportion of patients at risk of malnutrition is 29.2% lower than in the study by Orlandoni et al. (46%). The criteria that can explain this standard for patients in the intensive care unit of the two study centers are different. The results showed that the ICU and hospital mortality rates were 63.6% and 68.4%, respectively. This result was higher than the study by Fatemeh Osooli et al. (2019) (166), 31.3% and 37.3% because the age of this study was low as a mean of 57,42 ± 17,2 years.

The average protein and albumin values were 61,5±9,13 (g/L) and 30,8±6,3 (g/L), respectively. This result is similar to the study of Vu Thi Thu Ha in 2017 on the nutritional status of elderly patients at the Geriatric Hospital. The protein index is not sensitive because there are many influencing factors: dietary protein, altered metabolism with injury, stress, infection, decreased oxygen uptake, plasma protein deficiency due to protein loss, changes in capillary permeability, exercise, etc., while serum albumin reflects disease severity rather than malnutrition (62,63).

5.2 Development of the calf circumference (CC) cut-off values for critically ill older patients

Our finding was that the CC cut-off point of ICU older patients, men, and women (27.3 and 24.1) were low compared to the study in Malaysia (30.1 and 27.3), respectively. The study in Malaysia included all healthy participants, while our context was critically ill older people.

5.3 Effectiveness of NEP:

5.3.1 Comparison of knowledge, perceptions, self-efficacy, and practices of the ICU staff on older nutrition

The study involved 26 ICU staff, half of whom were male. The physician accounted for 9 (34.6%) and the nurse for 17 (65.4%). ICU staff reported having received training on nutritional screening and therapy (23.1%) and (7.7%), respectively. Two-thirds of the ICU staff had over four years of experience.

Physician knowledge levels at baseline were as low, moderate, and high as 33.3%, 44.4%, and 22.2%, respectively, with a mean score of 6,78 ± 2,64. Nutritional knowledge included nutritional screening and assessment, delivery of nutritional therapy, and monitoring and assessing clinical outcomes associated with malnutrition in critically ill elderly patients. In connection with the health system in Vietnam, only doctors who are not reasonably involved in this part can prescribe health therapies for patients.

3.8% and 25% perceived the clinical nutrition of ICU staff as moderate and high, respectively. ICU staff agreed that ICU patients admitted to the ICU develop a nutritional risk, and both critically ill couples with malnutrition worsen patient outcomes. They also agreed that a nutritionist must treat all malnourished individuals individually (80.8%), and all ICU staff must be included in the nutritional care team (69.2%). Additionally, the self-efficacy levels are as low, moderate, and high as 3.8%, 34.6%, and 61.5%. One-third of ICU staff need more confidence in providing patients with accurate nutritional screening, assessment, and nutritional therapy. Diet practice is low, medium, and high at 7.7%, 42.3%, and 50%, respectively. A tow-third of ICU staff said they did not or sometimes assess the nutritional risk of ICU patients. The prevalence of critical issues also confirms the need for continuing education and training to improve hospital nutritional care. However, a high percentage (88.5%) of those already agree that nutrition is essential. Unfortunately, this belief was only sometimes implemented, with only 30.8% constantly assessing a patient's eating ability or dietary tolerance during meals.

Therefore, 76.9% of staff need better training to support critical care patients' nutritional needs. The underlying concept of the NEP is that personal beliefs or perceptions can influence health behaviors. Providing an accurate nutrition education program can change beliefs or perceptions and therefore change practice behaviors based on medical science and experience.

The results showed a significant increase in the mean score of knowledge, perception, and practice but not self-efficacy of ICU staff at baseline and post-test. According to many studies, education can increase knowledge, but this does not necessarily suggest that it will improve practice right away, as behavior change is a

continuous process. Due to this, it is crucial to staff a multifaceted strategy for behavior change that combines teaching and/or training with other efforts to create an atmosphere that supports change (167). Education that improves knowledge is likely to impact practice if the personnel have the procedures to put it to use.

Exploratory analyses that contrast groups of staff members depending on their discipline and years of experience point to possible variations in KAP that merit additional study. Having more experience with higher KAP after years of practice was not surprising. Since most of the discrepancies were to be expected, it emphasized the importance of emphasizing staff education and ensuring the procedures are in place to put what is learned into practice. Conclusions about the relationships found in this analysis can only be made once the KAP questionnaire has been used to assess larger, more representative populations with better generalizability. There is no “one-size-fits-all” answer, but locally sensitive data can be used to create tailored on-premises solutions, which can then be integrated into the collection of locally effective best practices.

5.3.2 Comparison of knowledge, perceptions, self-efficacy, and practices of the ICU caregiver on older nutrition

A total of 250 ICU caregivers participated in the study, two-thirds female, and the most significant proportion (54.8%) are in the 20-49 age range. The relationship with the patient is almost husband/wife and son/daughter, but only half of those living with patients are in the same house. Since the age group of the careers is young, the highest level is the school-leaving certificate, with 94 people (37.6%).

This group's perception of older nutrition-related knowledge is high, with a mean score of 63.3 ± 11.95 (32 -95). The level of perception, as an average of 56.4% and high (43.6%), most strongly agree/somewhat agree that older ICU patients are at risk of malnutrition and that nutritional intake is essential to improve patient outcomes. In line with Nguyen Van Khang's study of hospital nurse nutrition, the result was that 94.4% of people reported diet-related diseases. Otherwise totally disagree/tend to disagree that they know how to estimate nutritional needs in terms of daily intake (56.4%) or required nutrients for elderly patients (53.6%). Therefore, 63.6% of

caregivers considered the nutritional education for ICU patients conducted by ICU staff to be essential.

Self-efficacy refers to a person's confidence in their ability to perform a behavior successfully. The higher the caregiver's self-efficacy, the greater the willingness to provide the best nutritional needs to patients in the ICU. People believe they would try their best to care for their beloved. The self-efficacy levels are low, moderate, and high at 0.4%, 56%, and 43.6%, respectively. However, practice at the older nutritional level is moderate. For example, the caregiver indicated that they would not cook for the patient (55.6%) or provide the patient with food appropriate for their daily energy intake (39.2%).

The NEP will be expanded to provide appropriate basic nutritional training for caregivers to increase their knowledge, awareness, and self-efficacy and thus enhance their practice to provide accurate nutrition required by ICU patients. For assessing the effectiveness of NEP, the study included 32 caregivers in phase 1 as a control group and an additional 32 caregivers in phase 3 and compared the mean of perception, self-efficacy, and practice between the two groups. However, increases in perception, self-efficacy, and practice in the experimental group are insignificant. The mean practice in the control and experimental groups is the lowest change at 16.3 ± 2.81 vs. 16.6 ±4.29. In the study, although the ICU caregiver in the experimental group had a higher mean score on older nutrition perception and self-efficacy, half of them did not live in the same home as the ICU patient, so they could not change practice behaviors.

Our main finding was that a nutrition education program (NEP) for ICU staff and caregivers had a positive impact, improving the mean caloric intake and reducing the length of stay in the ICU.

We had two cohorts comprising 32 non-randomized older patients in each group. The group of patients evaluated in the control and experiment groups were comparable. However, two-thirds of patients were at normal nutrition according to BMI but high nutrition risk according to mNUTRIC score. Per our observations, the control and experiment groups got EN support (oral/feeding tube) within 24 hours, which agrees with good clinical practice based on national and multi-international guidelines (71,72,98). However, the days from ICU admission to PN supplement were relatively

the same. Evidence shows early PN supplements are associated with more infections and prolonged hospitalization. Other studies have evaluated the impact of feeding protocols and educational tools on the quality of NT and clinical outcomes(145). In the most recent study, Soguel and colleagues measured the clinical impact of a two-step interdisciplinary quality nutrition program (168). They found essential improvements in the quality of nutritional therapy like those we observed in our study. These improvements were associated with auditing a dietician inside the ICU. Most studies implemented feeding protocols without bedside case discussions or audits. We also provided NEP to the ICU caregiver, who was the critical caloric intake provider to ICU patients.

There are limitations to our study. This study was conducted in a single medical ICU at a provincial hospital with a small number of ICU staff. Giving the same examination twice could be a design flaw because the first exam could be a learning experience that may influence performance on the second exam. Another relevant point is that many factors can influence caloric intake, and it is impossible to adjust our results for unknown confounders with this study design. At the time of the conducted study, the COVID-19 pandemic broke out worldwide, which changed the routine of hospital policy. Only one family member can stay and take care of ICU patients. They did not allow to go out of the quarantine zone, so they had only the choice to buy commercial nutrition to provide ICU patients. This situation differs from usual, so it may influence ICU patients' actual caloric intake. It would be necessary to conduct a randomized controlled study to confirm these findings. Elsewhere, variables that have been changed include at least the following:

1. Exposure to the intervention
2. Different patients being tested before and after
3. Other changes in processes and personnel that occurred in the unit over the six months

Therefore, our cause-and-effect inference is weak.

5.4 Conclusion:

Malnutrition is common in older patients admitted to the intensive care unit. The study showed a prevalence of malnutrition of 10.4% according to BMI, but these patients were at very high nutritional risk, according to NRS 2002 and nutria. Older

hospitalized patients may have pre-existing malnutrition due to aging and chronic disease, in addition to an acute change in metabolism, resulting in increased energy utilization and decreased absorption. Also, the lack of energy protein during a hospital stay doubles the burden associated with the disease. This leads to undesirable clinical consequences such as prolonged hospital stay, increased mechanical ventilation rate, and increased risk of complications. Therefore, nutritional screening and assessment are essential to develop an optimized nutritional care regimen for each individual and to help patients receive comprehensive care and disease management. BMI and nutritional screening tools can be affected by factors such as inflammation, edema, the ICU patient's inability to ask about their history, and insufficient to conduct an in-depth assessment. Therefore, in clinical practice, a simple, fast, easy-to-implement tool, such as calf circumference for nutritional screening, may be widespread. The study results suggest that the CC cut-off point for malnutrition in the older group admitted to the ICU is 27.3 cm and 24.1 cm for men and women, respectively.

The study also showed that ICU staff have average knowledge, awareness, and nutritional practices. ICU staff need to have more confidence in conducting nutritional screening and assessments and implementing optimal nutritional interventions for patients. In addition, older patients admitted to the ICU depend on their caregivers, so their nutritional knowledge, perception, self-efficacy, and practices are also a factor in improving the nutritional status of ICU patients. Developing a nutrition education program is necessary and effective to improve the nutritional status of older ICU patients. After participating in the NEP program, ICU staff and caregivers' knowledge, perception, and self-efficacy have changed. The evidence is that the patient's energy intake increased compared to the control group.

5.5 Recommendation

All older patients admitted to the ICU should be evaluated and nutritionally assessed. It is advisable to raise awareness among ICU staff and nurses of the consequences of malnutrition if not actively and effectively intervened. Nutritional communication and networks should be implemented to help patients receive comprehensive treatment. A post-discharge nutrition plan is required to allow the patient to recover better after surviving in the ICU.

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APPENDICES

Appendix A

Consent Form (Phase 1 and 2)

(ICU patients and caregivers)

Project title: Malnutrition in older patients: constructing knowledge, perceptions, and solutions for an Intensive care setting in Vietnam

Informed consent date: Day……..……Month……Year……...

Brief description of the research project:

This project aimed to study 1) the nutrition status and practice of older patients in the ICU; 2) explore a suitable program for nutrition therapy. It includes data collection methods of approximately 250 older ICU patients along with their caregiver/relatives by finish 20 minutes in-depth interview questionnaires 1) ICU older patients' Nutritional status and Nutrition Assessment by asking 250 relatives about situation and experience on daily nutrition intake in the past year up to present, as well as the anthropometric measurement of body weight and height, medical examination and other medical information of each older ICU patient. This nutritional assessment conduct by a researcher who is a medical doctor at the Department of Nutrition and ICU staff at Vinh Long General Hospital. After that, you will be invited to meet medical personnel and researcher for further nutrition consulting and education; 2) Survey interview guide on perceptions and practices regarding appropriate feeding for older patients during critical illnesses for ICU patients' caregivers/relatives by asking their general information, knowlegde, perception, the attitude of patient's illness, nutritional status and feeding during the critically ill stage as well as their self-efficacy of appropriate feeding for older patients during critical illnesses. This personal data will be kept confidential and will be disclosed only in a group summary. If necessary, an individual message will be presented based on an academic purpose but with the use of coding, not the participant's name. Participation in this project is based on the participants' willingness; therefore, each participant may quit the project at any point without negative consequences.

Data from this research project will be helpful for local public health authorities, and national policymakers to formulate plans and solutions relevant to local food security problems and needs. If there is any question, do not hesitate to contact the Vinh Long General Hospital at Vinh Long city.

Consent of the participant:

I have been informed about the research project objectives, data collection methods, and potential disadvantages resulting from my participation, and that I clearly understand. The researcher has assured me that he/she will answer all of the questions I may have without any disclosure, and I have the right to end my participation and quit the research project at any point in time. My participation is based on my willingness and that my decision to quit the project will not cause any negative impact on myself and my family. In addition, the researcher has assured me that my data will be kept confidential. The data will only be presented as a group summary report. My data can be presented as an individual message only for an academic purpose but with an assigned code instead of my name on it, and that it must not cause me any negative impact.

I have read the above content thoroughly, and that I clearly understand it. Therefore, I would like to consent to participate, and I would like to give my consent to allow my family members to participate in this project based on my willingness to participate.

Signature……Guardian of the participaSignature……Researcher

(……) (……..)

Date……

Date……

Appendix B (Vietnamese version)

Giấy chấp thuận

(Bệnh nhân ICU và người chăm sóc)

Tên dự án: Suy dinh dưỡng ở bệnh nhân lớn tuổi: xây dựng kiến thức, nhận thức và giải

pháp cho môi trường chăm sóc tích cực tại Việt Nam

Thông báo ngày đồng ý : Ngày……..……Tháng……Năm……...

Mô tả tóm tắt dự án nghiên cứu :

Dự án này nhằm mục đích nghiên cứu 1) tình trạng dinh dưỡng và thực hành của bệnh nhân lớn tuổi trong ICU; 2) khám phá một chương trình phù hợp cho liệu pháp dinh dưỡng. Nó bao gồm các phương pháp thu thập dữ liệu của khoảng 242 bệnh nhân ICU lớn tuổi cùng với người chăm sóc/người thân của họ bằng cách hoàn thành bảng câu hỏi phỏng vấn sâu trong 20 phút 1) Tình trạng dinh dưỡng và Đánh giá dinh dưỡng của bệnh nhân lớn tuổi ICU bằng cách hỏi 242 người thân về tình hình và kinh nghiệm về lượng dinh dưỡng hàng ngày trong năm qua cho đến nay, cũng như đo lường nhân trắc học về cân nặng và chiều cao, khám bệnh và các thông tin y tế khác của từng bệnh nhân ICU lớn tuổi. Nghiên cứu đánh giá dinh dưỡng này được thực hiện bởi nghiên cứu viên là bác sĩ y khoa tại Khoa Dinh dưỡng và nhân viên ICU Bệnh viện Đa khoa tỉnh Vĩnh Long. Sau đó, bạn sẽ được mời gặp nhân viên y tế và nhà nghiên cứu để được tư vấn và giáo dục thêm về dinh dưỡng; 2) Phỏng vấn khảo sát hướng dẫn về nhận thức và thực hành về chế độ dinh dưỡng hợp lý cho bệnh nhân lớn tuổi trong giai đoạn bệnh hiểm nghèo cho người chăm sóc/người thân bệnh nhân ICU bằng cách hỏi thông tin chung, kiến thức, nhận thức, thái độ của bệnh nhân, tình trạng dinh dưỡng và cả việc cho ăn trong giai đoạn bệnh nặng như sự tự tin của họ về việc cho ăn thích hợp đối với bệnh nhân lớn tuổi trong thời gian bệnh nặng. Dữ liệu cá nhân này sẽ được giữ bí mật và sẽ chỉ được tiết lộ trong phần tóm tắt của nhóm. Nếu cần thiết, một thông điệp cá nhân sẽ được trình bày dựa trên mục đích học thuật nhưng sử dụng mã hóa, không phải tên của người tham gia. Việc tham gia vào dự án này dựa trên sự tự nguyện của người tham gia; do đó, mỗi người tham gia có thể rời khỏi dự án bất cứ lúc nào mà không có hậu quả tiêu cực.

