令和 4 年度博士論文

ベトナムの入院高齢患者の嚥下障害状況と栄養管理

DYSPHAGIA SITUATION AND NUTRITION MANAGEMENT FOR VIETNAMESE OLDER ADULT INPATIENTS

十文字学園女子大学大学院

人間生活学研究科

食物栄養学専攻

19DA502

TRAN PHUONG THAO

トラン　フォン　タオ

指導教員　山本茂

副指導教員　小林三智子　　　　　　副指導教員　吉田亨

CONTENT

SUMMARY

DYSPHAGIA SITUATION AND NUTRITION MANAGEMENT FOR VIETNAMESE OLDER ADULT INPATIENTS

Background: The Vietnamese elderly population has increased rapidly on an annual basis and dysphagia has become a common issue. In Vietnamese hospitals, dysphagia screening/assessment and dietary treatment have not been matters of concern; the automatic solution for cases of choking/aspiration is still a prescription for tube feeding or for serving porridge without a thickening agent. In developed countries, dysphagia screening/assessment is routine. Oral intake of thickened fluids and a texture-modified diet (TMD) is a priority alternative for dysphagia. A thickening agent (such as Xanthan-gum) is necessary to create dysphagia diets and to thicken beverages. Worldwide, the International Dysphagia Diet Standardisation Initiative (IDDSI) was established with 5 levels of food including regular, soft& bite sized, minced & moist, pureed, and liquidized diet. In Japan, I studied the screening and assessment of dysphagia, as well as the technology for the appropriate viscosity of food and drinks. Then I conducted research on dysphagia situation and nutritional management in Vietnamese hospitals.

Study 1: Relationship between dysphagia and nutritional status

Objective: To assess the prevalence of dysphagia and determine nutritional status and some related factors in elderly inpatients.

Methods: Clinical trials (repetitive saliva swallow test (RSST) and water swallow test (WST)), Eating Assessment Tool (EAT-10) and nutritional status screening were conducted in 1007 elderly hospitalized patients aged 65 years and older at three large hospitals in Vietnam.

Results: The rate of dysphagia was very high at 16.5% in the clinical trials (RSST and WST) and 24.6% by EAT-10. Based on clinical trials, dysphagia tended to increase with age. About one third of patients had a normal nutrition status, 17% were in malnutrition, and more than half were at risk of malnutrition. The rate of malnutrition in the dysphagia group (50%) was higher than in the non-dysphagia group (11%). Based on EAT-10, the risk of dysphagia was independently associated with higher risk of malnutrition, with an odds ratio of 3.2 (95% CI: 1.9-5.3, p<0.001). In addition, malnutrition was also an independent predictor for risk of dysphagia, with an odds ratio of 3.1 (95% CI: 1.8-5.2, p<0.001).

Conclusions: Malnutrition and dysphagia prevalence were high; and malnutrition and dysphagia have a strong relationship in older adult inpatients in Vietnam. Therefore, for the proper treatment, nutritional and dysphagia screening at hospital admission are very important and should be recommended.

Study 2: Supplying water for dysphagia patients

Objective: To determine the appropriate viscosity levels of thickened water in stroke patients with dysphagia.

Methods: Assessing dysphagia by the Mann Assessment of Swallowing Ability (MASA) tool and determining the suitable viscosity level of thickened water in 85 stroke patients at Vietnamese Friendship Hospital.

Results: Stroke patients with severe dysphagia consume less water and respond well with a higher viscosity of water (maximum 3% xanthan-gum).

Conclusions: The viscosity of water (maximum 3% xanthan-gum) was proportional to the severity of dysphagia levels.

Study 3: Dietary management on dysphagia patients in hospitals at present

Objective: To compare the nutritional status of older adult inpatients consuming TMD to those consuming a regular diet.

Methods: The study was designed as cross-sectional and was conducted in three large hospitals in northern Vietnam. Textures of food were classified according to the IDDSI testing methods. The data about nutritional status using the Global Leadership Initiative on Malnutrition (GLIM) and dietary intake for 344 older adult inpatients were collected.

Results: The results showed 104 subjects were prescribed TMD. The textures of hospital diets have still not been adequately developed, according to IDDSI. In particular, the three hospitals in the study had not yet developed pureed meals. Of all the older adult inpatients (74.7 ± 6.8 years old, 52.9% female) 28.8% had malnutrition by GLIM criteria. The TMD group had a malnutrition prevalence two times higher than the regular diet group. Total energy intake from hospital meals and outside snacks in the regular diet group was higher than in the TMD group by about 150 kcal. Although energy provided from the hospital diet in both groups was similar, hospital meal wastage in the TMD group was higher than the regular diet group.

Conclusions: The older adult inpatients on TMD had a nutritional status worse than those consuming the regular diet. TMD needs to be improved in texture and quality. Patients on TMD should receive further support from not only dietitian but also other medical staff.

    These three studies are first steps to determine the dysphagia situation and nutritional management of older adult inpatients. Through studies and activities such as workshops and publications, the Vietnamese public and medical staffs can understand more about dysphagia and the role of dysphagic diets. Based on the results of these studies, I would like to contribute to the development of policies related to the nutritional management of dysphagia in hospitals and communities, dysphagia food label regulation, etc. In addition, I also would like to implement more activities to develop dysphagia research and treatment that follow IDDSI and are adapted to food culture in Vietnam.

ベトナムの入院高齢患者の嚥下障害状況と栄養管理

背景：ベトナムの高齢者人口は急速に増加しており、嚥下障害が一般的な問題となっている。ベトナムの病院では、嚥下障害のスクリーニング/判定および食事療法は考慮されていない。窒息/誤嚥の場合は、ほぼ自動的に経管栄養または増粘剤なしのお粥が処方箋される。先進国では、嚥下障害のスクリーニング/判定は日常業務である。嚥下障害では、濃厚な水分と嚥下食（TMD）の経口摂取が優先される。嚥下食や増粘飲料を作るには、増粘剤（キサンタンガムなど）が必要である。国際嚥下食標準化イニシアチブ（IDDSI）は、通常、やわらかい一口大の食品、しっとりしたミンチ状の食品、ピューレ、および流動食の5レベルの食品で構成されている。私は、先ず日本で嚥下障害のスクリーニング法と判定法、および飲食物の適切な粘度測定法を学んだ。その後、ベトナムの病院で嚥下障害状況と栄養管理に関する研究を行った。

研究1：嚥下障害と栄養状態の関係

目的：入院高齢患者の嚥下障害の割合、栄養状態およびその他要因の調査

方法：ベトナムの3つの大病院で、65歳以上の入院高齢患者1007人を対象に、臨床試験（反復唾液嚥下試験（RSST）と水嚥下試験(WST)）、摂食評価ツール-10（EAT-10）（アンケート）および栄養状態の判定を実施した。

結果：嚥下障害の率は非常に高く、臨床試験（RSSTおよびWST）では16.5％、EAT-10では24.6％であった。嚥下障害は年齢とともに増加する傾向が臨床試験の結果わかった。患者の栄養状態は、正常約1/3, 低栄養17％、そして低栄養のハイリスクは半分以上であった。栄養失調率は、嚥下障害群（50％）で、非嚥下障害群（11％）よりも高かった。嚥下障害が栄養失調を起こすリスクは高くオッズ比は3.2（95％CI：1.9-5.3、$p < 0.001$）であることがEAT-10でわかった。また、栄養失調も嚥下障害の独立した要因でオッズ比は3.1（95％CI：1.8-5.2、$p < 0.001$）であった。

結論：入院高齢患者の栄養失調と嚥下障害の割合は高く、両者には強い相関関係があった。したがって、適切な処置のためには入院時の栄養および嚥下障害のスクリーニングは非常に重要であり、推奨されるべきである。

研究2：嚥下障害患者への水の供給

目的：嚥下障害のある脳卒中患者に適切な水の粘度レベルを明らかにすること。

方法：ベトナム友好病院の85脳卒中患者で、Mann Assessment of Swallowing Ability（MASA）法で嚥下障害の判定を行い、最も適切な水粘度を調べた。

結果：重度の嚥下障害のある脳卒中患者は、水の消費量が少なく、粘度の高い水（最大3%キサンタンガム）がより適切であった。

結論：適切な水の粘度は、脳卒中患者の嚥下障害の程度に比例していた。

研究3：病院における嚥下障害患者の現在の食事管理

目的：入院高齢患者で、TMDを摂取している者と常食を摂取している者の栄養状態を比較すること。

方法：本研究は、ベトナム北部の3つの大きな病院で実施した横断研究である。食形態は、IDDSIのテスト方法に従って分類した。344入院高齢患者のGlobal Leadership Initiative on Malnutrition (GLIM)を使用した栄養状態判定と食事摂取量を調べた。

結果：被験者104人にTMDが処方された。IDDSIによると、3病院の食事の形態はまだ十分に発達していなかった。特に、病院はまだピューレ食を開発していなかった。すべての入院高齢患者（74.7±6.8歳、52.9%の女性）のうち、28.8%がGLIM基準によると栄養失調であった。TMD群の栄養失調率は常食群の2倍であった。常食群の総エネルギー摂取量（病院食と間食）は、TMD群よりも約150kcal高かった。両方のグループの病院食から提供されるエネルギーは類似していたが、TMD群の病院食の残食は常食群よりも多かった。

結論： TMDの入院高齢患者の栄養状態は、常食を摂取している入院患者よりも悪かった。嚥下食は、食形態および質をさらに改善する必要がある。嚥下食を摂取する入院高齢患者は、栄養士だけでなく他の医療スタッフの補助が必要である。

　以上の3つの研究は、入院高齢患者の嚥下障害の状況と栄養管理を決定するための最初のステップである。医療スタッフおよびベトナム人々は、ワークショップや出版などの活動および研究を通じて、嚥下障害と嚥下食の役割についてより深く理解することが望まれる。私は、これらの研究で学んだことを生かして、病院や地域社会における嚥下障害の栄養管理、嚥下障害食品表示規制などに関連する政策の策定に貢献したい。また、IDDSIに準拠し、ベトナムの食文化に適応した嚥下障害の研究・治療を発展させる活動を充実させていきたいと思う。

GENERAL INTRODUCTION

The Vietnamese elderly population has increased rapidly on an annual basis. Disease risk increases with advancing age. Dysphagia (swallowing difficulty) is a growing health concern issue in our aging population. However, in hospitals, dysphagia screening, assessment and dietary treatment have not been concern; the automatic solution for cases of choking/aspiration is still a prescription for tube feeding or for serving porridge without a thickening agent. In developed countries, dysphagia screening/assessment is routine work. Oral intake is a priority alternative for dysphagia and has positive consequences. Thickening agent (such as Xanthan-gum) is necessary to make dysphagia diet and drinking. Worldwide, the International Dysphagia Diet Standardisation Initiative (IDDSI) was established with 5 levels of food including: regular, soft& bite sized, minced & moist, pureed, and liquidised diet.

In Japan, I studied the screening and assessment of dysphagia, as well as the technology of the appropriate viscosity of food and water. Then I conducted research about dysphagia screening and nutritional management in Vietnamese hospitals.

Study 1: Relationship between dysphagia and nutritional status: chapter 1-4

Study 2: Supplying water for dysphagia patients: chapter 5

Study 3: Dietary management on dysphagia patients at present: chapter 6-7

CHAPTER 1. DYSPHAGIA PREVALENCE AMONG ELDERLY IN SOME VIETNAMESE HOSPITALS – STUDY 1

1.1. Abstract

Background/objective. The Vietnamese elderly population has increased rapidly on an annual basis and dysphagia has become a common issue. However, in hospitals, dysphagia screening has not been a concern; the automatic solution for cases of choking/aspiration is still a prescription for tube feeding. In developed countries, oral intake is a priority alternative for dysphagia and has positive consequences. For suitable dysphagia dietary treatment, early, quick and effective screening for dysphagia plays an important role. Therefore, in this study, the aim was to determine the prevalence of dysphagia in the elderly in some Vietnamese hospitals. Method. The study was designed as a cross-sectional study and was conducted in three large hospitals in Vietnam. The subjects consisted of 1007 elderly inpatients aged 65 and older. They completed dysphagia screening tests that included the repetitive saliva swallowing test (RSST), the water swallowing test (WST) and Eating assessment tool-10 (EAT-10) questionnaires. The investigators were dietitians who were trained to collect data. Results. The rate of dysphagia was quite high 16.5% (166) among elderly inpatients according to the RSST and WST; and 24.6% (248) according to EAT-10 questionnaires. Specifically, according to clinical test, the rate of dysphagia was found to be higher in neurologic disorder group 40% (45/113), the esophageal disorders group 51% (32/63) and the respiratory & latrogenic disorder group 29% (19/65). Almost all subjects who could not sit while they were being examined belonged to the dysphagia group. Conclusion. Through a combination of simple screening tests, this study indicated that the rate of dysphagia in elderly inpatients was quite high. Therefore, early dysphagia detection is necessary to administer priority dietary treatment by oral intake instead of tube feeding.