Dữ liệu từ dự án nghiên cứu này sẽ hữu ích cho các cơ quan y tế công cộng địa phương và các nhà hoạch định chính sách quốc gia để xây dựng các kế hoạch và giải pháp liên quan đến các vấn đề và nhu cầu về an ninh lương thực của địa phương. Nếu có bất kỳ thắc mắc nào, đừng ngần ngại liên hệ với Bệnh viện Đa khoa tỉnh Vĩnh Long tại thành phố Vĩnh Long.

Sự đồng ý của người tham gia :

Tôi đã được thông báo về các mục tiêu của dự án nghiên cứu, phương pháp thu thập dữ liệu và những bất lợi tiềm ẩn do sự tham gia của tôi và tôi hiểu rõ ràng. Nhà nghiên cứu đã đảm bảo với tôi rằng họ sẽ trả lời tất cả các câu hỏi mà tôi có thể có mà không tiết lộ bất kỳ điều gì, và tôi có quyền chấm dứt sự tham gia của mình và rời khỏi dự án nghiên cứu bất cứ lúc nào. Sự tham gia của tôi dựa trên sự tự nguyện của tôi và quyết định từ bỏ dự án của tôi sẽ không gây ra bất kỳ tác động tiêu cực nào đối với bản thân và gia đình tôi. Ngoài ra, nhà nghiên cứu đã đảm bảo với tôi rằng dữ liệu của tôi sẽ được giữ bí mật. Dữ liệu sẽ chỉ được trình bày dưới dạng báo cáo tóm tắt của nhóm. Dữ liệu của tôi có thể được trình bày dưới dạng một tin nhắn riêng lẻ chỉ cho mục đích học thuật nhưng với mã được chỉ định thay vì tên của tôi trên đó và dữ liệu đó không được gây ra bất kỳ tác động tiêu cực nào cho tôi.

Tôi đã đọc kỹ nội dung trên và hiểu rõ nội dung đó. Vì vậy, tôi muốn đồng ý tham gia và tôi muốn đồng ý cho phép các thành viên gia đình của tôi tham gia vào dự án này dựa trên sự sẵn sàng tham gia của tôi.

Chữ ký……Người giám hộ của ngu Chữ ký…….Người nghiên cứu tham gia

(……) (…….……..)

Ngày…… Ngày……

Appendix C

Consent Form (Phase 3)

(ICU patients and caregivers)

Project title: Malnutrition in older patients: constructing knowledge, perceptions, and solutions for an Intensive care setting in Vietnam

Informed consent date: Day……..……Month……Year……...

Brief description of the research project:

This project aimed to study 1) the nutrition status and practice of older patients in the ICU; 2) explore a suitable program for nutrition therapy. It includes data collection methods of approximately 50 older ICU patients who present malnutrition risk along with their caregiver/relatives by finish 20 minutes in-depth interview questionnaires 1) ICU older patients' Nutritional status and Nutrition Assessment by asking 50 relatives about situation and experience on daily nutrition intake in the past year up to present, as well as the anthropometric measurement of body weight and height, medical examination and other medical information of each older ICU patient. This nutritional assessment conduct by a researcher who is a medical doctor at the Department of Nutrition and ICU staff at Vinh Long General Hospital. After that, you will be invited to meet medical personnel and researcher for further nutrition consulting and education; 2) Survey interview guide on perceptions and practices regarding appropriate feeding for older patients during critical illnesses for ICU patients' caregivers/relatives by asking their general information, knowlegde, perception, the attitude of patient's illness, nutritional status and feeding during the critically ill stage as well as their self-efficacy of appropriate feeding for older patients during critical illnesses. This personal data will be kept confidential and will be disclosed only in a group summary. If necessary, an individual message will be presented based on an academic purpose but with the use of coding, not the participant's name. Participation in this project is based on the participants' willingness; therefore, each participant may quit the project at any point without negative consequences.

Data from this research project will be helpful for local public health authorities, and national policymakers to formulate plans and solutions relevant to local food security problems and needs. If there is any question, do not hesitate to contact the Vinh Long General Hospital at Vinh Long city.

Consent of the participant:

I have been informed about the research project objectives, data collection methods, and potential disadvantages resulting from my participation, and that I clearly understand. The researcher has assured me that he/she will answer all of the questions I may have without any disclosure, and I have the right to end my participation and quit the research project at any point in time. My participation is based on my willingness

and that my decision to quit the project will not cause any negative impact on myself and my family. In addition, the researcher has assured me that my data will be kept confidential. The data will only be presented as a group summary report. My data can be presented as an individual message only for an academic purpose but with an assigned code instead of my name on it, and that it must not cause me any negative impact.

I have read the above content thoroughly, and that I clearly understand it. Therefore, I would like to consent to participate, and I would like to give my consent to allow my family members to participate in this project based on my willingness to participate.

Signature……Guardian of the participa Signature…….Researcher

(…….) (……..)

Date……

Date……

Appendix D (Vietnamese version)

Giấy chấp thuận

(Bệnh nhân ICU và người chăm sóc)

Tên dự án: Suy dinh dưỡng ở bệnh nhân lớn tuổi: xây dựng kiến thức, nhận thức và giải pháp cho môi trường chăm sóc tích cực tại Việt Nam

Thông báo ngày đồng ý : Ngày……..……Tháng……Năm……...

Mô tả tóm tắt dự án nghiên cứu :

Dự án này nhằm mục đích nghiên cứu 1) tình trạng dinh dưỡng và thực hành của bệnh nhân lớn tuổi trong ICU; 2) khám phá một chương trình phù hợp cho liệu pháp dinh dưỡng. Nó bao gồm các phương pháp thu thập dữ liệu của khoảng 50 bệnh nhân ICU lớn tuổi có nguy cơ suy dinh dưỡng cùng với người chăm sóc/người thân của họ bằng cách hoàn thành bảng câu hỏi phỏng vấn sâu trong 20 phút 1) Tình trạng dinh dưỡng và Đánh giá dinh dưỡng của bệnh nhân lớn tuổi ICU bằng cách hỏi 50 người thân về tình hình và kinh nghiệm về lượng dinh dưỡng hàng ngày trong năm qua cho đến nay, cũng như đo lường nhân trắc học về cân nặng và chiều cao, khám bệnh và các thông tin y tế khác của từng bệnh nhân ICU lớn tuổi. Nghiên cứu đánh giá dinh dưỡng này được thực hiện bởi nghiên cứu viên là bác sĩ y khoa tại Khoa Dinh dưỡng và nhân viên ICU Bệnh viện Đa khoa tỉnh Vĩnh Long. Sau đó, bạn sẽ được mời gặp nhân viên y tế và nhà nghiên cứu để được tư vấn và giáo dục thêm về dinh dưỡng; 2) Phỏng vấn khảo sát hướng dẫn về nhận thức và thực hành về chế độ dinh dưỡng hợp lý cho bệnh nhân lớn tuổi trong giai đoạn bệnh hiểm nghèo cho người chăm sóc/người thân bệnh nhân ICU bằng cách hỏi thông tin chung, kiến thức, nhận thức, thái độ của bệnh nhân, tình trạng dinh dưỡng và cả việc cho ăn trong giai đoạn bệnh nặng như sự tự tin của họ về việc cho ăn thích hợp đối với bệnh nhân lớn tuổi trong thời gian bệnh nặng. Dữ liệu cá nhân này sẽ được giữ bí mật và sẽ chỉ được tiết lộ trong phần tóm tắt của nhóm. Nếu cần thiết, một thông điệp cá nhân sẽ được trình bày dựa trên mục đích học thuật nhưng sử dụng mã hóa, không phải tên của người tham gia. Việc tham gia vào dự án này dựa trên

sự tự nguyện của người tham gia; do đó, mỗi người tham gia có thể rời khỏi dự án bất cứ lúc nào mà không có hậu quả tiêu cực.

Dữ liệu từ dự án nghiên cứu này sẽ hữu ích cho các cơ quan y tế công cộng địa phương và các nhà hoạch định chính sách quốc gia để xây dựng các kế hoạch và giải pháp liên quan đến các vấn đề và nhu cầu về an ninh lương thực của địa phương. Nếu có bất kỳ thắc mắc nào, đừng ngần ngại liên hệ với Bệnh viện Đa khoa tỉnh Vĩnh Long tại thành phố Vĩnh Long.

Sự đồng ý của người tham gia :

Tôi đã được thông báo về các mục tiêu của dự án nghiên cứu, phương pháp thu thập dữ liệu và những bất lợi tiềm ẩn do sự tham gia của tôi và tôi hiểu rõ ràng. Nhà nghiên cứu đã đảm bảo với tôi rằng họ sẽ trả lời tất cả các câu hỏi mà tôi có thể có mà không tiết lộ bất kỳ điều gì, và tôi có quyền chấm dứt sự tham gia của mình và rời khỏi dự án nghiên cứu bất cứ lúc nào. Sự tham gia của tôi dựa trên sự tự nguyện của tôi và quyết định từ bỏ dự án của tôi sẽ không gây ra bất kỳ tác động tiêu cực nào đối với bản thân và gia đình tôi. Ngoài ra, nhà nghiên cứu đã đảm bảo với tôi rằng dữ liệu của tôi sẽ được giữ bí mật. Dữ liệu sẽ chỉ được trình bày dưới dạng báo cáo tóm tắt của nhóm. Dữ liệu của tôi có thể được trình bày dưới dạng một tin nhắn riêng lẻ chỉ cho mục đích học thuật nhưng với mã được chỉ định thay vì tên của tôi trên đó và dữ liệu đó không được gây ra bất kỳ tác động tiêu cực nào cho tôi.

Tôi đã đọc kỹ nội dung trên và hiểu rõ nội dung đó. Vì vậy, tôi muốn đồng ý tham gia và tôi muốn đồng ý cho phép các thành viên gia đình của tôi tham gia vào dự án này dựa trên sự sẵn sàng tham gia của tôi.

Chữ ký……Người giám hộ của ngu Chữ ký……Người nghiên cứu tham gia

(……) (……..)

Ngày…… Ngày……

Appendix E

Consent Form

(ICU staff)

Project title: Malnutrition in older patients: constructing knowledge, perceptions, and solutions for an Intensive care setting in Vietnam

Informed consent date: Day……..……Month……Year……...

Brief description of the research project:

This project aimed to study 1) the nutrition status and practice of older patients in the ICU; 2) explore a suitable program for nutrition therapy. It includes data collection methods of knowledge, perception, attitude, and current practices of 30-50 ICU staff in nutritional therapy to older critically ill patients by 10 minutes online/ printed-off survey. This questionnaire includes general information, knowledge, perceptions about the seriousness of malnutrition in clinical outcomes, screening and assessing nutrition status, and the self-efficiency to practice medical nutrition support for older critically ill patients. After the interview, the ICU staff will be invited to a workshop about enhancing the best evidence nutrition therapy practice to provide adequate energy and nutrients intake of older ICU patients. This personal data will be kept confidential and will be disclosed only in a group summary. If necessary, an individual message will be presented based on an academic purpose but with the use of coding, not the participant's name. Participation in this project is based on the participants' willingness; therefore, each participant may quit the project at any point without negative consequences.

Data from this research project will be helpful for local public health authorities, and national policymakers to formulate plans and solutions relevant to

local food security problems and needs. If there is any question, do not hesitate to contact the Vinh Long General Hospital at Vinh Long city.

Consent of the participant:

I have been informed about the research project objectives, data collection methods, and potential disadvantages resulting from my participation, and that I clearly understand. The researcher has assured me that he/she will answer all of the questions I may have without any disclosure, and I have the right to end my participation and quit the research project at any point in time. My participation is based on my willingness and that my decision to quit the project will not cause any negative impact on myself and my family. In addition, the researcher has assured me that my data will be kept confidential. The data will only be presented as a group summary report. My data can be presented as an individual message only for an academic purpose but with an assigned code instead of my name on it, and that it must not cause me any negative impact.

I have read the above content thoroughly, and that I clearly understand it. Therefore, I would like to consent to participate in this project based on my willingness to participate.

Signature……Guardian of the participa Signature…….Researcher

(…….) (……..)

Date……

Date……

Appendix F (Vietnamese version)

Giấy chấp thuận

(Nhân viên ICU)

Tên dự án: Suy dinh dưỡng ở bệnh nhân lớn tuổi: xây dựng kiến thức, nhận thức và giải pháp cho môi trường chăm sóc tích cực tại Việt Nam

Thông báo ngày đồng ý : Ngày……..……Tháng……Năm……...

Mô tả tóm tắt dự án nghiên cứu :

Dự án này nhằm mục đích nghiên cứu 1) tình trạng dinh dưỡng và thực hành của bệnh nhân lớn tuổi trong ICU; 2) khám phá một chương trình phù hợp cho liệu pháp dinh dưỡng. Nó bao gồm các phương pháp thu thập dữ liệu về kiến thức, nhận thức, thái độ và thực hành hiện tại của 30-50 nhân viên ICU trong liệu pháp dinh dưỡng cho bệnh nhân lớn tuổi bị bệnh nặng trong 10 phút trực tuyến/bản in khảo sát . Bảng câu hỏi này bao gồm thông tin chung, kiến thức, nhận thức về mức độ nghiêm trọng của suy dinh dưỡng trong kết quả lâm sàng, sàng lọc và đánh giá tình trạng dinh dưỡng, và hiệu quả của bản thân trong thực hành hỗ trợ dinh dưỡng y tế cho bệnh nhân lớn tuổi mắc bệnh nặng. Sau cuộc phỏng vấn, nhân viên ICU sẽ được mời tham dự hội thảo về việc tăng cường thực hành trị liệu dinh dưỡng bằng chứng tốt nhất để cung cấp đủ năng lượng và chất dinh dưỡng cho bệnh nhân ICU lớn tuổi. Dữ liệu cá nhân này sẽ được giữ bí mật và sẽ chỉ được tiết lộ trong phần tóm tắt của nhóm. Nếu cần thiết, một thông điệp cá nhân sẽ được trình bày dựa trên mục đích học thuật nhưng sử dụng mã hóa, không phải tên của người tham gia. Việc tham gia vào dự án này dựa trên sự tự nguyện của người tham gia; do đó, mỗi người tham gia có thể rời khỏi dự án bất cứ lúc nào mà không có hậu quả tiêu cực.

Dữ liệu từ dự án nghiên cứu này sẽ hữu ích cho các cơ quan y tế công cộng địa phương và các nhà hoạch định chính sách quốc gia để xây dựng các kế hoạch và giải pháp liên quan đến các vấn đề và nhu cầu về an ninh lương thực của địa phương. Nếu

có bất kỳ thắc mắc nào, đừng ngần ngại liên hệ với Bệnh viện Đa khoa tỉnh Vĩnh Long tại thành phố Vĩnh Long.

Sự đồng ý của người tham gia :

Tôi đã được thông báo về các mục tiêu của dự án nghiên cứu, phương pháp thu thập dữ liệu và những bất lợi tiềm ẩn do sự tham gia của tôi và tôi hiểu rõ ràng. Nhà nghiên cứu đã đảm bảo với tôi rằng họ sẽ trả lời tất cả các câu hỏi mà tôi có thể có mà không tiết lộ bất kỳ điều gì, và tôi có quyền chấm dứt sự tham gia của mình và rời khỏi dự án nghiên cứu bất cứ lúc nào. Sự tham gia của tôi dựa trên sự tự nguyện của tôi và quyết định từ bỏ dự án của tôi sẽ không gây ra bất kỳ tác động tiêu cực nào đối với bản thân và gia đình tôi. Ngoài ra, nhà nghiên cứu đã đảm bảo với tôi rằng dữ liệu của tôi sẽ được giữ bí mật. Dữ liệu sẽ chỉ được trình bày dưới dạng báo cáo tóm tắt của nhóm. Dữ liệu của tôi có thể được trình bày dưới dạng một tin nhắn riêng lẻ chỉ cho mục đích học thuật nhưng với mã được chỉ định thay vì tên của tôi trên đó và dữ liệu đó không được gây ra bất kỳ tác động tiêu cực nào cho tôi.