1.2. Introduction

Older adults are the fastest growing segment of the population in Vietnam. The number of Vietnamese aged 65 and older is projected to increase from 7.8% in 2015 to 17.8% in 2050 (1). Disease risk increases with advancing age. Dysphagia (swallowing difficulty) is a growing health concern issue in our aging population. Swallowing is a complex neuromuscular activity that consists of oral, pharyngeal, and esophageal phases, and involves the coordinated function of many muscles. Thus, many adverse health conditions can influence swallowing function. Neurological diseases, cancers of the head/neck and esophagus, and metabolic deficits are broad categories of diseases that might contribute to dysphagia. A systematic review indicated that dysphagia affected 8.1-80 % of stroke patients and 11-81 % of Parkinson's disease patients (2). Dysphagia may contribute to decreased food and liquid intake and may reflect altered level of consciousness, physical weakness, or lack of coordination in the swallowing mechanism (3). Therefore, prevention and early detection of dysphagia are important in improving health in the elderly.

There are many tools for screening dysphagia depending on conditions and resources. Some previous research on Vietnamese acute stroke patients showed that the rate of dysphagia is quite high, around 33-81% (4–6). Almost these studies were carried out on neurological disorder patients by rehabilitation specialists and sample sizes were limited by the dysphagia screening tools that were used, which require specialized techniques, take time, and can be costly. Under conditions in Vietnam, almost all hospitals have lacked speech therapy specialists and modern equipment such as video fluoroscopy (VF) and video endoscopy (VE) (7). Screening for dysphagia has not been a major concern; even if some hospitals have techniques for screening/assessing dysphagia, the automatic solution for cases of choking /aspiration is still a prescription for tube feeding. Dysphagia is related directly to nutritional status and quality of life. In developed countries, oral intake is a priority alternative for dysphagia and has positive consequences (8, 9).

Therefore, in order to improve Vietnamese dysphagia nutrition management, dietitians also should have basic knowledge about how to actively detect dysphagia patients, to prepare food for dysphagia and to apply techniques to feed dysphagia patients by oral intake, in case the dietitians lack support from rehabilitation specialists.

In addition, at present Vietnam is lacking data related to dysphagia rates among general elderly inpatients. Therefore, a simple screening tool would be useful in determining the rate

of dysphagia and more importantly can be used by staff members such as dietitians who are not speech or language pathologists to identify dysphagia and aspiration risk in elderly patients or other subjects who may have a high risk of dysphagia. In this study, we used the repetitive the saliva swallowing test (RSST), the water swallowing test (WST) and the Eating assessment tool-10 (EAT-10) as initial screening dysphagia tools. These tools are simple, quick, low-cost procedures and in particular have a high sensitivity and specificity compared to modern equipment (7, 10–12). By combining clinical tests at a specific time and questionnaires administered over a span of time, we hoped to detect all subjects who have a risk of dysphagia to determine the proportion of dysphagia in elderly inpatients in some Vietnamese hospitals.

1.3. Methods

Settings and Sample

The study was designed as a cross-sectional study and was conducted for 6 months from August 2018 through January 2019. This research received permission from Hanoi Medical University's ethical committee, number 1318. The study population consisted of elderly inpatients being treated in three large general hospitals in Vietnam, Hanoi Medical University Hospital (500 beds), Dong Da General Hospital (800 beds) and National Geriatric Hospital (500 beds).

Subjects were recruited for the study from all newly admitted patients, i.e., patients in the first 48 hours after admission, by random selection (using a random number table) from admission registers.

The sample size was 1000 subjects who met the inclusion criteria: (a) hospitalized elderly in the three above hospitals, (b) age 65 or over. The exclusion criteria included: (a) refusal to participate in this study, (b) mute, deaf or psychosis and (c) suffering from ventilator, coma, dementia, trauma or injury. All potential subjects completed questionnaires and were screened using swallowing tests.

Data collection

All the questionnaires were filled out by investigators. The investigators were dietitians who were trained to collect study data. Before carrying out the actual study, we conducted a pilot study on 50 patients to revise the instruments.

Below is the information that we obtained.

Demographic data

The data were collected from medical records, caregivers and subjects.

Repetitive saliva swallowing test (RSST)

Patients were asked to swallow their own saliva as many times as possible in 30 seconds; the examiner determined the absence of laryngeal elevation during swallow by observing and/or feeling laryngeal movement. If a patient was unable to perform three consecutive swallows with two retests, he/she suffered from dysphagia. If a patient was able to swallow 3 times or more, then the WST would be administered (10).

Water swallowing test (WST)

The position while drinking water needed to be evaluated: sitting or not sitting (from 30 degrees to 60 degrees). The examiner would offer 3ml water for the subject to drink; if patients choked or their voice changed, patients suffered from dysphagia. If there was no choking or voice change, subjects continued to drink 30 ml water. Subjects who had choking or voice change were dysphagia. If there was no choking or voice change but patients needed to swallow more than once or spent more than 5 seconds swallowing, subjects were suspected to have dysphagia. Subjects who swallowed 1 time within 5 seconds without abnormal symptoms were normal (10). In this study, no dysphagia group would be included both suspected dysphagia and normal status.

Beside the clinical tests, the following questionnaire was also used to screen dysphagia.

Eating assessment tool (EAT-10) questionnaire

EAT-10, a self-reported validated questionnaire that assesses perception of swallowing difficulty was used to evaluate dysphagia risk. The EAT-10 questionnaire was translated from English into Vietnamese. There are 10 simple questions with a total score of 40 points and the cut-off point is 3. If total score $\geq$ 3 points, it means the patient may have problems swallowing efficiently and safely (13).

1.4. Results

This selection process resulted in a total of 1007 elderly inpatients (420 males and 587 females, mean age 75.5 years). Dysphagia was observed in 62 males (6.2%), 104 females (10.3%) and a combination of 166 males and females (16.5%) out of 1007 elderly inpatients. The no dysphagia group was about 83.5% of the total.
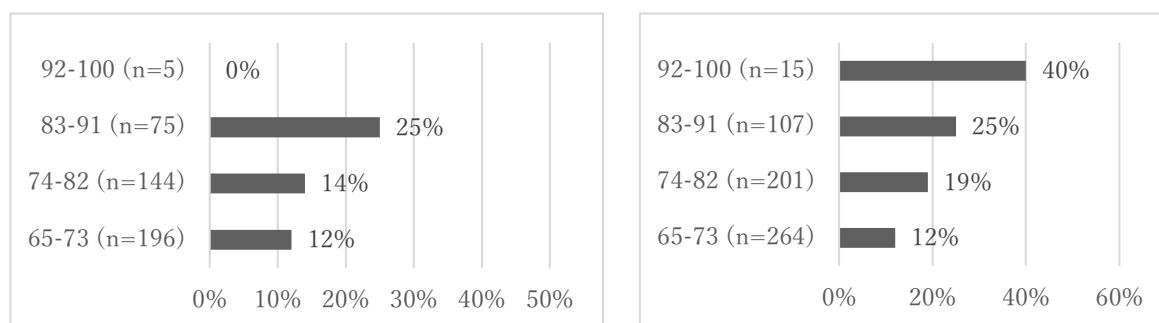

Figure 1. 1. Prevalence of dysphagia by age in males (left) and females (right)

Figure 1.1 shows that with regard to age, the highest prevalence of dysphagia was seen in 83-91 year-old males (25%) and in 92-100 year-old females (40%), and the lowest prevalence dysphagia was observed in 65-73 year-olds, both males and females, with the same rate of 12%.

Table 1. 1. Dysphagia status by clinical test (RSST & WST) and EAT-10 questionnaires in elderly inpatients according to function analysis.

Dysphagia status		Neurologic disorders (n=113)	Esophageal disorders (n=63)	Respiratory & latrogenic disorder (n=65)	Other (n=766)
Clinical test	Dysphagia	45 (40%)	32 (51%)	19 (29%)	70 (9%)
EAT-10	≥3 score	57 (50%)	47 (75%)	30 (46%)	114 (15%)

According to disease analysis, by clinical test, the patients with neurologic disorders (stroke, Parkinson's, etc.), esophageal disorders (dysfunction esophageal, gastroesophageal reflex, etc.) and respiratory & latrogenic disorders (tracheal surgery, artificial airway, etc.) had high dysphagia incidence (40%, 45/113), (51%, 32/63) and (29%, 19/65), respectively. By the EAT-10 questionnaires, neurologic disorders, esophageal disorders and respiratory & latrogenic disorder also had high dysphagia incidence at 50%, 75%, 46%, respectively.
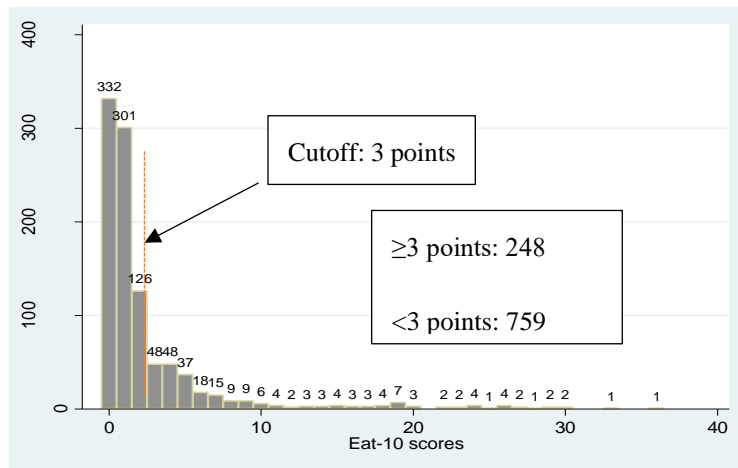
Figure 1. 2. The distribution of EAT-10 scores

Figure 1.2 shows the distribution of EAT-10 scores. There were 248 subjects (24.6%) who had an EAT-10 score ≥3, which means that they have problems swallowing.
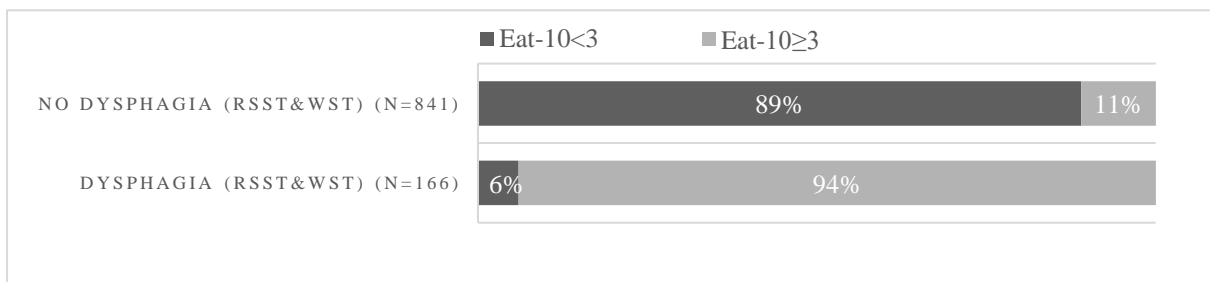
Figure 1. 3. Dysphagia status by clinical test (RSST&WST) and EAT-10 score.

Figure 1.3 indicates the dysphagia status by clinical test and EAT-10 score. The dysphagia patients screened by clinical test (94%) almost all had an EAT-10 score ≥3 points and no dysphagia patients (89%) had EAT-10 score<3 points.
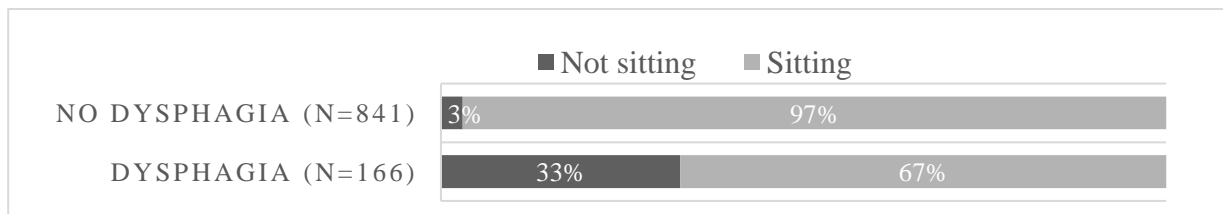
Figure 1. 4. Sitting position to screen dysphagia and dysphagia status of elderly inpatient

Figure 1.4 shows the sitting position to screen dysphagia and dysphagia status of elderly inpatients. The rate of not sitting in the dysphagia group (33%, 54/166) was higher than in the no dysphagia group (3%, 29/841).

1.5. Discussion

Dysphagia is a common issue in elderly populations. World-wide, there are several swallowing tests to screen for dysphagia. In hospitals, VF and VE are used widely to assess dysphagia (7). However, they are expensive and require specialized techniques so simple swallow screening tests should be implemented first to detect abnormal cases before using complicated equipment. In Vietnam, dysphagia screening has not been a major concern. Even simple screening tests have not been implemented as standard procedure for all patients at risk of dysphagia such as the elderly, stroke victims, Parkinson's disease, dementia patients, etc.

There have been studies about simple tests such as RSST, WST and EAT-10 questionnaires that were used to screen for dysphagia. RSST and WST were indicated as a useful simple task-screening tool to detect dysphagia and they have high sensitivity, specifically as a predictor of aspiration ($p<0.05$) compared with VF (7, 11). And the EAT-10 questionnaire also was a reliable dysphagia screening tool (10). Thus, in this study, we used the simple tests to screen for dysphagia on more than one thousand elderly patients. Based on these results, we observed that the results of the EAT-10 questionnaires have a rate of dysphagia higher than the clinical tests because the questionnaires would ask about a range of time, but dysphagia symptoms may not be present when the clinical tests are conducted.