Tôi đã đọc kỹ nội dung trên và hiểu rõ nội dung đó. Vì vậy, tôi muốn đồng ý tham gia vào dự án này dựa trên sự sẵn sàng tham gia của tôi.

Chữ ký……Người giám hộ của ngu Chữ ký……Người nghiên cứu tham gia

(……) (……..)

Ngày…… Ngày……

Appendix J

MAHASARAKHAM UNIVERSITY ETHICS COMMITTEE FOR
RESEARCH INVOLVING HUMAN SUBJECTS

Certificate of Approval

Approval number: 055-359/2022

Title : Malnutrition in older patients: constructing knowledge, perceptions, and solutions for an intensive care setting in Vietnam.

Principal Investigator : Miss Le Lam Tuyet Duy
Responsible Department : Faculty of Medicine
Research site : Vietnam

Review Method : Expedited Review

Date of Manufacture : 18 February 2022 **expire :** 17 February 2023

This research application has been reviewed and approved by the Ethics Committee for Research Involving Human Subjects, Mahasarakham University, Thailand. Approval is dependent on local ethical approval having been received. Any subsequent changes to the consent form must be re-submitted to the Committee.

Ratree S.

(Asst. Prof. Ratree Sawangjit)
Chairman

Approval is granted subject to the following conditions: (see back of this Certificate)

Appendix H

Tool 1

Survey interview guide on perceptions, self-efficacy and practices regarding appropriate feeding for critical ill older patients of the caregivers

(Pre-test and Post-test)

This survey interview guide (Tool 1) is aimed to assess for pre-test and post-test of the before and after receiving the Nutrition Education Program (NEP) regarding perceptions, self-efficacy and practices regarding appropriate feeding for critical ill older patients of the caregivers. The tool comprises 4 parts with a total of 50 questions:

A. General information, background, and relation to the patient on part of the caregiver (8 questions);

B. Perceptions of patient's illness, nutritional status and feeding during the critically ill stage (importance of older feeding in the critical ill stage, type, frequency, quality and quantity of feeding) (15 questions);

C. Self-efficacy of appropriate feeding for older patients during critical illnesses (15 questions).

D. Practices prior to ICU admission and intention to perform feeding practices after discharge from hospital (number of meals, quality and quantity of actual provided meals daily, sources, prices), as well as problems and solutions in provisioning of appropriate feeding meals for the patients (8 questions)

Survey interview guide on perceptions, self-efficacy and practices regarding

appropriate feeding for critical ill older patients of the caregivers

Please complete the following questions to the best of your ability. It should only take a few minutes of your time. Thank you for taking the time to complete this questionnaire. (Online via Google form or printed document)

A. GENERAL INFORMATION

Instruction: *This part contains questions about general personal information of the participants who were formal guardienne or caregiver of the patient.*

1. Sex ☐ 1. Female ☐ 2. Male ☐ 3. Other (specify)…….

2. Age in full year ☐☐ years

3. Education

☐ 1. No education ☐ 2. Primary level (Grade 1-6) ☐ 3. Junior high school level

☐ 4. High school/Certificate ☐ 5. Some college education ☐ 6. Others (specify) .....

4. Marital status

☐ 1. Single ☐ 2. Married ☐ 3. Widowed ☐ 4. Divorced ☐ 5. Separated ☐ 6. Others...

5. Major occupations (Occupation that takes up most of the time to perform) (One answer, please)

☐ 1. No occupation ☐ 2. Agriculturalist ☐ 3. Trading ☐ 4. Fisherman

☐ 5. Labor in agri-farm ☐ 6. Construction labor ☐ 7. Shop workers ☐ 8. Factory workers

☐ 9. Office workers ☐ 10. State enterpris officer ☐ 11.Government officer ☐ 12. Others……

6.Relation to the patient and living arrangement prior to admissio

6.1 Relation to the patient

☐ 1. Husband or wife ☐ 2. Daughter or son ☐ 3. Grand-daughter or grand-son

☐ 4. Brother or sister ☐ 5. Relative ☐ 6. Other (specify)……..…….

6.2. Living with the patient in the same house prior to admission☐ 1.Yes ☐ 2. No (specify)…..

7. Income of the caregiver from all sources ……vnd/year

8. Current condition/status of the patient on the post-NEP

☐ 1. ICU patient ☐ 2. Move to other hospital ward ☐ 2. Discharge (specify)……...

B. PERCEPTIONS OF NUTRITON RELATED TO CRITICALLY ILL OLDER PATIENT

Instruction: *Please indicate one best answer for each question based on your perception regarding nutrition of the critically ill older patient, from "1" for strongly disagree, "2" for somewhat disagree, "3" for neutral, "4" for somewhat agree, to "5" for strongly agree for the positive questions and the reversed scales are applied for the negative ones.*

No	Statement	Strongly agree (5)	Somewhat agree (4)	Neutral (3)	Somewhat disagree (2)	Strongly disagree (1)
9.	ICU older patient generally has risk of malnutrition.	☐	☐	☐	☐	☐
10.	Food and nutrient are very important to improve treatment results of critical ill older patients.	☐	☐	☐	☐	☐
11.	Critically illness and inadequate dietary intake can worsen older patients' outcomes.	☐	☐	☐	☐	☐

No	Statement	Strongly agree (5)	Somewhat agree (4)	Neutral (3)	Somewhat disagree (2)	Strongly disagree (1)
12.	I know how to calculate the amount of daily energy intake for older adult.	☐	☐	☐	☐	☐
13.	I know how to calculate the required daily nutrients for older adult.	☐	☐	☐	☐	☐
14.	I know about five food groups suitable for older adults.					
15.	I know which food is rich in complex carbohydrate suitable for older adults.	☐	☐	☐	☐	☐
16.	I know which food is rich in protein suitable for older adults.	☐	☐	☐	☐	☐
17.	I know which food contains high lipid or fat which is not suitable for older adults.	☐	☐	☐	☐	☐
18.	I know which food is rich in sodium.	☐	☐	☐	☐	☐
19.	I know which food is rich in micronutrients and minerals.	☐	☐	☐	☐	☐
20.	I know which food is rich in fiber that is good for older adults.	☐	☐	☐	☐	☐
21.	I know which food has high glycemic index.	☐	☐	☐	☐	☐

No	Statement	Strongly agree (5)	Somewhat agree (4)	Neutral (3)	Somewhat disagree (2)	Strongly disagree (1)
22.	I know the recommended food pyramid for older adults.	☐	☐	☐	☐	☐
23.	I know how to make blenderized food for older adult.	☐	☐	☐	☐	☐
24.	I know how to read food labels correctly.	☐	☐	☐	☐	☐
25.	I know that high energy commercial food products such as ……are not good for health.	☐	☐	☐	☐	☐
26.	I know that body weight loss is common in older adults.	☐	☐	☐	☐	☐
27.	I think nutrition education for critically ill older adults provided by ICU staff is essential.	☐	☐	☐	☐	☐

A. SELF-EFFICACY OF PROVIDING APPROPRIATE FEEDING FOR OLDER ICU PATIENT

Instruction: *Please indicate one best answer for each question based on your perception regarding nutrition of the critically ill older patient, from "1" for strongly disagree, "2" for somewhat disagree, "3" for neutral, "4" for somewhat agree, to "5" for strongly agree.*

No	Statement	Strongly agree (5)	Somewhat agree (4)	Neutral (3)	Somewhat disagree(2)	Strongly disagree (1)
28.	I feel confidence to provide enough amount of food daily suitable for dietary needs of the older patient while in hospital.	☐	☐	☐	☐	☐
29.	I feel confidence to provide nutritious food daily suitable for nutrient intake of the older patient while in hospital.	☐	☐	☐	☐	☐
30.	I feel confidence to cook standard blenderized food suitable for older patient daily while in hospital.	☐	☐	☐	☐	☐
31.	I feel confidence to choose quality food for older patient from correctly reading food labels.	☐	☐	☐	☐	☐
32.	I feel confidence to cook enough amount of food suitable for daily nutrient intake of	☐	☐	☐	☐	☐

No	Statement	Strongly agree (5)	Somewhat agree (4)	Neutral (3)	Somewhat disagree(2)	Strongly disagree (1)
	an older adult after discharge.					
33.	I feel confidence to help an older patient to eat suitable complex carbohydrate daily after discharge.	☐	☐	☐	☐	☐
34.	I feel confidence to help an older patient to eat enough protein daily after discharge.	☐	☐	☐	☐	☐
35.	I feel confidence to help an older patient to eat less fatty food daily after discharge.	☐	☐	☐	☐	☐
36.	I feel confidence to help an older patient to eat less sodium daily after discharge.	☐	☐	☐	☐	☐
37.	I feel confidence to help an older patient to eat high fiber food daily after discharge.	☐	☐	☐	☐	☐
38.	I feel confidence to check body weight loss of an older patient after discharge.	☐	☐	☐	☐	☐

No	Statement	Strongly agree (5)	Somewhat agree (4)	Neutral (3)	Somewhat disagree(2)	Strongly disagree (1)
39.	I feel confidence to enhance the appetite of an older patient after discharge.	☐	☐	☐	☐	☐
40.	I feel confidence to help older patient to eat food suitable for his/her chronic disease.	☐	☐	☐	☐	☐
41.	I feel confidence to avoid giving high energy commercial food products such as……..to older patient.	☐	☐	☐	☐	☐
42.	I feel confidence to provide support to enhance nutrition status of an older patient.					

D. NUTRITION RELATED PRACTICES PRIOR TO ADMISSION AND INTENTION TO PRACTICE AFTER DISCHARGE

Instruction: *Please rate each statement based on your practices regarding feeding and provisioning of nutrition care to the critically ill older patients in the past two months prior to ICU admission-pre-test (or your intention to practice regarding feeding and*

provisioning of nutrition care after the patient is discharged-post-test). Please give the following:

"4" for always meaning practice every day or nearly every day, 6-7 days a week or every time

"3" for often meaning practice 4-5 days a week or almost all the time

"2" for sometimes meaning practice 1-3 days or less frequent but still so practice

"1" for never meaning not practice such a behavior at all

"1" "N/A" for not applicable meaning such a practice is irrelevant for your situation

No	Statement	Always (4)	Often (3)	Some times(2)	Never (1)	N/A (1)
43.	I (intend to)* read the food labels before purchasing food for the patient.	☐	☐	☐	☐	☐
44.	I (intend to)* cooked food for the patient.	☐	☐	☐	☐	☐
45.	I (intend to)* checked the patient's "body weight."	☐	☐	☐	☐	☐
46.	I (intend to)* checked the patient's appetite.	☐	☐	☐	☐	☐
47.	I (intend to)* provided food to the patient based on his/her preference.	☐	☐	☐	☐	☐
48.	I (intend to)* provided food to the patient suitable for his/her disease condition.	☐	☐	☐	☐	☐
49.	I (intend to)* provided food to the patient suitable for his/her daily energy intake.	☐	☐	☐	☐	
50	I (intend to)* provided food to the patient suitable for his/her daily nutrient intake.	☐	☐	☐	☐	

Remark or Note: *additional statement for post-test

Appendix J (Vietnamese version)

Công cụ 1

Hướng dẫn phỏng vấn khảo sát về nhận thức, năng lực bản thân và thực hành liên quan đến chế độ ăn thích hợp cho bệnh nhân lớn tuổi bị bệnh nặng điều trị tại ICU của thân nhân bệnh nhân.

(Pre-test and Post-test)

Hướng dẫn phỏng vấn khảo sát này (Công cụ 1) nhằm đánh giá trước và sau khi nhận Chương trình Giáo dục Dinh dưỡng (NEP) về nhận thức, năng lực bản thân và thực hành liên quan đến chế độ ăn phù hợp cho bệnh nhân lớn tuổi bị bệnh nặng của thân nhân. Công cụ này bao gồm 4 phần với tổng số 50 câu hỏi:

A. Thông tin chung, lý lịch và mối quan hệ với bệnh nhân của người chăm sóc (8 câu hỏi);

B. Nhận thức về bệnh tật, tình trạng dinh dưỡng và cách nuôi dưỡng của bệnh nhân trong giai đoạn bệnh nặng (tầm quan trọng của việc cho ăn ở giai đoạn bệnh nặng, loại, tần suất, chất lượng và số lượng cho ăn) (15 câu hỏi);

C. Năng lực bản thân về việc nuôi dưỡng thích hợp cho bệnh nhân lớn tuổi khi bệnh nặng (15 câu hỏi).

D. Thực hành trước khi nhập viện ICU và ý định thực hiện cho ăn sau khi xuất viện (số bữa ăn, chất lượng và số lượng bữa ăn thực tế được cung cấp hàng ngày, nguồn, giá cả), cũng như các vấn đề và giải pháp trong việc cung cấp bữa ăn phù hợp cho bệnh nhân (8 câu hỏi)

Hướng dẫn phỏng vấn khảo sát về nhận thức, năng lực bản thân và thực hành liên quan đến chế độ ăn thích hợp cho bệnh nhân lớn tuổi bị bệnh nặng điều trị tại ICU của thân nhân bệnh nhân.

Vui lòng hoàn thành các câu hỏi sau với khả năng tốt nhất của bạn. Nó sẽ chỉ mất một vài phút, cảm ơn bạn đã dành thời gian để hoàn thành bảng câu hỏi này. (Trực tuyến qua Google form hoặc tài liệu in)

A. THÔNG TIN CHUNG

Hướng dẫn: *Phần này bao gồm các câu hỏi về thông tin cá nhân chung của những người tham gia là người đại diện chính thức hoặc người chăm sóc bệnh nhân.*

1. Giới tính ☐ 1. Nữ ☐ 2. Nam ☐ 3. Khác (ghi rõ)…….

2. Tuổi ☐☐ tuổi

3. Trình độ học vấn

☐ 1. Không biết chữ ☐ 2. Tiểu học (Lớp 1-5) ☐ 3. Trung học cơ cở

☐ 4. Trung học phổ thông ☐ 5. Cao đẳng/ Đại học ☐ 6. Khác (ghi rõ) .....

4. Tình trạng hôn nhân

☐ 1. Độc thân ☐ 2. Đã kết hôn ☐ 3. Goá bụa ☐ 4. Ly hôn ☐ 5. Ly thân ☐ 6. Khác...

5. Nghề nghiệp chính (Nghề nghiệp chiếm phần lớn thời gian để thực hiện) (Xin trả lời một câu)

☐ 1. Thất nghiệp ☐ 2. Nông dân ☐ 3. Buôn bán ☐ 4. Ngư dân

☐ 5. Lao động nông nghiệp thời vụ ☐ 6. Công nhân xây dựng ☐ 7. Nhân viên bán hàng ☐ 8. Công nhân nhà máy

☐ 9. Văn phòng ☐ 10. Nhân viên doanh nghiệp Nhà nước ☐ 11.Nhân viên chính phủ ☐ 12. Khác……

6. Mối quan hệ với bệnh nhân và mức sống trước khi nhập viện

6.1 Quan hệ với bệnh nhân

☐ 1. Chồng/Vợ ☐ 2. Con ruột ☐ 3. Cháu gái/trai

☐ 4. Anh/Chị ☐ 5. Họ hàng ☐ 6. Khác ……..…….

6.2. Sống chung nhà với bệnh nhân trước khi nhập viện ☐ 1.Có ☐ 2. Không

7. Tổng thu nhập của thân nhân ……vnd/năm

8. Tình trạng của bệnh nhân sau khi can thiệp NEP

☐ 1. Vẫn điều trị tại ICU ☐ 2. Chuyển khoa khác ☐ 3. Xuất viện……...