We found that the prevalence of dysphagia was 16.5% (166/1007) by RSST and WST and 24.6% by the EAT-10 questionnaire. These results were similar to those reported by Okamoto et al (15.1%) by using WST and Kawashima et al (13.8%) from questionnaires on community-dwelling individuals aged 65 and older in one prefecture in Japan (14, 15). This is also similar to a dysphagia survey in general hospitals by the Japanese National Institute of Longevity Research (13.6%) (16) and research in the US (about 15%) (12). Based on these results, we realized that the rate of dysphagia in elderly Vietnamese inpatients was quite high and similar to countries which have good dysphagia management systems with screening, dysphagia assessment and texture-modified food for oral intake by dysphagia patients. Through early detection of dysphagia and dysphagia dietary treatment, dysphagia status and quality of life can be significantly improved (8, 9). Therefore, screening for dysphagia is necessary and needs to be implemented widely in Vietnam not only in hospitals but also in the community; the choice of a suitable screening method further depends on the conditions in each country and area.

The rates of dysphagia related to neurologic disorders, esophageal disorders and respiratory & Iatrogenic disorders were quite high according to the clinical tests and the EAT-10 questionnaires. These results are similar to a systematic review which showed that 8.1–80 % of stroke patients and 11–81 % of Parkinson's disease patients have dysphagia (2). This systematic review had large range rate may be because of the difference method to screening dysphagia and epidemiology. These are patient groups with a high risk of dysphagia. Therefore, it is necessary to screen for dysphagia as soon as possible in these patients.

In Vietnam, dietitians are formally trained and the number of dietitians is gradually increasing. Therefore, by using the simple swallowing screening tools, the dietitian can actively screen patients for dysphagia and also administer food for dysphagia. In addition, dietitians determine diets for patients so it is more convenient for dietitians to detect dysphagia patients through their eating behavior. These were the reasons why in this study we selected dietitians to be investigators and they performed well.

Dysphagia is usually a concern in the elderly. In this study, we also observed that the higher the age, the higher the risk of dysphagia. The elderlies are likely to suffer from sarcopenia, stroke, dementia and many diseases which are closely related to dysphagia. In addition, the ability of the elderly to recover is less than that of younger people because of reduced organ function, so the risk of dysphagia is higher (12).

By comparing the two methods (clinical tests and EAT-10 questionnaires), we observed that almost dysphagia patients (94%) according to the clinical tests had EAT-10 score ≥ 3 points. Therefore, the appropriate cut-off point is 3, as indicated by the questionnaire instructions.

With regard to the sitting position when the clinical tests (RSST, WST) were administered, only 8% (83/1007) could not sit while they were being checked. These patients would lie on a bed tilted 30 – 60 degrees with head lying on a pillow tilted 30 degrees to administer the test. About 65% (54/83) of bedridden patients suffered from dysphagia. It is understandable that almost patients who cannot sit to swallow are in the dysphagia group because dysphagia usually occurs in patients who are suffering from a neurological disorder such as paralysis from stroke. Therefore, with bedridden patients, dysphagia detection needs to be a concern.

Limitations of this study included limited resources, so we have been unable to undertake a study to validate the Vietnamese EAT-10 questionnaire; we merely translated the English version into Vietnamese and did a pilot study to complete the questionnaire. In any case, the

content of the questionnaire is not difficult, with items such as "Swallowing liquids takes extra effort", "Swallowing solids takes extra effort" etc., with levels from (0) "no problem" to (4) "severe problem", so we felt that the possibility of translation bias would be small.

In conclusion, through a combination of simple screening tests, this study indicated the rate of dysphagia in elderly inpatients was quite high. Therefore, early dysphagia detection is necessary to administer dietary treatment by oral intake instead of tube feeding.

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CHAPTER 2. ORAL FUNCTION, HANDGRIP STRENGTH AND ASPIRATION PNEUMONIA IN DYSPHAGIC OLDER ADULT INPATIENTS IN VIETNAM - STUDY 1

Thao Phuong Tran*, Linh Nguyen Thuy, Keiko Hirose, Fumio Shimura, Shigeru Yamamoto. Oral function, handgrip strength and aspiration pneumonia in dysphagic older adult inpatients in Vietnam. Asian J. Diet. 2: 71-74. **2020**.

2.1. Abstract

Background/objective. The Vietnamese older adult population has increased rapidly on an annual basis and dysphagia has become a common issue. Dysphagia and factors related to dysphagia will effect treatment in general and dietary treatment in particular. This study aimed to find out the relationship between dysphagia and oral function, handgrip strength and pneumonia in older adult inpatients in Vietnam. Method. The study was designed as a cross sectional study and was conducted in three large hospitals in Vietnam. There were more than one thousand older adult patients who met the inclusion criteria. The data about dysphagia status, oral function, muscle strength and pneumonia were collected by dietitians. Results. The proportions of older adult inpatients with the ability to open the mouth more than three fingers, move the tongue forward, move the tongue to the left and right, push the buccal mucosa with the tongue, inflate both cheeks and with no atrophy of the tongue and no tongue-surface dryness in the non-dysphagia group were more than dysphagia group ($p<0.001$). No difference was observed between those with and without dentures in the two groups. The dysphagic older adult inpatients had lower muscle strength than the non-dysphagics in both genders ($p<0.001$). There were 13.5% older adult inpatients who suffered from pneumonia. The pneumonia rate (39.2%) in the dysphagia group was higher than in the non-dysphagia group (8.4%). Conclusion. Dysphagia has a positive relationship with poor oral function, low handgrip strength and a high rate of pneumonia. Dietitians need to have an overview of dysphagia patients in order to supply a suitable texture-modified diet.

2.2. Introduction

Population aging is now a worldwide unavoidable trend. Dysphagia has become a common issue in older adult populations (1). Swallowing is a complex neuromuscular activity that consists of oral, pharyngeal, and esophageal phases, and involves the coordinated function of many muscles. Thus, many adverse health conditions can influence swallowing function. Neurological diseases, head/neck and esophageal cancer, and metabolic deficits are broad categories of diseases that might contribute to dysphagia.

The number of Vietnamese aged 65 and older is projected to increase rapidly from 7.8% in 2015 to 17.8% in 2050 (2). In previously published data, more than one thousand older adult inpatients in three large Vietnamese hospitals were screened for dysphagia through the use of quick and simple tools. The results showed that the rate of dysphagia was quite high, about 16.5% (3). This result is similar to other studies in Japanese and US older adult populations (4, 5). Therefore, dysphagia also is a main issue in older adult inpatients in Vietnam.

In clinical practice, dysphagia patients who suffer from neurological conditions such as stroke disease, Parkinson's disease may have limited oral function because of their neurological disorder. These abnormal oral functions, such as open mouth, tongue motion, inflated cheeks, dentures, atrophy of the tongue papilla and drying of the tongue surface may affect dysphagia status. These are simple tests but based on the dysfunction of each part of the oral cavity, the dietitian can decide which kind of texture-modified diet is suitable for each patient.