B. NHẬN THỨC VỀ BỆNH TẬT, TÌNH TRẠNG DINH DƯỠNG VÀ CÁCH NUÔI DƯỠNG CỦA BỆNH NHÂN TRONG GIAI ĐOẠN NẶNG

Hướng dẫn: *Vui lòng chọn một câu trả lời tốt nhất cho mỗi câu hỏi dựa trên nhận thức của bạn về chế độ dinh dưỡng của bệnh nhân lớn tuổi bị bệnh nặng, từ "1" là hoàn toàn không đồng ý, "2" là một phần không đồng ý, "3" là trung tính, "4" là một phần đồng ý , đến "5" để đồng ý hoàn toàn cho các câu hỏi khẳng định và thang đo đảo ngược được áp dụng cho câu hỏi phủ định.*

STT	Ý KIẾN	Hoàn toàn đồng ý (5)	Một phần đồng ý (4)	Trung lập (3)	Một phần không đồng ý (2)	Hoàn toàn không đồng ý (1)
9.	Bệnh nhân ICU lớn tuổi thường có nguy cơ suy dinh dưỡng.	☐	☐	☐	☐	☐
10.	Thức ăn và chất dinh dưỡng rất quan trọng để cải thiện kết quả điều trị của những bệnh nhân lớn tuổi bị bệnh hiểm nghèo.	☐	☐	☐	☐	☐

STT	Ý KIẾN	Hoàn toàn đồng ý (5)	Một phần đồng ý (4)	Trung lập (3)	Một phần không đồng ý (2)	Hoàn toàn không đồng ý (1)
11.	Bệnh nặng và chế độ ăn uống không đủ chất có thể làm trầm trọng thêm kết quả của bệnh nhân lớn tuổi.	☐	☐	☐	☐	☐
12.	Tôi biết cách tinh tổng năng lượng cần thiết cho bệnh nhân lớn tuổi.	☐	☐	☐	☐	☐
13.	Tôi biết tính thành phần dinh dưỡng cần thiết hằng ngày cho bệnh nhân lớn tuổi.	☐	☐	☐	☐	☐
14.	Tôi biết về năm nhóm thực phẩm thích hợp cho người lớn tuổi.					
15.	Tôi biết thực phẩm nào giàu bột đường thích hợp cho bệnh nhân lớn tuổi.	☐	☐	☐	☐	☐
16.	Tôi biết thực phẩm nào giàu đạm thích hợp cho bệnh nhân lớn tuổi.	☐	☐	☐	☐	☐
17.	Tôi biết thực phẩm nào giàu chất béo thích hợp cho bệnh nhân lớn tuổi.	☐	☐	☐	☐	☐
18.	Tôi biết thực phẩm nào giàu muối.	☐	☐	☐	☐	☐

STT	Ý KIẾN	Hoàn toàn đồng ý (5)	Một phần đồng ý (4)	Trung lập (3)	Một phần không đồng ý (2)	Hoàn toàn không đồng ý (1)
19.	Tôi biết thực phẩm nào giàu vitamin, nguyên tố vi lượng và khoáng chất thích hợp cho bệnh nhân lớn tuổi.	☐	☐	☐	☐	☐
20.	Tôi biết thực phẩm nào giàu chất xơ thích hợp cho bệnh nhân lớn tuổi.	☐	☐	☐	☐	☐
21.	Tôi biết thực phẩm nào có chỉ số đường huyết cao.	☐	☐	☐	☐	☐
22.	Tôi biết về tháp dinh dưỡng khuyến nghị cho người lớn tuổi.	☐	☐	☐	☐	☐
23.	Tôi biết cách nấu súp xay cho bệnh nhân lớn tuổi	☐	☐	☐	☐	☐
24.	Tôi biết cách đọc nhãn thực phẩm.	☐	☐	☐	☐	☐
25.	Tôi biết rằng các sản phẩm thực phẩm thương mại có năng lượng cao như bánh ngọt, đồ đóng hộp,…không tốt cho sức khỏe.	☐	☐	☐	☐	☐
26.	Tôi biết rằng giảm trọng lượng cơ thể là phổ biến ở người lớn tuổi.	☐	☐	☐	☐	☐

STT	Ý KIẾN	Hoàn toàn đồng ý (5)	Một phần đồng ý (4)	Trung lập (3)	Một phần không đồng ý (2)	Hoàn toàn không đồng ý (1)
27.	Tôi nghĩ rằng giáo dục dinh dưỡng cho người lớn tuổi bị bệnh nặng do nhân viên ICU cung cấp là điều cần thiết.	☐	☐	☐	☐	☐

C. NĂNG LỰC BẢN THÂN VỀ VIỆC NUÔI DƯỠNG THÍCH HỢP CHO BỆNH NHÂN LỚN TUỔI BỆNH NẶNG

Hướng dẫn: *Vui lòng chọn một câu trả lời tốt nhất cho mỗi câu hỏi dựa trên nhận thức của bạn về chế độ dinh dưỡng của bệnh nhân lớn tuổi bị bệnh nặng, từ "1" là hoàn toàn không đồng ý, "2" là một phần không đồng ý, "3" là trung tính, "4" là một phần đồng ý , đến "5" để đồng ý hoàn toàn cho các câu hỏi khẳng định và thang đo đảo ngược được áp dụng cho câu hỏi phủ định.*

STT	Ý KIẾN	Hoàn toàn đồng ý (5)	Một phần đồng ý (4)	Trung lập (3)	Một phần không đồng ý (2)	Hoàn toàn không đồng ý (1)
28.	Tôi tự tin cung cấp đủ tổng năng lượng hàng ngày phù hợp với nhu cầu năng lượng của người bệnh lớn tuổi khi nằm viện.	☐	☐	☐	☐	☐
29.	Tôi tự tin cung cấp thực phẩm với thành phần dinh dưỡng hàng ngày phù hợp với nhu	☐	☐	☐	☐	☐

STT	Ý KIẾN	Hoàn toàn đồng ý (5)	Một phần đồng ý (4)	Trung lập (3)	Một phần không đồng ý (2)	Hoàn toàn không đồng ý (1)
	cầu của bệnh nhân lớn tuổi khi nằm viện.					
30.	Tôi cảm thấy tự tin để nấu súp xay tiêu chuẩn hàng ngày phù hợp với bệnh nhân lớn tuổi khi nằm viện.	☐	☐	☐	☐	☐
31.	Tôi cảm thấy tự tin để chọn thực phẩm chất lượng cho bệnh nhân lớn tuổi từ việc đọc đúng nhãn thực phẩm	☐	☐	☐	☐	☐
32.	Tôi cảm thấy tự tin để nấu đủ lượng thức ăn phù hợp với lượng dinh dưỡng hàng ngày của một người lớn tuổi sau khi xuất viện.	☐	☐	☐	☐	☐
33.	Tôi cảm thấy tự tin khi giúp một bệnh nhân lớn tuổi hàng ngày ăn đủ lượng bột đường phù hợp sau khi xuất viện.	☐	☐	☐	☐	☐
34.	Tôi cảm thấy tự tin khi giúp một bệnh nhân lớn tuổi hàng ngày ăn đủ lượng đạm phù hợp sau khi xuất viện	☐	☐	☐	☐	☐
35.	Tôi cảm thấy tự tin khi giúp một bệnh nhân lớn tuổi hàng	☐	☐	☐	☐	☐

STT	Ý KIẾN	Hoàn toàn đồng ý (5)	Một phần đồng ý (4)	Trung lập (3)	Một phần không đồng ý (2)	Hoàn toàn không đồng ý (1)
	tuổi ăn ít chất béo hơn phù hợp sau khi xuất viện.					
36.	Tôi cảm thấy tự tin khi giúp một bệnh nhân lớn tuổi hàng tuổi ăn ít muối hơn phù hợp sau khi xuất viện	☐	☐	☐	☐	☐
37.	Tôi cảm thấy tự tin khi giúp một bệnh nhân lớn tuổi hàng tuổi ăn nhiều chất xơ hơn phù hợp sau khi xuất viện.	☐	☐	☐	☐	☐
38.	Tôi cảm thấy tự tin khi kiểm tra tình trạng giảm trọng lượng cơ thể của một bệnh nhân lớn tuổi sau khi xuất viện.	☐	☐	☐	☐	☐
39.	Tôi cảm thấy tự tin để cải thiện sự thèm ăn của một bệnh nhân lớn tuổi sau khi xuất viện.	☐	☐	☐	☐	☐
40.	Tôi cảm thấy tự tin khi giúp bệnh nhân lớn tuổi ăn thức ăn phù hợp với bệnh mãn tính của mình.	☐	☐	☐	☐	☐
41.	Tôi cảm thấy tự tin để tránh sử dụng các sản phẩm thực phẩm thương mại có năng lượng cao	☐	☐	☐	☐	☐

STT	Ý KIẾN	Hoàn toàn đồng ý (5)	Một phần đồng ý (4)	Trung lập (3)	Một phần không đồng ý (2)	Hoàn toàn không đồng ý (1)
	như bánh ngọt, đồ đóng hộp,…cho bệnh nhân lớn tuổi.					
42.	Tôi cảm thấy tự tin khi cung cấp hỗ trợ để cải thiện tình trạng dinh dưỡng của một bệnh nhân lớn tuổi.					

D. THỰC HÀNH TRƯỚC KHI NHẬP ICU VÀ Ý ĐỊNH THỰC HIỆN SAU KHI XUẤT VIỆN LIÊN QUAN ĐẾN CUNG CẤP DINH DƯỠNG HỢP LÝ CHO BỆNH NHÂN LỚN TUỔI BỆNH NẶNG.

Hướng dẫn: *Vui lòng đánh giá từng ý kiến dựa trên thực tiễn của bạn về việc cho ăn và chăm sóc dinh dưỡng cho những bệnh nhân lớn tuổi bị bệnh nặng trong hai tháng trước khi kiểm tra trước khi nhập viện ICU (hoặc ý định của bạn thực hành liên quan đến việc cho ăn và cung cấp dịch vụ chăm sóc dinh dưỡng sau bệnh nhân được xuất viện). Vui lòng cung cấp thông tin sau:*

"4" luôn có nghĩa là luyện tập hàng ngày hoặc gần như mỗi ngày, 6-7 ngày một tuần hoặc mọi lúc

"3" thường có nghĩa là luyện tập 4-5 ngày một tuần hoặc hầu như tất cả thời gian

"2" đôi khi có nghĩa là luyện tập 1-3 ngày hoặc ít thường xuyên hơn nhưng vẫn nên luyện tập

"1" không bao giờ có nghĩa là hoàn toàn không thực hành một hành vi như vậy

"1" "Không áp dụng" nghĩa là không áp dụng được, cách làm như vậy không phù hợp với tình huống của bạn

STT	Ý KIẾN	Luôn luôn (4)	Thường xuyên (3)	Đôi khi (2)	Không bao giờ (1)	Không phù hợp (1)
43.	Tôi (dự định) * đọc nhãn thực phẩm trước khi mua thực phẩm cho bệnh nhân.	☐	☐	☐	☐	☐
44.	Tôi (định) * nấu ăn cho bệnh nhân.	☐	☐	☐	☐	☐
45.	Tôi (dự định) * đã kiểm tra "trọng lượng cơ thể" của bệnh nhân.	☐	☐	☐	☐	☐
46.	Tôi (dự định) * đã kiểm tra sự thèm ăn của bệnh nhân.	☐	☐	☐	☐	☐
47.	Tôi (dự định) * cung cấp thức ăn cho bệnh nhân dựa trên sở thích của họ.	☐	☐	☐	☐	☐
48.	Tôi (dự định) * cung cấp thức ăn cho bệnh nhân phù hợp với tình trạng bệnh của họ.	☐	☐	☐	☐	☐
49.	Tôi (dự định) * cung cấp thức ăn cho bệnh nhân phù hợp với năng lượng cần thiết hàng ngày của họ.	☐	☐	☐	☐	
50	Tôi (dự định) * cung cấp thức ăn cho bệnh nhân phù hợp với lượng chất dinh dưỡng hàng ngày của họ	☐	☐	☐	☐	

Nhận xét hoặc Lưu ý: * tuyên bố bổ sung cho post-test

Chân thành cảm ơn những đóng góp của anh/chị!

Appendix K

Tool 2

Nutritional Status and Clinical Assessment Form of ICU older patients

(Pre-test and Post-test)

Objective 1: To investigate nutritional statuses, feeding practice situation related to clinical outcomes of the critically ill elderly patients in ICU

Description: The recording form used in this study was developed and modified from the current nutrition in ICU guidelines, such as ESPEN, ASPEN, Asia pacific and Vietnam to be applied for nutritional status and clinical assessment of ICU older patients in Vinh Long General Hospital. The form comprises four parts covering patient's general information and family background; nutritional status assessment, received nutritional therapeutic practices; clinical outcomes; laboratory test results on admission day, day 4, day 7 and discharge day.

A. GENERAL INFORMATION: Patient's basic information and family background include parts of Health quality of life - WHO; information in this part will be collected from the medical record of each patient.

B. MEDICAL INFORMATION includes department prior to ICU admission, date of ICU admission, cause of admission, diagnosis, vital conditions at time of admission and other clinical information; information in this part will be collected from the medical record of each patient.

C. NUTRITION SCREENING: SGA (Subjective global assessment) questionnaire, m-NUTRIC score, NRS-2002 will be used for nutrition screening and assessment. Anthropometric measurement such as BMI, calf- and mid-upper arm circumference and other nutrition and clinical conditions are also . Daily target calories (kcal) and received nutritional therapeutic practices: duration of time from ICU admission to EN (hour), received EN within 24 hours of admission, combined PN support, interruption of EN, total EN support days, meeting requirement of caloric goal during ICU stay, weight change (kg), amount and ingredients of daily EN intaking (24-hour food recall

method) feeding route, delivery methods, use of motility agents also will be investigated in this part.

D. NUTRITION AND CLINICAL ASSESSMENT: Assessment of nutrition and clinical outcomes include primary- and secondary outcomes of the study nutrition status (SGA) and laboratory test results on admission, day 4, day 7 and discharge day. WBC, lymphocyte, Neutrophil/lymphocyte ration, hemoglobin, BUN, creatinine, AST, ALT, blood glucose, electrolytes, albumin, protein, BUN, GFR, CRP, initial SOFA, APACHE II scores.

Nutritional Status and Clinical Assessment Form of ICU older patients

Patient code ☐☐☐

Survey date (dd/mm/yy) ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

A. GENERAL INFORMATION:

Instruction: *This section will be filled out by the researcher from patient's record and from partly interviewing patients or patient caregivers*

A1. Sex ☐ 1. Female ☐ 2. Male ☐ 3. Other (specify).....

A2. Age ☐☐ year (full year) **[**Year of birth: ☐☐☐☐**]**

A3. Education

☐ 1. No education ☐ 2. Primary level (Grade 1-6) ☐ 3. Junior high school level

☐ 4. High school/Certificate ☐ 5. Some college education ☐ 6. Others (specify) .....

A4. Marital status

☐ 1. Single ☐ 2. Married ☐ 3. Widowed ☐ 4. Divorced ☐ 5. Separated ☐ 6. Others ……..

A5. Major occupation, one that takes up most of the time to perform (One answer, please)

☐ 1. No occupation ☐ 2. Agriculturalist ☐ 3. Trading ☐ 4. Fisherman

☐ 5. Labor in agri-farm ☐ 6. Construction labor ☐ 7. Shop workers ☐ 8. Factory worker

☐ 9. Office workers ☐ 10. State enterprise officer ☐ 11.Government officer ☐ 12. Others……

A6. Other occupations (More than one answer)

☐ 1. No occupation ☐ 2. Agriculturalist ☐ 3. Trading

☐ 4. Labor in agri-farm ☐ 5. Construction labor ☐ 6. Shop workers

☐ 7. Business/company workers ☐ 8. State enterprise officer ☐ 9. Government officer

A7. Patient's number of family member …… members

A8. Patient's income …….. vnd/year

A9. Having medical insurance: ☐ 1. Yes ☐ 2. No

B. MEDICAL INFORMATION:

Instruction: *This section will be filled out using information from patient's medical records.*

B1. Date of ICU admission ☐☐ ☐☐ ☐☐

B2. Department prior to ICU admission

☐ 1. Emergency department ☐ 2. Transfer from other department

B3. Admission status

☐ 1. Elective ☐ 2. Emergency ☐ 3. Direct admission ☐ 4. Others……

B4. Main diagnosis …….. **and ICD-10 code** ☐☐ ☐☐

C. NUTRITION SCREENING

Instruction: *This section will be filled out by the researcher based on the patient's medical record and direct anthropometric measurement.*

Anthropometric measurements and daily energy target measurements based on BMI (actual weight/ ideal weight)

		Day 1	**Day 4**	**Day 7**	**Discharge/died**
C1.	Weight (Kg) by using the paramount bed with calculator	☐☐.☐	☐☐.☐	☐☐.☐	☐☐.☐
C2.	Height (cm) by supine length measurement with flexible measuring tape the length between the vertex of the head and the heel was measured.	☐☐☐.☐	☐☐☐.☐	☐☐☐.☐	☐☐☐.☐
C3.	BMI (kg/m^2)	☐☐.☐	☐☐.☐	☐☐.☐	☐☐.☐
C4.	Mid-upper arm circumference (cm) by WHO - circumference measurement tape	☐☐.☐	☐☐.☐	☐☐.☐	☐☐.☐
C5.	Calf circumference (cm) by WHO -	☐☐.☐	☐☐.☐	☐☐.☐	☐☐.☐

	circumference measurement tape				
C6.	Energy target (kcal) (20kcal/day at acute phase, 30 kcal/day at post-acute phase of critically ill or under 70% to 100% of EE until day 3rd) – The researcher will fill out this section.				
C7.	Protein requirement (gm) researcher will fill out this section.				

Nutrition screening at Day 1

C8. NRS – 2002 final score (full form*)-Pls see the **Tool 2.1 NRS-2002**

C9. Modified NUTRIC Score (full form*)-Pls see the **Tool 2.2 NUTRIC Score**

	Day 1st	**Day 4th**	**Day 7th**	**Discharge/died**
mNUTRIC	☐	☐	☐	☐

Received nutritional therapy

		Day 1st	Day 4th	Day 7th	Discharge/died
C10.	Received EN within 24 hours of admission	☐ 1. Yes ☐ 2. No			
C11.	Only PN support	☐ 1. Yes ☐ 2. No			
C12	Combined PN support	☐ 1. Yes ☐ 2. No			
C13.	Duration of time from ICU admission to EN (hour)	☐☐			
C14.	EN delivery methods	☐ 1. Nasoenteric feeding tubes ☐ 2. Gastrotomy feeding ☐ 3. Jejunostomy feeding ☐ 4. Gastrostomy with Jejunal adapter.			
C15.	Total EN support days	☐☐			
C16.	PN delivery methods	☐ 1. Central ☐ 2. Peripheral			
	Total PN support days	☐☐			
C17.	Total combined PN support days	☐☐			
C18-C21.	Meeting requirement of caloric goal	☐ 1. Yes ☐ 2. No	☐ 1. Yes ☐ 2. No	☐ 1. Yes ☐ 2. No	☐ 1. Yes ☐ 2. No
C22.	Number of medications prescribed per day	☐☐			

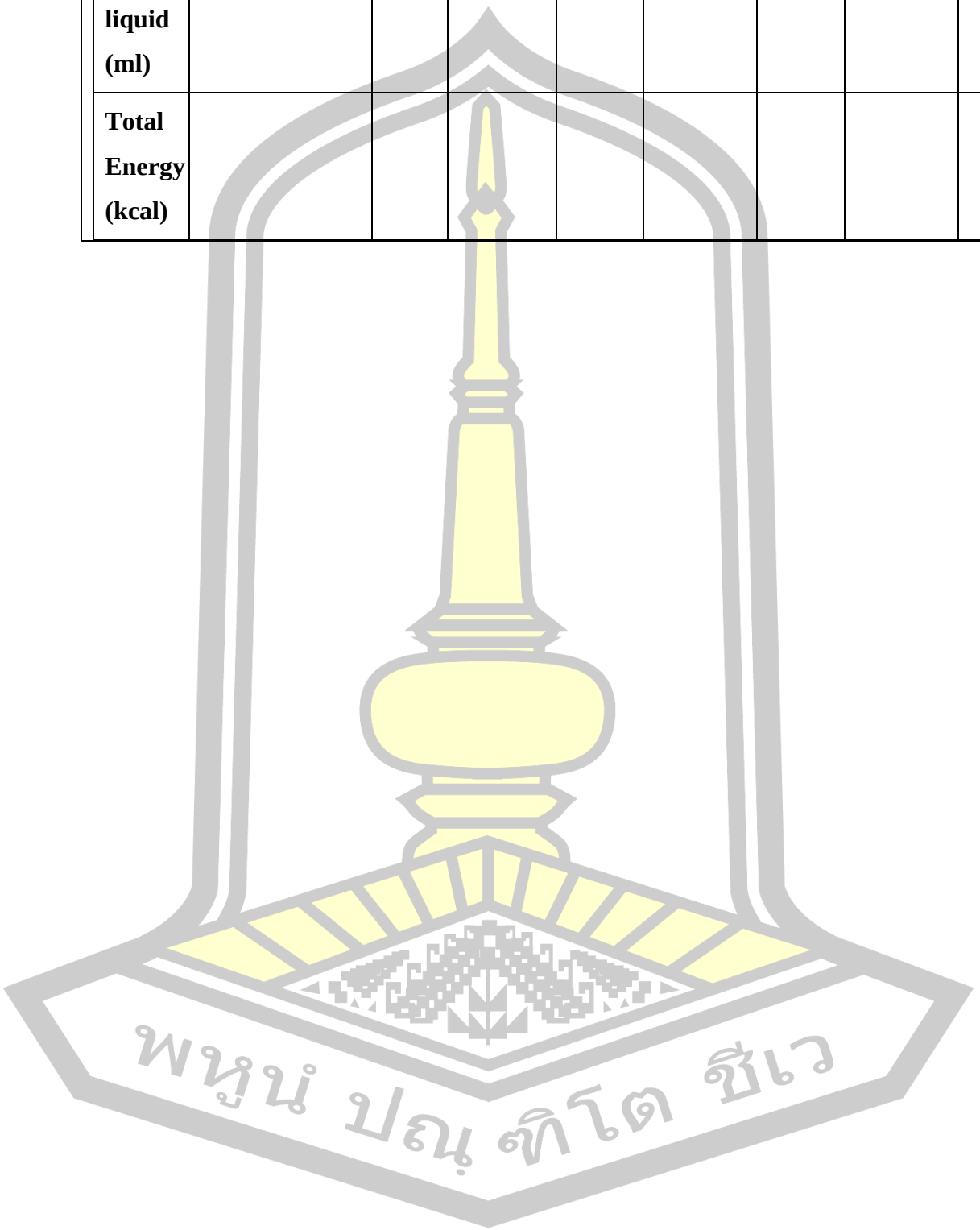
C23.	Number of vitamin and mineral prescribed per day	☐☐

Amount and ingredients of daily EN and PN intake (24 hours recall method and medical record

The information of nutrients will be analyzed by using the Vietnam National Institute Of Nutritio Software based on the Vietnamese Food Composition Table)

Meal		**1st**		**2nd**		**3rd**		**4th**	
		Name	**Amount**	**Name**	**Amount**	**Name**	**Amount**	**Name**	**Amount**
Milk									
	CHO								
	Lipid								
	Protein								
	Micronutrients								
Soup									
	CHO								
	Lipid								
	Protein								
	Micronutriens								
PN									

Total liquid (ml)									
Total Energy (kcal)									



D. NUTRITION AND CLINICAL ASSESSMENTS:

Instruction: *This section will be filled out by the researcher based on the information available from the patient's medical record and partly from the laboratory results (derived from bio-medical lab of Vinh Long General Hospital) attached to the medical record.*

SGA full form* (Please see Tool 2.3 Subjective Global Assessment (SGA)Form)

	Day 1	**Day 4**	**Day 7**	**Discharge/died**
SGA	☐	☐	☐	☐

	Day 1st	**Day 4th**	**Day 7th**	**Discharge/died**
D1. Total Energy intake-kcal (% of target goal)	☐☐ (☐☐)	☐☐ (☐☐)	☐☐ (☐☐)	☐☐ (☐☐)
D2. Total protein intake-gram (% of target goal)	☐☐ (☐☐)	☐☐ (☐☐)	☐☐ (☐☐)	☐☐ (☐☐)
D3. Total micronutrient intake	☐☐ (☐☐)	☐☐ (☐☐)	☐☐ (☐☐)	☐☐ (☐☐)
D4. Nutritional tolerance (Having diarrhea,…….)	☐1. Yes ☐2. No	☐1. Yes ☐2. No	☐1. Yes ☐2. No	☐1. Yes ☐2. No
D5. Blood Glucose (mg%)	☐☐☐	☐☐☐	☐☐☐	☐☐☐
D6. WBC (k/ul)	☐☐☐	☐☐☐	☐☐☐	☐☐☐

D7. Neu (%)	☐☐☐	☐☐☐	☐☐☐	☐☐☐
D8. HGB (g/dl)	☐☐☐	☐☐☐	☐☐☐	☐☐☐
D9. PLT (k/ul)	☐☐☐	☐☐☐	☐☐☐	☐☐☐
D10. CRP (mg/dl)	☐☐☐	☐☐☐	☐☐☐	☐☐☐
D11. Albumin (g/l)	☐☐	☐☐	☐☐	☐☐
D12. Protein (g/l)	☐☐	☐☐	☐☐	☐☐
D13. APACHE II form* (Pls see Tool 2.4)	☐☐	☐☐	☐☐	☐☐
D14. SOFA form* (Pls see Tool 2.5)	☐☐	☐☐	☐☐	☐☐
D15. ICU length of stay (days)	☐			
D16. Hospital length of stay (days)	☐			
D18. On Renal Replacement Therapy (RRT)	☐1. Yes ☐2. No			
D19. Duration on RRT (days)				
D20. On Mechanical Ventilator (MV)	☐1. Yes ☐2. No			
D21. Duration of MV (days)	☐			

Appendix L (Vietnamses version)

Công cụ 2
Tình trạng dinh dưỡng và biểu mẫu đánh giá lâm sàng của bệnh nhân ICU lớn tuổi
(Pre-test and Post-test)

Mục tiêu 1: Điều tra tình trạng dinh dưỡng, tình hình thực hành nuôi ăn liên quan đến kết quả lâm sàng của bệnh nhân cao tuổi bị bệnh nặng trong ICU.

Mô tả: Mẫu ghi chép được sử dụng trong nghiên cứu này được phát triển và sửa đổi từ khuyến nghị trong hướng dẫn dinh dưỡng lâm sàng cho bệnh nhân ICU, chẳng hạn như ESPEN, ASPEN, Châu Á Thái Bình Dương và hội hồi sức cấp cứu Việt Nam để áp dụng cho tình trạng dinh dưỡng và đánh giá lâm sàng của bệnh nhân ICU lớn tuổi tại Bệnh viện Đa khoa tỉnh Vĩnh Long. Biểu mẫu bao gồm bốn phần bao gồm thông tin chung của bệnh nhân và gia đình; đánh giá tình trạng dinh dưỡng, thực hành điều trị dinh dưỡng được nhận tại ICU; kết quả lâm sàng; kết quả xét nghiệm vào ngày nhập viện, ngày 4, ngày 7 và ngày xuất viện.

A. THÔNG TIN CHUNG: thông tin cơ bản của bệnh nhân và hoàn cảnh gia đình bao gồm chất lượng y tế và chất lượng cuộc sống - WHO; thông tin trong phần này sẽ được thu thập từ hồ sơ bệnh án của từng bệnh nhân.

B. THÔNG TIN Y TẾ bao gồm bệnh cảnh trước khi nhập viện ICU, ngày nhập viện ICU, nguyên nhân nhập viện, chẩn đoán, dấu hiệu sinh tồn tại thời điểm nhập viện và các thông tin lâm sàng khác; thông tin trong phần này sẽ được thu thập từ hồ sơ bệnh án của từng bệnh nhân.

C. SÀNG LỌC DINH DƯỠNG: Bảng câu hỏi SGA (Đánh giá toàn cầu chủ quan), điểm m-NUTRIC, NRS-2002 sẽ được sử dụng để sàng lọc và đánh giá dinh dưỡng. Các phép đo nhân trắc học như BMI, chu vi bắp chân và bắp tay cũng như các tình trạng dinh dưỡng và lâm sàng khác. Lượng calo mục tiêu hàng ngày (kcal) và thực hành can thiệp dinh dưỡng nhận được: khoảng thời gian từ khi nhập học ICU đến EN (giờ), nhận được EN trong vòng 24 giờ sau khi nhập viện, PN kết hợp, ngắt quãng EN, tổng số ngày hỗ trợ EN, đáp ứng yêu cầu của mục tiêu calo trong thời gian ở ICU, sự thay đổi

trọng lượng (kg), số lượng và thành phần của nuôi ăn EN hàng ngày (phương pháp thu hồi thực phẩm trong 24 giờ).

D. ĐÁNH GIÁ NUÔI DƯỠNG VÀ LÂM SÀNG: Đánh giá dinh dưỡng và kết quả lâm sàng bao gồm kết quả chính và phụ về tình trạng dinh dưỡng trong nghiên cứu (SGA) và kết quả xét nghiệm khi nhập viện, ngày 4, ngày 7 và ngày xuất viện. Tỷ lệ bạch cầu, tế bào lympho, bạch cầu trung tính / tế bào lympho, hemoglobin, BUN, creatinin, AST, ALT, đường huyết, chất điện giải, albumin, protein, BUN, GFR, CRP, điểm SOFA ban đầu, APACHE I

Phiếu đánh sàng lọc và đánh giá dinh dưỡng của bệnh nhân lớn tuổi tại ICU

Patient code ☐☐☐

Ngày khảo sát (dd/mm/yy) ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐

E. THÔNG TIN CHUNG:

Hướng dẫn: *Phần này sẽ được nghiên cứu viên điền từ hồ sơ bệnh nhân và một phần phỏng vấn bệnh nhân hoặc thân nhân bệnh nhân.*

A1. Giới tính ☐ 1. Nữ ☐ 2. Nam ☐ 3. Khác (Ghi rõ).....

A2. Tuổi ☐☐ **[**Năm sinh: ☐☐☐☐**]**

A3. Trình độ học vấn

☐ 1. Không biết chữ ☐ 2. Tiểu học ☐ 3. Trung học cơ sở

☐ 4. Trung học phổ thông ☐ 5. Cao đẳng/ đại học ☐ 6. Khác .....

A4. Tình trạng hôn nhân

☐ 1. Độc thân ☐ 2. Kết hôn ☐ 3. Goá ☐ 4. Ly hôn ☐ 5. Ly thân ☐ 6. Khác ……..