Muscle weakness may reflect a global effect of aging. The tongue is a key component in safe swallowing. Poor performance of the tongue leads to high risk of aspiration. There was a significant positive association between posterior tongue strength and handgrip strength (6). Checking handgrip strength may be supply information which reflects tongue strength and muscle of the body. On the basis of these data, a dietitian can design suitable menus for patients.

Dysphagia patients who aspirate are at an increased risk of acquiring pneumonia. A recent large-scale cross-sectional study of Japanese older adults showed that the risk factors for aspiration pneumonia were sputum suctioning, dysphagia, dehydration, and dementia; pneumonia is the third leading cause of death in this country (7, 8). Pneumonia is a serious consequence of dysphagia and a major cause of morbidity and mortality in the older adult; therefore, improving understanding of the prevalence of dysphagia in people with pneumonia is also important to highlight the necessary for better management of dysphagia to prevent development of this serious condition.

In this study, dietitians would directly collect the oral function indicators and muscle strength and pneumonia status of subjects. We thought that by understanding oral function, muscle strength, and pneumonia status, the dietitian can provide dysphagia patients suitable food choices. The aim of this study was to find the relationship between dysphagia and oral function, muscle strength and pneumonia status in dysphagic older adult inpatients in Vietnamese hospitals.

2.3. Methods

Settings and Sample

The study was designed as a cross-sectional study and was conducted for 6 months, from August 2018 through January 2019. This research was conducted in accordance with Declaration of Helsinki and approved by the Hanoi Medical University's ethical committee, number 1318. The study population consisted of older adult inpatients being treated in three large general hospitals in Vietnam: Hanoi Medical University Hospital (500 beds), Dong Da General Hospital (800 beds) and National Geriatric Hospital (500 beds).

Subjects were recruited for the study from all newly admitted patients, i.e., patients in the first 48 hours after admission, by random selection (using a random number table) from admission registers.

The sample size was about one thousand subjects who met the inclusion criteria: (1) hospitalized older adults in the above three hospitals, (2) age 65 or over. The exclusion criteria included: (1) refusal to participate in this study, (2) mute, deaf or psychotic and (3) suffering from ventilator, coma, trauma or injury. All potential subjects completed questionnaires and were screened using swallowing tests.

Data collection

All the questionnaires were carried out by investigators. The investigators were dietitians who were trained to collect the study data. Before carrying out the actual study, we conducted a pilot study on 50 patients to revise the instruments.

Below is the information that we obtained.

Demographic data

Data such as age, gender, diagnosed diseases were collected from medical records.

Dysphagia screening

Repetitive saliva swallowing test (RSST)

Patients were asked to swallow their own saliva as many times as possible in 30 seconds; the examiner determined the absence of laryngeal elevation during swallowing by observing and/or feeling laryngeal movement. If a patient was unable to perform three consecutive swallows with two retests, he/she suffered from dysphagia. If a patient was able to swallow 3 times or more, then the Water Swallowing Test would be administered (9).

Water Swallowing Test (WST)

The examiner would offer 3ml water for the subject to drink; if patients choked or their voice changed, patients suffered from dysphagia. If there was no choking or voice change, subjects continued to drink 30 ml water. Subjects who had choking or voice change were dysphagic. If there was no choking or voice change, patients were normal (9).

Oral functional test

In order to check oral function, a tongue depressor was used. Some indicators such as opening degree, tongue motion, inflating cheeks, dentures, atrophy of the tongue papilla and lingual surface drying were collected.

Muscle strength

Muscle strength was assessed using hand grip strength. A hand dynamometer (MP-HDM03-BK, China) was used. The mean of three measurements from each hand was recorded. In cases of parenteral nutrition or paralysis, a mean of three measurements was used from the dominant hand. Missing data could be accepted.

Pneumonia

Information was collected from the medical record.

Statistical analysis

P-values of less than 0.05 were considered statistically significant for all the analyses is the plural. The above statistical procedures were performed using Stata version 12.0.

2.4. Results

Table 2. 1. Characteristics of subjects enrolled in this study (n=1007)

Characteristics	Overall (n=1007)	Dysphagia (n=166)	Non-dysphagia (n=841)	P-value
Age, years	75.5±7.3	78.0±7.7	75.0±7.1	<0.05#
Female, n (%)	587 (58.3)	104 (62.7)	483 (57.4)	0.21*
Male, n (%)	420 (41.7)	62 (37.3)	358 (42.6)	
Disease groups				
• Neurologic disorders, n (%)	113 (11.2)	45 (27.1)	68 (8.0)	
• Esophageal disorders, n (%)	63 (6.3)	32 (19.3)	31 (3.7)	
• Respiratory & latrogenic disorders, n (%)	65 (6.5)	19 (11.4)	46 (5.5)	
• Other, n (%)	766 (76)	70 (42.2)	696 (82.8)	

Data presented as mean ± standard deviation or n (%)

*Chi-square test   # Student t-test

Table 2.1 shows the characteristics of 1007 older adult inpatients (420 males and 587 females, mean age 75.5±7.3 years). Dysphagia occurs more in older patients with no difference between genders. There were 24% of subjects who suffered from neurologic disorders or esophageal disorders or respiratory & latrogenic disorders.

Table 2. 2. The comparison about oral function between dysphagia group and non-dysphagia group

Oral function indicators		Overall (n=1007)	Dysphagia (n=166)	Non-dysphagia (n=841)	p-value
Mouth opening degree	Higher three fingers	943 (93.6%)	133 (80.1%)	810 (96.3%)	<0.001
	Lower three finger	64 (6.4%)	33 (19.9%)	31 (3.7%)	
Move your tongue forward	Can	981 (97.4%)	149 (89.8%)	832 (98.9%)	<0.001
	Can not	26 (2.6%)	17 (10.2%)	9 (1.1%)	
Move your tongue left and right	Can	946 (93.9%)	130 (78.3%)	816 (97.0%)	<0.001
	Can not	61 (6.1%)	36 (21.7%)	25 (3.0%)	
Push the buccal mucosa with your tongue	Can	941 (93.4%)	127 (76.5%)	814 (96.8%)	<0.001
	Can not	66 (6.6%)	39 (23.5%)	27 (3.2%)	
Inflating both cheeks	Can	941 (93.4%)	124 (74.7%)	817 (97.1%)	<0.001
	Can not	66 (6.6%)	42 (25.3%)	24 (2.8%)	
Dentures	Yes	302 (30.0%)	48 (28.9%)	254 (30.2%)	<0.5
	No	705 (70.0%)	118 (71.1%)	587 (69.8%)	
Atrophy of the tongue papilla	Yes	83 (8.2%)	32 (19.3%)	51 (6.0%)	<0.001
	No	924 (91.8%)	134 (80.7)	790 (94.0%)	
Tongue surface drying	Little saliva	112 (11.1%)	48 (28.9%)	64 (7.6%)	<0.001
	Enough saliva	895 (88.9%)	118 (71.1%)	777 (92.4%)	

Fisher's exact test

Table 2.2 shows the comparison about oral function between dysphagia group and non-dysphagia group. The proportions of older adult inpatients with the ability to open the mouth more than three fingers, move the tongue forward, move the tongue to the left and right, push the buccal mucosa with the tongue, inflate both cheeks in non-dysphagia group were higher in the non-dysphagia group than in the dysphagia group and have a significant difference with p<0.001. There was no observed difference in having or not having dentures between the two groups. The dysphagia group had rates of tongue atrophy and tongue surface dryness higher than the non-dysphagia group and the difference was statistically significant with p<0.001.