A5. Nghề nghiệp chính (Nghề nghiệp chiếm phần lớn thời gian để thực hiện) (Xin trả lời một câu)

☐ 1. Thất nghiệp ☐ 2. Nông dân ☐ 3. Buôn bán ☐ 4. Ngư dân

☐ 5. Lao động nông nghiệp thời vụ ☐6. Công nhân xây dựng ☐ 7. Nhân viên bán hàn ☐ 8. Công nhân nhà máy

☐ 9. Văn phòng ☐ 10. Nhân viên doanh nghiệp Nhà nước ☐ 11.Nhân viên chính phủ ☐ 12. Khác……

A6. Nghề nghiệp khác (có thể chọn nhiều hơn một)

☐ 1. Thất nghiệp ☐ 2. Nông dân ☐ 3. Buôn bán

☐ 4. Lao động nông nghiệp ☐ 5. Công nhân xây dựng ☐ 6. Nhân viên bán hàng

☐ 7. Kinh doanh ☐ 8. Nhân viên doanh nghiệp Nhà nước ☐ 9. Nhân viên chính phủ

A7. Tổng số thành viên trong gia đình……

A8. Tổng thu nhập …….. vnd/năm

A9. BHYT: ☐ 1. Có ☐ 2. Không

F. THÔNG TIN Y TẾ:

Hướng dẫn: *Phần này sẽ được điền bằng cách sử dụng thông tin từ hồ sơ bệnh án của bệnh nhân.*

B1. Ngày nhập ICU ☐☐ ☐☐ ☐☐

B2. Khoa điều trị trước khi nhập ICU

☐ 1. Khoa cấp cứu ☐ 2. Các khoa khác

B3. Tình trạng nhập ICU

☐ 1. Có hội chẩn ☐ 2. Cấp cứu ☐ 3. Nhập trực tiếp ☐ 4. Khác…….

B4. Chẩn đoán chính …….. **mã ICD-10** ☐☐ ☐☐

G. SÀNG LỌC DINH DƯỠNG

Hướng dẫn: *Phần này sẽ được nghiên cứu viên điền dựa trên bệnh án của bệnh nhân và đo nhân trắc trực tiếp.*

Các phép đo nhân trắc học và các tính mục tiêu năng lượng hàng ngày dựa trên BMI (cân nặng thực tế /cân nặng lý tưởng)

		Ngày 1	**Ngày 4**	**Ngày 7**	**Xuất viện/ tử vong**
C1.	Trọng lượng (Kg) bằng giường Paramout có cân	☐☐.☐	☐☐.☐	☐☐.☐	☐☐.☐

C2.	Chiều cao (cm) bằng cách đo chiều dài khi nằm ngửa với thước dây linh hoạt đo chiều dài giữa đỉnh đầu và gót chân.	□□□.□	□□□.□	□□□.□	□□□.□
C3.	BMI (kg/m^2)	□□.□	□□.□	□□.□	□□.□
C4.	Chu vi vòng bắp tay (cm) – thước đo chu vi của WHO	□□.□	□□.□	□□.□	□□.□
C5.	Chu vi vòng bắp chân (cm) – thước đo chu vi của WHO	□□.□	□□.□	□□.□	□□.□
C6.	Mục tiêu năng lượng (kcal) (20kcal/ngày ở giai đoạn cấp tính, 30 kcal/ngày ở giai đoạn ổn định của bệnh nặng hoặc dưới 70% đến 100% EE cho đến ngày 3) *- Nghiên cứu viên sẽ điền vào phần này.*				
C7.	Nhu cầu protein *- Nghiên cứu viên sẽ điền vào phần này*				

Sàng lọc dinh dưỡng

C8. NRS – 2002 final score (full form*)-Pls see the **Tool 2.1 NRS-2002**

	Ngày 1	**Ngày 4**	**Ngày 7**	**Xuất viện/ tử vong**
NRS-2002	☐	☐	☐	☐

C9. Modified NUTRIC Score (full form*)-Pls see the **Tool 2.2 NUTRIC Score**

	Ngày 1	**Ngày 4**	**Ngày 7**	**Xuất viện/ tử vong**
mNUTRIC	☐	☐	☐	☐

Hỗ trợ dinh dưỡng

		Ngày 1	**Ngày 4**	**Ngày 7**	**Xuất viện/ tử vong**
C10.	Nuôi dưỡng tiêu hoá trong vòng 24h sau khi nhập ICU	☐ 1. Có ☐ 2. Không			
C11.	Chỉ sử dụng dinh dưỡng qua tĩnh mạch	☐ 1. Có ☐ 2. Không			
C12	Kết hợp dinh dưỡng tĩnh mạch	☐ 1. Có ☐ 2. Không			
C13.	Thời gian từ khi nhập ICU đến lúc được cung cấp dinh dưỡng tiêu hoá (giờ)	☐☐			

C14.	Phương thức nuôi dưỡng tiêu hoá	☐ 1.Ống sonde mũi-dạ dày ☐ 2. Mở dạ dày ra da ☐ 3. Mở hỗng tràng ra da ☐ 4. Mở dạ dày bằng ống nối hỗng tràng
C15.	Tổng ngày nuôi ăn dinh dưỡng tiêu hoá	☐☐
C16.	Phương thức nuôi ăn tĩnh mạch	☐ 1. Tĩnh mạch trung tâm ☐ 2. Ngoại vi
C17.	Tổng ngày nuôi ăn tĩnh mạch	☐☐
C18.	Tổng ngày nuôi ăn tiêu hoá kết hợp tĩnh mạch	☐☐
C19-C22.	Đáp ứng nhu cầu năng lượng khuyến nghị	☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No ☐ 1. Yes ☐ 2. No
C23.	Số lượng thuốc được kê đơn mỗi ngày	☐☐
C24.	Số lượng vitamin và khoáng chất được kê đơn mỗi ngày	☐☐

Số lượng và thành phần của EN và PN hàng ngày (phương pháp thu hồi 24 giờ và hồ sơ y tế). Thông tin các chất dinh dưỡng sẽ được phân tích bằng phần mềm của Viện Dinh dưỡng Quốc gia Việt Nam dựa trên Bảng thành phần thực phẩm Việt Nam)

Meal		**1st**		**2nd**		**3rd**		**4th**	
		Name	**Amount**	**Name**	**Amount**	**Name**	**Amount**	**Name**	**Amou**

Milk									
	CHO								
	Lipid								
	Protein								
	Micronutrients								
Soup									
	CHO								
	Lipid								
	Protein								
	Micronutriens								
PN									
Total liquid (ml)									
Total Energy (kcal)									

H. ĐÁNH GIÁ, THEO DÕI DINH DƯỠNG VÀ LÂM SÀNG:

Hướng dẫn: *Phần nàyi nghiên cứu viên sẽ điền dựa trên thông tin có được từ bệnh án của bệnh nhân và một phần từ kết quả xét nghiệm (lấy từ phòng xét nghiệm sinh phẩm của Bệnh viện Đa khoa tỉnh Vĩnh Long) kèm theo bệnh án.*

SGA full form* (Please see Tool 2.3 Subjective Global Assessment (SGA)Form)

	Ngày 1	**Ngày 4**	**Ngày 7**	**Xuất viện/ tử vong**
SGA	☐	☐	☐	☐

	Ngày 1	**Ngày 4**	**Ngày 7**	**Xuất viện/ tử vong**
D1. Tổng nặng lượng tiêu thụ-kcal (% of target goal)	☐☐ (☐☐)	☐☐ (☐☐)	☐☐ (☐☐)	☐☐ (☐☐)
D2. Tổng protein tiêu thụ-gram (% of target goal)	☐☐ (☐☐)	☐☐ (☐☐)	☐☐ (☐☐)	☐☐ (☐☐)
D3. Tổng vi chất tiêu thụ	☐☐ (☐☐)	☐☐ (☐☐)	☐☐ (☐☐)	☐☐ (☐☐)
D4. Dung nạp dinh dưỡng (Having diarrhea,…….)	☐1. Yes ☐2. No	☐1. Yes ☐2. No	☐1. Yes ☐2. No	☐1. Yes ☐2. No
D5. Blood Glucose (mg%)	☐☐☐	☐☐☐	☐☐☐	☐☐☐
D6. WBC (k/ul)	☐☐☐	☐☐☐	☐☐☐	☐☐☐
D7. Neu (%)	☐☐☐	☐☐☐	☐☐☐	☐☐☐
D8. HGB (g/dl)	☐☐☐	☐☐☐	☐☐☐	☐☐☐

D9. PLT (k/ul)	☐☐☐	☐☐☐	☐☐☐	☐☐☐
D10. CRP (mg/dl)	☐☐☐	☐☐☐	☐☐☐	☐☐☐
D11. Albumin (g/l)	☐☐	☐☐	☐☐	☐☐
D12. Protein (g/l)	☐☐	☐☐	☐☐	☐☐
D13. APACHE II form* (Pls see Tool 2.4)	☐☐	☐☐	☐☐	☐☐
D14. SOFA form* (Pls see Tool 2.5)	☐☐	☐☐	☐☐	☐☐
D15. Ngày nằm ICU (ngày)	☐			
D16. Ngày nằm viện (ngày)	☐			
D18. Lọc máu cấp cứu (RRT)	☐1. Có ☐2. Không			
D19. Số ngày cần lọc máu cấp cứu (days)	☐			
D20. Thở máy (MV)	☐1. Có ☐2. Không			
D21. Thời gian thở máy (ngày)	☐			

Appendix M

Tool 3

Survey questionnaire on perception, attitude, and current practices in nutritional assessment and therapy for older critically ill patients of the ICU Staff (Pre-test and Post-test)

This survey questionnaire comprises three parts, which was partly adapted from Malnutrition Knowledge, Attitudes and Practices in the study by C Laur, H Marcus, S Ray and HH Keller (2017) and literature review by the researcher, including:

A. General information and background of the ICU staff;

B. Perceptions: Significance of nutrition screening and assessment, provision of nutrition therapy, as well as monitoring and evaluation of clinical outcomes related to malnutrition of the critically ill older patients;

C. Self-efficacy: Nutrition screening and assessment, provision of nutrition therapy, as well as monitoring and evaluation of clinical outcomes related to malnutrition of the critically ill older patients;

D. Practices: Nutrition screening and assessment, provision of nutrition therapy, as well as monitoring and evaluation of clinical outcomes related to malnutrition of the critically ill older patients.

E. Knowledge: Nutrition screening and assessment, provision of nutrition therapy, as well as monitoring and evaluation of clinical outcomes related to malnutrition of the critically ill older patients.

Survey questionnaire on perceptions, attitude, and current practices in nutritional assessment and therapy for critically ill older patients of the ICU Staff (Pre-test and Post-test)

Please complete the following questions to the best of your ability, either online via Google Form or printed questionnaire). Thank you very much for taking the time to complete this questionnaire. It should only take a few minutes of your time.

Staff code ☐☐☐

Survey date (dd/mm/yy) ☐☐ ☐☐ ☐☐

A. GENERAL INFORMATION

Instruction: *please answer this section by write the appropriate number in the column of*

response for each question.

No.	Questions	For the researcher
1	What is your self-identified gender? ☐ 1. Male ☐ 2. Female ☐ 3.Other	☐
2	2.1 What is your year of birth? ☐☐☐☐ 2.2 Your age is ☐ ☐ years	☐ ☐
3	Category of your current work. ☐ 1. Registered ☐ 2. Part time ☐ 3. Contract	☐
4	Your current profession ☐ 1. Doctor ☐ 2. Nurse	☐
5	How many years of your experience holding a position on Q4? ☐☐	☐☐
6	Have you ever attended any training related to nutrition assessment? ☐ 1. Yes, please specify topic……..and year of attendance……. ☐ 2. No	☐ ☐☐

7	Have you ever attended any training course(s) related to nutrition therapy and/or dietetics? ☐ 1. Yes, please specify topic……..and year of attendance……. ☐ 2. No	☐ ☐☐

B. PERCEPTIONS OF NUTRITION SCREENING AND ASSESSMENT, NUTRITION

CARE/THERAPY, OUTCOME MONITORING AND EVALUATION FOR OLDER

PATIENTS IN ICU

Instruction: *please rate your agreement with each of the following statements, from "1", strongly disagree to "5" strongly agree.*

No	Statement	Strongly agree (5)	Somewhat agree (4)	Neutral (3)	Somewhat disagree (2)	Strongly disagree (1)
1	The majority of critically ill older patients admitted to ICU have risk of malnutrition.	☐	☐	☐	☐	☐
2	Both critical illness and malnutrition can worsen patient outcome(s).	☐	☐	☐	☐	☐
3	Adequate amount of food will enhance recovery of the ICU patients.	☐	☐	☐	☐	☐

No	Statement	Strongly agree (5)	Somewhat agree (4)	Neutral (3)	Somewhat disagree (2)	Strongly disagree (1)
4	All patients should be screened for malnutrition at ICU admission.	☐	☐	☐	☐	☐
5	Malnutrition is a high priority to be further assessed using standard assessment tool(s) for accurately diagnosis for critically ill older patients at this ICU.	☐	☐	☐	☐	☐
6	Monitoring food intake is a good way to determine a patient's nutritional status.	☐	☐	☐	☐	☐
7	Nutritional care of a patient is the major role of the dietitian.	☐	☐	☐	☐	☐
8	All ICU staff should involve in nutritional care for older patients.	☐	☐	☐	☐	☐
9	All malnourished patients require individualized treatment by a dietitian.	☐	☐	☐	☐	☐
10	All malnourished patients require individualized treatment by a medical doctor.	☐	☐	☐	☐	☐
11	Promoting food intake to a patient is a job of every ICU staff.	☐	☐	☐	☐	☐

No	Statement	Strongly agree (5)	Somewhat agree (4)	Neutral (3)	Somewhat disagree (2)	Strongly disagree (1)
12	I have an important role in promoting a patient's dietary intake.	☐	☐	☐	☐	☐
13	I do not know any of the nutrition screening tool.	☐	☐	☐	☐	☐
14	I do not know any of the nutrition assessment tool.	☐	☐	☐	☐	☐
15	I do not have time to conduct nutrition status screening for detecting risk of malnutrition of the ICU patients.	☐	☐	☐	☐	☐
16	I do not have time to conduct nutrition status assessment for malnutrition diagnosis of the ICU patients.	☐	☐	☐	☐	☐
17	Conducting nutritional screening can help me to adjust the patient's treatment plan.	☐	☐	☐	☐	☐
18	I know *when* to consult the dietitian for assistance of patient's nutrition therapy.	☐	☐	☐	☐	☐
19	I know when a patient is at risk of malnutrition.	☐	☐	☐	☐	☐
20	Conducting nutrition screening	☐	☐	☐	☐	☐

No	Statement	Strongly agree (5)	Somewhat agree (4)	Neutral (3)	Somewhat disagree (2)	Strongly disagree (1)
	using standard tool(s) is necessary for ICU patients.					
21	Conducting nutrition assessment for malnutrition diagnosis using standard tool(s) is necessary for ICU patients.	☐	☐	☐	☐	☐
22	I need more training to better support the nutrition needs of the ICU patients.	☐	☐	☐	☐	☐

C. SELF-EFFICACY OF NUTRITON SCREENING AND ASSESSMENT, NUTRITION CARE/THERAPY, OUTCOME MONITORING AND EVALUATION FOR PATIENTS IN ICU

Instruction: *please rate your agreement with each of the following statements, from "1", strongly disagree to "5" strongly agree.*

No	Statement	Strongly agree (5)	Somewhat agree (4)	Neutral (3)	Somewhat disagree(2)	Strongly disagree (1)
23	I feel confidence to perform nutrition screening using standard tool(s) for patients at ICU admission.	☐	☐	☐	☐	☐
24	I feel confidence to perform nutrition assessment to diagnose malnutrition for	☐	☐	☐	☐	☐

No	Statement	Strongly agree (5)	Somewhat agree (4)	Neutral (3)	Somewhat disagree(2)	Strongly disagree (1)
	patients using standard tool(s) soon after ICU admission.					
25	I feel confidence to investigate whether a patient is at risk of malnutrition or not.	☐	☐	☐	☐	☐
26	I feel confidence to provide appropriate individualized nutritional treatment or care for undernourished older patients.	☐	☐	☐	☐	☐
27	I feel confidence to prescript nutrition care plan in line with medicine or nursing care	☐	☐	☐	☐	☐
28	I feel confidence to monitor food intake of the patients in ICU to assure they receive adequate amount suitable for bodily requirement.	☐	☐	☐	☐	☐
29	I feel confidence to corporately work with the dietitian for patient's nutrition therapy or care.	☐	☐	☐	☐	☐
30	I feel confidence to suggest patient caregivers regarding nutrition care for older patients.	☐	☐	☐	☐	☐