Table 2. 3. The comparison about muscle strength between dysphagia group and non-dysphagia group

Muscle strength (kg)	Overall	Dysphagia	Non-dysphagia	p-value
Male	(n=384) 18.6±8.0	(n=53) 12.6±7.4	(n=331) 19.6±7.7	
Female	(n=532) 11.2±5.0	(n=87) 9.0±4.7	(n=445) 11.6±4.9	
All	(n=916) 14.3±7.4	(n=140) 10.3±6.1	(n=776) 15.0±7.4	<0.001

Mann-Whitney U test

Table 2.3 indicated the comparison about muscle strength between dysphagia group and non-dysphagia group. The dysphagia older adult inpatients had lower muscle strength than non-dysphagia patients in both genders with a significant difference of p<0.001.

Table 2. 4. The comparison about aspiration pneumonia between dysphagia group and non-dysphagia group

Pneumonia status	Overall (n=1007)	Dysphagia (n=166)	Non-dysphagia (n=841)	p-value
Yes	13.5% (136)	39.2% (56)	8.4% (71)	<0.0001
No	86.5% (871)	60.8% (101)	91.6% (770)	

Fisher's exact test

Table 2.4 show the comparison about aspiration pneumonia between dysphagia group and non-dysphagia group. There were 13.5% older adult inpatients who suffered from pneumonia. The pneumonia rate (39.2%) in the dysphagia group was higher than in the non-dysphagia group (8.4%). It had a significant difference of p<0.0001.

2.5. Discussion

The aging population in Vietnam is increasing rapidly and dysphagia is becoming an issue of concern related directly to quality of life and mortality of older adults. Oral function indexes also provide results regarding dysphagia. Limited mouth opening, tongue movement are related strongly to dysphagia. Based on these examinations, dietitians were able to adjust the texture of food and the liquid feeding position of dysphagia patients. For example, dysphagia patients cannot open the mouth easily to chew so pureed food will be the priority of choice. In cases of paralysis on one side where the patient cannot sit to eat, the patient's position can be adjusted so that he/she lies on the healthy side and can turn the head to the paralyzed side; then food can be given on the healthy side of the mouth.

A decline in isometric tongue strength with aging has been previously reported (10). There was a significant positive association between posterior tongue strength and handgrip strength (6). It is suggested that lower isometric tongue strength might represent diminished functional reserve, which may increase risk for dysphagia and cause dysphagia omit (11). In this study we found handgrip strength of the dysphagia group was lower than in the non-dysphagia. Malnutrition also leads to reduced muscle (sarcopenia disease) which has a high risk of dysphagia. Hand grip strength uses simple equipment to detect low muscle strength and its relation to dysphagia. A diet should have not only suitable texture but also sufficient energy and protein should be considered with dysphagia patients with low muscle strength.

Pneumonia was found at a higher rate in the dysphagia group. Aspiration leading to pneumonia is common in dysphagia patients. Besides pneumonia status, the body temperature also needs to be considered in determining inflammation status. Energy and water requirements will need to be increased to speed recovery and reduce risk of mortality. Aspiration pneumonia usually occurs in dysphagia patients in general and in dysphagia patients with Gastroesophageal reflux disease (GERD) in particular. Dysphagia patients with tube feeding usually have GERD and consideration of a nutrition liquid with high viscosity such as a semi-solid can be effective in reducing symptoms of GERD (12).

Therefore, oral function, muscle strength and pneumonia have a strong relationship with dysphagia status. From these observations, the dietitian can make suitable adjustments to diet from texture to nutrients to improve the nutrition status of patients.

In conclusion, dysphagia has a positive relationship with poor oral function, low handgrip strength and a high rate of pneumonia. Dietitians need to have an overview of dysphagia patients in order to supply a suitable texture-modified diet.

2.6. References

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CHAPTER 3. NUTRITIONAL STATUS AND FEEDING PRACTICE AMONG DYSPHAGIC OLDER ADULT INPATIENTS IN VIETNAM - STUDY 1

Thao Phuong Tran*, Linh Thuy Nguyen, Jun Kayashita, Fumio Shimura, Shigeru Yamamoto. Nutritional status and feeding practice among dysphagic older adult inpatients in Vietnam. J Nutr Sci Vitaminol. 66: 224-228. 2020.

3.1. Abstract

The Vietnamese older adult population has increased rapidly on an annual basis and dysphagia has become a common issue. The nutritional status of older adults in general and of dysphagic older adults in particular has not received adequate attention. The automatic solution for cases of serious choking/aspiration is still a prescription for tube feeding. In developed countries, oral intake is a priority alternative for dysphagia and has positive consequences. This study aimed to investigate the nutritional status of and feeding practices for dysphagic older adult inpatients in some Vietnamese hospitals. The study was designed as a cross-sectional study and was conducted in three large hospitals in northern Vietnam. The data for 1007 older inpatients (58.3% were females, mean age was 75.5±7.3 years) about their dysphagic status, nutritional status and feeding practices were collected by dietitians. About 17% of the older adult inpatients suffered from malnutrition and 54% had a risk of malnutrition. Half of the dysphagia group had malnutrition and 42% were at risk of malnutrition. About 78% of the dysphagic older adults had oral intake of soft foods/regular foods and the remainder had tube feeding. Almost all dysphagic patients had reduced food intake over the prior 3 months. The rate of pneumonia was quite high among dysphagic patients. The nutritional status of Vietnamese older adult inpatients in general and of dysphagic older adults specifically was poor. Oral intake of a texture-modified diet should be a method with priority over tube feeding or soft foods/regular foods for dysphagic patients.

3.2. Introduction

Older adults are the fastest growing segment of the population in Vietnam. The number of Vietnamese aged 65 and older is projected to increase from 7.8% in 2015 to 17.8% in 2050 (1). Older adults often have many health problems, among which malnutrition is quite common. Malnutrition is associated with increasing risk of infections, delayed wound healing, muscle weakness, depression, increasing mortality risk and length of hospital stay (2). Therefore, finding out the nutritional status of older adults in Vietnam is necessary to have a suitable nutrition intervention strategy for the community in general and hospitals in particular.