D. PRACTICES REGARDING NUTRITON SCREENING AND ASSESSMENT, NUTRITION CARE/THERAPY, OUTCOME MONITORING AND EVALUATION FOR PATIENTS IN ICU

Instruction: *please rate how often you DO the following statements in the past two months. Please give the following:*

"4" for always meaning practice every day or nearly every day, 6-7 days a week or every time

"3" for often meaning practice 4-5 days a week or almost all the time

"2" for sometimes meaning practice 1-3 days a week or less frequently so doing/practice

"1" for never meaning not practice such a behavior at all

"1" "N/A" for not applicable meaning such a practice is irrelevant for your situation

No	Statement	Always (5)	Often (4)	Some times (3)	Never (1)	N/A (0)
31	Check the patient's body weight and height	☐	☐	☐	☐	☐
32	Check the malnutrition risk	☐	☐	☐	☐	☐
33	Prescript nutrition care plan in line with medicine or nursing care	☐	☐	☐	☐	☐
34	Prescript total amount of nutrient intake for each ICU patient based on his/her condition	☐	☐	☐	☐	☐
35	Visit and check a patient during their meal time to see their ability to intake of food or nutrition tolerance	☐	☐	☐	☐	☐
36	Monitor and evaluation of significance clinical outcome such as……	☐	☐	☐	☐	☐
37	Provision of nutrition education to malnourished patient caregivers.	☐	☐	☐	☐	☐
38	Provision of nutrition education material to malnourished patient caregivers.	☐	☐	☐	☐	☐

E. KNOWLEDGE REGARDING NUTRITON SCREENING AND ASSESSMENT, NUTRITION CARE/THERAPY, OUTCOME MONITORING AND EVALUATION FOR PATIENTS IN ICU

Instruction: *please answer this section by chose the most appropriate answer in the column of response for each question.*

No	Questions	☐ A.	☐ B.	☐ C.	☐. D
39	Which of the following is the largest component of total energy expenditure (TEE)?	☐ RMR	☐ Thermogenic effect of digestion	☐ Physical activity	☐ Metabolic stres
40	Which of the following is the most commonly used method for assessing energy expenditure?	☐ Indirect calorimetry (IC)	☐ Predictive equations	☐ The reverse Fick equation	☐ Doubly labeled w
41	A physician informs you that a patient has a serum albumin of 2.8 g/dL and prealbumin of 14 mg/dL and asks whether these laboratory findings mean the patient is malnourished. What is the most appropriate response?	☐ The patient's protein intake is inadequate, and the patient should receive prompt nutrition support.	☐ Together, these markers indicate that the patient has moderate protein-energy malnutrition.	☐ Considerati on of medical history, clinical diagnosis, and laboratory signs of the inflammator y	☐ For most hospitali patients, albumin prealbumin h excellent sensiti and specificity to iden malnutrition.

				response would help you interpret these findings.	
42	Which of the following is one of the best validated screening indicators for malnutrition risk?	☐ Patient reports a nonvolitional weight loss.	☐ Patient reports following a low-carbohydrate, weight loss diet.	☐ Patient is 2 days status post laparoscopic cholecystectomy	☐ Patient reports recent flu-like feb illness.
43	Which of the following is a benefit of EN compared with parenteral nutrition (PN) or no nutrition?	☐ Maintenance of normal gallbladder function	☐ Reduced gastrointestinal (GI) bacterial translocation	☐ More efficient nutrient metabolism	☐ All of the above
44	High-protein hypocaloric EN feeding providing 65% to 70% of energy needs, as determined by indirect calorimetry (IC), is recommended for intensive care unit	☐ Malnutrition	☐ Obesity	☐ Liver failure	☐ Acute respirat distress syndro (ARDS)

	(ICU) patients with which of the following conditions?				
45	A 60-year-old, critically ill patient has been tolerating a standard 1 kcal/mL enteral feeding formula well for the past week. She begins having frequent bouts of loose stools, requiring placement of a rectal tube. What should be the clinician's next suggestion?	☐ Change to a peptide-based formula.	☐ Determine the cause of diarrhea.	☐ Add pre- and probiotics to the feeding regimen.	☐ Change to a fil supplemented formula.
46	Which of the following methods is not recommended to minimize contamination of enteral feeding formula?	☐ Washing hands and donning clean gloves before preparing enteral formula.	☐ Immediate use of enteral formula from a newly opened container.	☐ Infusing reconstituted powdered formulas or formulas with added modular components in 1 bag for up to 8 hours.	☐ Changing an "op feeding conta every 24 hours.
47	What is the optimal nutrition support for a	☐	☐	☐	☐

	malnourished patient when enteral nutrition (EN) is not feasible for a prolonged period?	Central parenteral nutrition (CPN)	Nasogastric enteral tube feedings	Postpyloric enteral tube feedings	Peripheral parent nutrition (PPN)
48	CPN is contraindicated in which of the following conditions?	☐ Do not resuscitate (DNR) status	☐ Peritonitis	☐ Intestinal hemorrhage	☐ High-output fistul
49	Which of the following will increase the solubility of calcium and phosphate in a PN formulation?	☐ Use of calcium as the chloride salt	☐ Use of phosphate as the sodium salt	☐ Increased amino acid concentratio n	☐ Increased temperature
50	Which of the following is the most common metabolic complication associated with PN?	☐ Hyperglycem i-a	☐ Essential fatty acid deficiency (EFAD)	☐ Azotemia	☐ Hyperammo-nem

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Thank you very much for your kind contributions.

Appendix N

Công cụ 3

Bảng câu hỏi khảo sát về nhận thức, thái độ và thực hành hiện tại của Bác sĩ và Điều dưỡng trong đánh giá và điều trị dinh dưỡng cho bệnh nhân lớn tuổi bị bệnh nặng tại khoa Hồi sức tích cực (Pre-test and Post-test)

Bảng câu hỏi khảo sát này bao gồm năm phần, được điều chỉnh từ Kiến thức, Thái độ và Thực hành về Suy dinh dưỡng trong nghiên cứu của C Laur, H Marcus, S Ray và HH Keller (2017) và tổng quan tài liệu của nghiên cứu sinh với 57 câu hỏi, bao gồm:

A. Thông tin chung và lý lịch của nhân viên ICU;

B. Nhận thức: Tầm quan trọng của việc sàng lọc và đánh giá dinh dưỡng, điều trị, cũng như theo dõi và đánh giá kết quả lâm sàng liên quan đến suy dinh dưỡng của bệnh nhân lớn tuổi bị bệnh nặng;

C. Năng lực bản thân: Sàng lọc và đánh giá dinh dưỡng, cung cấp liệu pháp dinh dưỡng, cũng như theo dõi và đánh giá các kết quả lâm sàng liên quan đến suy dinh dưỡng của bệnh nhân lớn tuổi bị bệnh nặng ;

D. Thực hành: Sàng lọc và đánh giá dinh dưỡng, cung cấp liệu pháp dinh dưỡng, cũng như theo dõi và đánh giá kết quả lâm sàng liên quan đến suy dinh dưỡng của bệnh nhân lớn tuổi bị bệnh nặng.

E. Kiến thức: Kiểm tra và đánh giá dinh dưỡng, cung cấp liệu pháp dinh dưỡng, cũng như theo dõi và đánh giá kết quả lâm sàng liên quan đến suy dinh dưỡng của bệnh nhân lớn tuổi bị bệnh nặng.

Bảng câu hỏi khảo sát về nhận thức, thái độ và thực hành hiện tại của Bác sĩ và Điều dưỡng trong đánh giá và điều trị dinh dưỡng cho bệnh nhân lớn tuổi bị bệnh nặng tại khoa Hồi sức tích cực (Pre-test and Post-test)

Vui lòng hoàn thành các câu hỏi sau với khả năng tốt nhất của bạn, trực tuyến qua Google Biểu mẫu hoặc bảng câu hỏi in). Cảm ơn bạn rất nhiều vì đã dành thời gian để hoàn thành bảng câu hỏi này.

Staff code ☐☐☐

Ngày khảo sát (dd/mm/yy) ☐☐ ☐☐ ☐☐

A. THÔNG TIN CHUNG

Hướng dẫn: *anh/chị vui lòng trả lời phần này bằng cách đánh dấu hoặc điền câu trả lời thích hợp cho mỗi câu hỏi.*

No.	Questions	For the researcher
1	Giới tính? ☐ 1. Nam ☐ 2. Nữ ☐ 3.Khác	☐
2	2.1 Năm sinh? ☐☐☐☐ 2.2 Tuổi ☐☐ years	☐☐
3	Hiện tại anh/chị là nhân viên của khoa ICU ☐ 1. Biên chế ☐ 2. Hợp đồng ☐ 3. Không lương	☐
4	Chức danh nghề nghiệp ☐ 1. Bác sĩ ☐ 2. Điều dưỡng	☐
5	Anh/chị đã có bao nhiêu năm kinh nghiệm làm việc ở vị trí Q4? ☐☐	☐☐
6	Anh/chị đã từng được tham gia bất kỳ khoá đào tạo nào liên quan đến đánh giá dinh dưỡng? ☐ 1. Nếu có, xin ghi rõ chuyên đề……..năm tham dự……. ☐ 2. Không	☐ ☐☐

7	Anh/chị đã từng tham gia bất kỳ khoá đào tạo nào liên quan đến dinh dưỡng lâm sàng và tiết chế? ☐ 1. Nếu có, xin ghi rõ chuyên đề……..năm tham dự……. ☐ 2. Không	☐ ☐☐

B. NHẬN THỨC TẦM QUAN TRỌNG CỦA VIỆC SÀNG LỌC VÀ ĐÁNH GIÁ DINH DƯỠNG, ĐIỀU TRỊ CŨNG NHƯ THEO DÕI VÀ ĐÁNH GIÁ KẾT QUẢ LÂM SÀNG LIÊN QUAN ĐẾN SUY DINH DƯỠNG CỦA BỆNH NHÂN LỚN TUỔI BỊ BỆNH NẶNG

Hướng dẫn: *vui lòng đánh giá mức độ đồng ý của bạn với mỗi câu sau đây, từ "1", hoàn toàn không đồng ý đến "5" hoàn toàn đồng ý.*

STT	Ý KIẾN	Hoàn toàn đồng ý (5)	Một phần đồng ý (4)	Trung lập (3)	Một phần không đồng ý (2)	Hoàn toàn không đồng ý (1)
8	Phần lớn bệnh nhân lớn tuổi bị bệnh nặng được đưa vào ICU có nguy cơ bị suy dinh dưỡng.	☐	☐	☐	☐	☐
9	Bệnh hiểm nghèo và suy dinh dưỡng đều có thể làm xấu đi kết cục lâm sàng của bệnh nhân.	☐	☐	☐	☐	☐
10	Cung cấp đầy đủ lượng thức ăn sẽ tăng cường khả năng hồi phục của bệnh nhân ICU.	☐	☐	☐	☐	☐

STT	Ý KIẾN	Hoàn toàn đồng ý (5)	Một phần đồng ý (4)	Trung lập (3)	Một phần không đồng ý (2)	Hoàn toàn không đồng ý (1)
11	Tất cả bệnh nhân nên được tiến hành sàng lọc dinh dưỡng khi nhập khoa ICU.	☐	☐	☐	☐	☐
12	Suy dinh dưỡng là ưu tiên hàng đầu cần được đánh giá thêm bằng cách sử dụng (các) công cụ đánh giá tiêu chuẩn để chẩn đoán chính xác cho những bệnh nhân lớn tuổi bị bệnh nặng tại ICU này.	☐	☐	☐	☐	☐
13	Theo dõi lượng thức ăn tiêu thụ là một cách tốt để xác định tình trạng dinh dưỡng của bệnh nhân.	☐	☐	☐	☐	☐
14	Chuyên gia dinh dưỡng giữ vai trò chính trong việc chăm sóc đinh dưỡng cho bệnh nhân.	☐	☐	☐	☐	☐
15	Tất cả nhân viên ICU nên tham gia vào việc chăm sóc dinh dưỡng cho bệnh nhân.	☐	☐	☐	☐	☐
16	Tất cả bệnh nhân suy dinh dưỡng cần được điều trị dinh dưỡng cá thể hoá bởi chuyên gia dinh dưỡng.	☐	☐	☐	☐	☐
17	Tất cả bệnh nhân suy dinh dưỡng cần được điều trị dinh	☐	☐	☐	☐	☐

STT	Ý KIẾN	Hoàn toàn đồng ý (5)	Một phần đồng ý (4)	Trung lập (3)	Một phần không đồng ý (2)	Hoàn toàn không đồng ý (1)
	dưỡng cá thể hoá bởi bác sĩ lâm sàng.					
18	Tư vấn dinh dưỡng hợp lý là nhiệm vụ của mỗi nhân viên trong ICU.	☐	☐	☐	☐	☐
19	Tôi có vai trò quan trọng trong tư vấn dinh dưỡng hợp lý cho bệnh nhân trong ICU.	☐	☐	☐	☐	☐
20	Tôi không biết bất kỳ công cụ sàng lọc dinh dưỡng nào.	☐	☐	☐	☐	☐
21	Tôi không biết bất kỳ công cụ đánh giá dinh dưỡng nào.	☐	☐	☐	☐	☐
22	Tôi không có thời gian thực hiện sàng lọc tình trạng dinh dưỡng để phát hiện nguy cơ suy dinh dưỡng của bệnh nhân ICU	☐	☐	☐	☐	☐
23	Tôi không có thời gian để tiến hành đánh giá tình trạng dinh dưỡng tổng thể để chẩn đoán suy dinh dưỡng của bệnh nhân ICU.	☐	☐	☐	☐	☐
24	Tiến hành sàng lọc dinh dưỡng có thể giúp tôi điều chỉnh kế hoạch điều trị của bệnh nhân.	☐	☐	☐	☐	☐

STT	Ý KIẾN	Hoàn toàn đồng ý (5)	Một phần đồng ý (4)	Trung lập (3)	Một phần không đồng ý (2)	Hoàn toàn không đồng ý (1)
25	Tôi biết *khi nào* nên hỏi ý kiến chuyên gia dinh dưỡng để được hỗ trợ can thiệp dinh dưỡng cho bệnh nhân.	☐	☐	☐	☐	☐
26	Tôi biết khi nào bệnh nhân có nguy cơ bị suy dinh dưỡng.	☐	☐	☐	☐	☐
27	Thực hiện sàng lọc dinh dưỡng sử dụng (các) công cụ tiêu chuẩn là cần thiết cho bệnh nhân ICU.	☐	☐	☐	☐	☐
28	Tiến hành đánh giá dinh dưỡng tổng thể để chẩn đoán suy dinh dưỡng bằng (các) công cụ tiêu chuẩn là cần thiết đối với bệnh nhân ICU.	☐	☐	☐	☐	☐
29	Tôi cần được đào tạo thêm để hỗ trợ tốt hơn nhu cầu dinh dưỡng của bệnh nhân ICU.	☐	☐	☐	☐	☐

C. NĂNG LỰC BẢN THÂN VỀ VIỆC SÀNG LỌC VÀ ĐÁNH GIÁ DINH DƯỠNG, ĐIỀU TRỊ CŨNG NHƯ THEO DÕI VÀ ĐÁNH GIÁ KẾT QUẢ LÂM SÀNG LIÊN QUAN ĐẾN SUY DINH DƯỠNG CỦA BỆNH NHÂN LỚN TUỔI BỊ BỆNH NẶNG

Hướng dẫn: *vui lòng đánh giá mức độ đồng ý của bạn với mỗi câu sau đây, từ "1", hoàn toàn không đồng ý đến "5" hoàn toàn đồng ý.*

STT	Ý KIẾN	Hoàn toàn đồng ý (5)	Một phần đồng ý (4)	Trung lập (3)	Một phần không đồng ý (2)	Hoàn toàn không đồng ý (1)
30	Tôi cảm thấy tự tin để thực hiện sàng lọc dinh dưỡng bằng (các) công cụ tiêu chuẩn cho bệnh nhân khi nhập ICU.	☐	☐	☐	☐	☐
31	Tôi cảm thấy tự tin để thực hiện đánh giá dinh dưỡng tổng thể bằng (các) công cụ tiêu chuẩn để chẩn đoán suy dinh dưỡng cho bệnh nhân khi nhập ICU.	☐	☐	☐	☐	☐
32	Tôi cảm thấy tự tin để đánh giá xem một bệnh nhân có nguy cơ bị suy dinh dưỡng hay không.	☐	☐	☐	☐	☐
33	Tôi cảm thấy tự tin khi tiến hành can thiệp hoặc điều trị dinh dưỡng cá thể hoá phù hợp cho bệnh nhân lớn tuổi bị suy dinh dưỡng.	☐	☐	☐	☐	☐
34	Tôi cảm thấy tự tin khi đề xuất y lệnh chăm sóc dinh dưỡng phù hợp với thuốc đang sử dụng.	☐	☐	☐	☐	☐

STT	Ý KIẾN	Hoàn toàn đồng ý (5)	Một phần đồng ý (4)	Trung lập (3)	Một phần không đồng ý (2)	Hoàn toàn không đồng ý (1)
35	Tôi cảm thấy tự tin khi theo dõi lượng thức ăn tiêu thụ của bệnh nhân trong ICU để đảm bảo rằng họ nhận được đủ lượng, phù hợp với nhu cầu của cơ thể.	☐	☐	☐	☐	☐
36	Tôi cảm thấy tự tin khi làm việc một cách chính xác và phối hợp tốt với chuyên gia dinh dưỡng để điều trị và/hoặc chăm sóc dinh dưỡng cho bệnh nhân.	☐	☐	☐	☐	☐
37	Tôi cảm thấy tự tin khi tư vấn cho thân nhân về việc chăm sóc dinh dưỡng cho bệnh nhân lớn tuổi ở ICU.	☐	☐	☐	☐	☐

D. THỰC HÀNH VỀ VIỆC SÀNG LỌC VÀ ĐÁNH GIÁ DINH DƯỠNG, ĐIỀU TRỊ CŨNG NHƯ THEO DÕI VÀ ĐÁNH GIÁ KẾT QUẢ LÂM SÀNG LIÊN QUAN ĐẾN SUY DINH DƯỠNG CỦA BỆNH NHÂN LỚN TUỔI BỊ BỆNH NẶNG

Hướng dẫn: *vui lòng đánh giá tần suất bạn LÀM những việc sau đây trong hai tháng qua. Vui lòng cung cấp thông tin sau:*

"4" luôn làm có nghĩa là luyện tập hàng ngày hoặc gần như mỗi ngày, 6-7 ngày một tuần hoặc mọi lúc

"3" thường làm có nghĩa là thực hành 4-5 ngày một tuần hoặc gần như tất cả thời gian

"2" đôi khi có nghĩa là thực hành 1-3 ngày một tuần hoặc ít thường xuyên hơn
"1" không bao giờ có nghĩa là hoàn toàn không thực hành một hành vi như vậy
"0" "N/A" "Không áp dụng" nghĩa là không áp dụng được, cách làm như vậy không phù hợp với tình huống ở khoa của bạn

STT	Ý KIẾN	Luôn luôn (5)	Thường xuyên (4)	Đôi khi (3)	Không bao giờ (1)	Không áp dụng (0)
38	Kiểm tra cân nặng và chiều cao của bệnh nhân	☐	☐	☐	☐	☐
39	Tầm soát nguy cơ dinh dưỡng	☐	☐	☐	☐	☐
40	Chỉ định can thiệp dinh dưỡng phù hợp với thuốc điều trị và chăm sóc dinh dưỡng của điều dưỡng	☐	☐	☐	☐	☐
41	Chỉ định tổng nhu cầu năng lượng cá thể hoá cho bệnh nhân ICU.	☐	☐	☐	☐	☐
42	Giám sát và kiểm tra trong thời gian ăn để đánh giá khả năng tiêu thụ và dung nạp của bệnh nhân.	☐	☐	☐	☐	☐
43	Theo dõi và đánh giá kết quả lâm sàng như cải thiện BMI, chỉ số sinh hoá,……	☐	☐	☐	☐	☐
44	Tư vấn, giáo dục cho thân nhân về chăm sóc dinh dưỡng cho tất cả bệnh nhân.	☐	☐	☐	☐	☐
45	Tư vấn, giáo dục, cung cấp tài liệu dinh dưỡng cho thân nhân chăm sóc	☐	☐	☐	☐	☐

	dinh dưỡng cho bệnh nhân có nguy cơ dinh dưỡng.					

E. THỰC HÀNH VỀ VIỆC SÀNG LỌC VÀ ĐÁNH GIÁ DINH DƯỠNG, ĐIỀU TRỊ CŨNG NHƯ THEO DÕI VÀ ĐÁNH GIÁ KẾT QUẢ LÂM SÀNG LIÊN QUAN ĐẾN SUY DINH DƯỠNG CỦA BỆNH NHÂN LỚN TUỔI BỊ BỆNH NẶNG (PHẦN DÀNH CHO BÁC SĨ)

Hướng dẫn: *vui lòng trả lời phần này bằng cách chọn một câu trả lời thích hợp nhất cho mỗi câu hỏi*

STT	Questions	☐ A.	☐ B.	☐ C.	☐. D
46	Yếu tố nào là thành phần lớn nhất của tổng tiêu hao năng lượng (TEE)?	☐ Trao đổi chất khi nghỉ ngơi	☐ Sinh nhiệt tiêu hoá	☐ Hoạt động thể chất	☐ Stress chuyển hoá
47	Phương pháp nào sau đây được sử dụng phổ biến nhất để đánh giá mức tiêu thụ năng lượng?	☐ Đo nhiệt lượng gián tiếp (IC)	☐ Các phương trình dự đoán	☐ Phương trình Fick đảo	☐ Đồng vị bền

48	Một bác sĩ thông báo cho bạn rằng một bệnh nhân có albumin huyết thanh là 2,8 g/dL, prealbumin là 14 mg/dL và hỏi những chỉ số sinh hoá này có nghĩa là bệnh nhân bị suy dinh dưỡng hay không. Tiếp cận và giải thích thích hợp nhất là gì?	☐ Bệnh nhân thiếu protein, cần phải bổ sung dinh dưỡng kịp thời đặc biệt là axit amin.	☐ Các dấu hiệu này kết hợp với nhau cho thấy bệnh nhân bị suy dinh dưỡng thiếu protein-năng lượng ở mức trung bình.	☐ Cần xem xét bệnh sử, chẩn đoán lâm sàng và các dấu hiệu của phản ứng viêm để giải thích tình trạng giảm protein và albumin máu	☐ Đối với hầu hết bệnh nhân nhập viện, albumin và prealbumin có độ nhạy và độ đặc hiệu tuyệt đối giúp xác định tình trạng suy dinh dưỡng.
49	Yếu tố nào sau đây là một trong những yếu tố giúp sàng lọc nguy cơ suy dinh dưỡng đã được kiểm chứng tốt nhất?	☐ Sự giảm cân không chủ ý.	☐ Bệnh nhân giảm cân theo chế độ ăn giàu đạm ít bột đường.	☐ Bệnh nhân hậu phẫu cắt túi mật qua nội soi ngày 2.	☐ Tình trạng sốt, cảm cúm gần đây.
50	Lợi ích nào sau đây của dinh dưỡng tiêu hoá so với dinh dưỡng tĩnh mạch hoặc hoàn toàn không cung cấp dinh dưỡng	☐ Duy trì chức năng túi mật bình thường	☐ Duy trì chức năng vi khuẩn có lợi	☐ Chuyển hoá sinh lý hơn	☐ Tất cả các ý kiến trên

			đường tiêu hoá		
51	Chế độ ăn giảm năng lượng nhưng đạm cao qua tiêu hoá cung cấp 65%-70% tổng năng lượng tính bằng cách đo nhiệt lượng gián tiếp, được khuyến cáo áp dụng cho bệnh nhân nào?	☐ Suy dinh dưỡng	☐ Béo phì	☐ Suy gan	☐ Suy hô hấp cấp nguy kịch (ARDS)
52	Một bệnh nhân bệnh nặng 60 tuổi, đã được nuôi ăn qua tiêu hoá bằng công thức chuẩn 1 kcal / mL trong một tuần. Bệnh nhân bắt đầu đi ngoài phân lỏng thường xuyên, đòi hỏi đặt ống trực tràng. Đề nghị tiếp theo của bác sĩ nên là gì?	☐ Thay đổi công thức peptit	☐ Xác định nguyên nhân gây tiêu chảy	☐ Thêm men vi sinh và men tiêu hoá vào chế độ ăn.	☐ Đổi sang công thức cho ăn giàu chất xơ.

53	Phương pháp nào sau đây không được khuyến nghị để giảm thiểu ô nhiễm đường ruột khi nuôi ăn sữa qua đường tiêu hoá?	☐ Rửa tay và đeo găng tay sạch trước khi pha sữa hoặc cho ăn.	☐ Sử dụng ngay sữa công thức khi khui hộp.	☐ Sử dụng sữa đã pha hoặc các túi cho ăn không quá 8 tiếng.	☐ Thay hộp đựng thức ăn "mở" cứ sau 24 giờ.
54	Hỗ trợ dinh dưỡng tối ưu cho bệnh nhân suy dinh dưỡng khi dinh dưỡng qua đường ruột (EN) không khả thi trong một thời gian dài?	☐ Dinh dưỡng tĩnh mạch trung tâm (CPN)	☐ Ống sonde dạ dày	☐ Mở dạ dày ra da	☐ Dinh dưỡng tĩnh mạch ngoại vi (PPN)
55	Chống chỉ định của dinh dưỡng tĩnh mạch trung tâm?	☐ Bệnh nhân hấp hối (DNR)	☐ Viêm phúc mạc	☐ Xuất huyết tiêu hoá	☐ Rò động tĩnh mạch
56	Điều nào sau đây sẽ làm tăng độ tan của canxi và photphat trong công thức dinh dưỡng tĩnh mạch	☐ Sử dụng canxi dạng muối clorua	☐ Sử dụng phospho dạng muối natri	☐ Tăng nồng độ axit amin	☐ Tăng nhiệt độ

57	Biến chứng chuyển hóa nào sau đây là phổ biến nhất liên quan đến dinh dưỡng tĩnh mạch	☐ Tăng đường huyết	☐ Thiếu axit béo thiết yếu (EFAD)	☐ Tăng ure huyết	☐ Tăng natri huyết

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Chân thành cảm ơn những đóng góp của anh/chị!

Appendix O

NUTRITION SUPPORT FOR ADULT ICU PATIENT

Nutrition fact

- At least 1/3 patients developed malnutrition pre-admitted
- 2/3 patients at ICU got malnutrition if they did not received nutrition support
- Inadequate nutrition intake is associated with negative outcome, such as: prolong hospital length of stay, ventilator machine, complications and mortality.

Nutrition related issues

- Malnutrition
- Sarcopenia, wasting
- Overweight, Obesity
- Lack of micronutrients
- Refeeding syndrome

Nutrition care process

- Screening
- Assessment
- Treatment
- Following

Nutrition support in ICU

- Pay attention to clinical nutrition
- Clinicians play a certain role in nutrition care process
- Screening and assessment

Objectives of clinical nutrition in ICU

Preserve muscle mass

Appendix P

DINH DƯỠNG CHO NGƯỜI TRƯỞNG THÀNH Ở KHOA HSTC&CĐ

Thực trạng dinh dưỡng

- Ít nhất 1/3 người ở các nước đang phát triển nhập viện có suy dinh dưỡng trước đó
- Nếu không được can thiệp dinh dưỡng kịp thời, 2/3 số người bệnh sẽ có nguy cơ dinh dưỡng
- Thiếu dinh dưỡng hoặc cung cấp dinh dưỡng quá mức cần thiết có liên quan đến kéo dài thời gian nằm viện, thở máy, các biến chứng và tử vong.

Các vấn đề liên quan đến dinh dưỡng

- Suy dinh dưỡng
- Suy mòn, mất cơ
- Thừa cân, béo phì
- Thiếu vi chất
- Hội chứng nuôi ăn lại

Quy trình chăm sóc dinh dưỡng

- Sàng lọc
- Chẩn đoán
- Can thiệp
- Theo dõi và đánh giá

Cải thiện tình trạng dinh dưỡng ở bệnh nhân HSTC&CĐ

- Nên chú trọng dinh dưỡng
- Các nhà lâm sàng giữ vai trò nhất định trong quy tình chăm sóc dinh dưỡng
- Sàng lọc và đánh giá nguy cơ dinh dưỡng và suy dinh dưỡng
- Can thiệp cá thể hóa tối ưu
- Mạng lưới dinh dưỡng
- Xây dựng truyền thông dinh dưỡng

Mục tiêu của dinh dưỡng lâm sàng ở khoa HSTC&CĐ

Bảo tồn khối cơ

Duy tri chức năng miễn dịch

Ngăn ngừa rối loạn chuyển hóa

ICU Management & Practice, Volume 19 - Issue 3, 2019

Appendix Q

Building meal from Food units and food label

Nutrition education

Dr. LE LAM TUYET DUY – ICU department

SỬ DỤNG ĐƠN VỊ CHUYỂN ĐỔI THỰC PHẨM TRONG XÂY DỰNG THỰC ĐƠN & TƯ VẤN DINH DƯỠNG – ĐỌC NHÃN THỰC PHẨM

Truyền thông giáo dục dinh dưỡng

BS. LÊ LÂM TUYẾT DUY – HSTC&CĐ

Appendix R


Mahasarakham University
Heart of the Northeast
Vinh Long General Hospital
Update guidelines on clinical nutrition in Intensive care unit
www.msu.ac.th
Lê Lâm Tuyết Duy – ICU Department
Vĩnh Long, 08/2022
1


Mahasarakham University
Heart of the Northeast
Viện Đa Khoa Vĩnh Long
Cập nhật hướng dẫn dinh dưỡng lâm sàng tại khoa Hồi sức tích cực
www.msu.ac.th
Lê Lâm Tuyết Duy – Khoa ICU
Vĩnh Long, 08/2022
1

Appendix S

Nutritional therapy

Share clinical cases
ICU Department

Kế hoạch chăm sóc dinh dưỡng

Ca lâm sàng
Khoa HSTC&CĐ

BIOGRAPHY

NAME	Miss Le Lam Tuyet Duy
DATE OF BIRTH	November 20, 1991
PLACE OF BIRTH	Tam Binh Hospital, Vinh Long Province, Vietnam
ADDRESS	House Number 1, Sub-village 1, Tam Binh District, Vinh Long Province, Vietnam
PLACE OF WORK	Vinh Long General Hospital, Vinh Long province, Vietnam
EDUCATION	2006 Tam Binh Secondary School, Vinh Long Province, Vietna 2009 Nguyen Binh Khiem High School for the Gifted, Vinh Long Province, Vietnam 2016 Can Tho University of Medicine and Pharmacy, Can Tho City, Vietnam 2018 Cert. in Approach to Oral and Enteral Nutrition in Adults Cert. in Nutrition Support in Metabolic Syndrome LLL Programme in Clinical Nutrition and Metabolism, European Society for Clinical Nutrition and Metabolism (ESPEN) in cooperation with the Society of Parenteral and Enteral Nutrition of Thailand (SPENT) 2020 Certificate in Clinical Nutrition, National Institute of Nutrition, Vietnam 2024 Doctor of Philosophy (Ph.D.) in Health Science Faculty of Medicine, Mahasarakham University, Thailand
Research grants & awards	The 2022 Research Grant offered by the Faculty of Medicine, Mahasarakham University, Thailand
Research output	Le Lam Tuyet, D. and Homchampa, P. (2020). Health problems and healthcare outcomes of older patients admitted to intensive care units in the low- and middle-income countries: A systematic review and meta-analysis. BJM. 2020; 7(2): 39-64.