According to a systematic review, there are many significant risk factors leading to malnutrition in older adults. Among these, swallowing difficulty is a common risk factor (3). Swallowing is a complex neuromuscular activity that consists of oral, pharyngeal, and esophageal phases, and involves the coordinated function of many muscles. Thus, many adverse health conditions can influence swallowing function. Neurological diseases, head/neck and esophageal cancer, and metabolic deficits are broad categories of diseases that might contribute to dysphagia. In previously published data, more than one thousand older adult inpatients in three large Vietnamese hospitals were screened for dysphagia through the use of quick and simple tools. The results showed that the rate of dysphagia was quite high, about 16.5% (4). In developed countries, nutrition for dysphagia patients is a matter of concern. Texture-modified diets (puree, jelly) and thickened liquids have been effective in the management of chronic and acute dysphagia (5). At present, in Vietnam, dysphagia patients lack suitable dietary management. In mild dysphagia situations, soft foods such as porridge or noodles is served to patients. The soft food is intended for patients with chewing difficulties. Characteristic of soft foods is that the water still has the ability to separate from the solid foods so it is not safe with dysphagic patients. Choking still can happen but oral intake of soft foods is a more comfortable choice compared to tube feeding. When the dysphagia status becomes serious and patients complain to the doctor, tube feeding is prescribed automatically as soon as dysphagia is diagnosed. There are reports that the risk of pneumonia with tube feeding for dysphagia patients was higher than with oral intake of dysphagia food (6, 7). Moreover, Leibovitz et al. found that there is a high prevalence of oropharyngeal colonization with gram-negative bacteria in patients with tube feeding (both nasogastric and Percutaneous Endoscopic Gastrostomy tube) compared to orally-fed patients (7). In this study, we also collected more information about the pneumonia rate based on current feeding practices for dysphagic patients.

Vietnamese dysphagia older adult inpatients may have a high risk of malnutrition. Therefore, this study aimed to investigate the nutritional status of and feeding practices for dysphagic older adult inpatients in some Vietnamese hospitals.

3.3. Methods

Settings and Sample

The study was designed as a cross-sectional study and was conducted for 6 months, from August 2018 through January 2019. This research was conducted in accordance with Declaration of Helsinki and approved by the Hanoi Medical University's ethical committee, number 1318. The study population consisted of older adult inpatients being treated in three large general hospitals in Vietnam: Hanoi Medical University Hospital (500 beds), Dong Da General Hospital (800 beds) and National Geriatric Hospital (500 beds).

Subjects were recruited for the study from all newly admitted patients, i.e., patients in the first 48 hours after admission, by random selection (using a random number table) from admission registers.

The sample size was about one thousand subjects who met the inclusion criteria: (1) hospitalized older adults in the above three hospitals, (2) age 65 or over. The exclusion criteria included: (1) refusal to participate in this study, (2) mute, deaf or psychotic and (3) suffering from ventilator, coma, trauma or injury. All potential subjects completed questionnaires and were screened using swallowing tests.

Data collection

All the questionnaires were carried out by investigators. The investigators were dietitians who were trained to collect the study data. Before carrying out the actual study, we conducted a pilot study on 50 patients to revise the instruments.

Below is the information that we obtained.

Demographic data

Data such as age, gender, diagnosed diseases were collected from medical records.

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Repetitive saliva swallowing test (RSST)

Patients were asked to swallow their own saliva as many times as possible in 30 seconds; the examiner determined the absence of laryngeal elevation during swallow by observing

and/or feeling laryngeal movement. If a patient was unable to perform three consecutive swallows with two retests, he/she suffered from dysphagia. If a patient was able to swallow 3 times or more, then the Water Swallowing Test would be administered (8).

Water Swallowing Test (WST)

The examiner would offer 3ml water for the subject to drink; if patients choked or their voice changed, patients suffered from dysphagia. If there was no choking or voice change, subjects continued to drink 30 ml water. Subjects who had choking or voice change were dysphagic. If there was no choking or voice change, patients were normal (8).

Nutritional parameters

Anthropometric measurement

If patients could stand, weight and height were measured by Tanita scale BC-760-WH (Tanita, Tokyo, Japan) and Seca Germany. Weight was gathered in the morning before eating and after toilet. Patients removed their shoes and wore only hospital clothes. Body mass index (BMI) was calculated using base weight and height. If patients could not stand, we used circumference of the leg as an indicator to screen nutrition by MNA-SF (9).

Mid-upper arm circumference (MUAC)

MUAC was measured by dedicated tape. MUAC is the circumference of the arm (usually measured on the non-dominant side) in centimeters at the mid-point between the acromion (the lateral extension of the spine of the scapula, forming the highest point of the shoulder) and the olecranon (the bony projection of the ulna at the elbow) (10).

Mini nutritional assessment – short form (MNA-SF)

Various scales have been used to perform a quick initial nutritional assessment. The Mini Nutritional Assessment Short Form (MNA-SF) is used globally. Although it does not require special equipment, it has high sensitivity and specificity for assessing malnutrition risk in older adults in multiple settings, including hospitals (11, 12). MNA-SF consists of six sections: appetite or eating problems, recent weight loss, mobility impairment, acute illness/ stress, dementia or depression, and BMI. It contains a total of 14 points; a score of 12–14 is within the normal range, 8–11 indicates risk of malnutrition, and ≤ 7 indicates malnutrition. All assessments were performed per the MNA-SF user guide (9).

Statistical analysis

All statistical analyses were performed using the Stata version 12.0 software. Categorical variables were expressed as the number of patients (percentage), and quantitative variables, including parametric and nonparametric values evaluated by the histogram, were expressed as mean ± standard deviation (SD) such as age, MUAC. Comparisons between groups were made using the Chi square test and Student's t-test for categorical variables and quantitative variables, respectively. P-values of less than 0.05 were considered statistically significant for all the analyses.

3.4. Results

Table 3. 1. Characteristics of subjects enrolled in this study (n=1007)

Characteristics	Overall (n=1007)	Non-dysphagia (n=841)	Dysphagia (n=166)	p-value
Age, years	75.5±7.3	75.0±7.1	78.0±7.7	<0.05[#]
Female, n (%)	587 (58.3)	483 (57.4)	104 (62.7)	0.21*
Male, n (%)	420 (41.7)	358 (42.6)	62 (37.3)	
Disease groups				
• Neurologic disorders, n (%)	113 (11.2)	68 (8.0)	45 (27.1)	
• Esophageal disorders, n (%)	63 (6.3)	31 (3.7)	32 (19.3)	
• Respiratory & Iatrogenic disorders, n (%)	65 (6.5)	46 (5.5)	19 (11.4)	
• Other, n (%)	766 (76)	696 (82.8)	70 (42.2)	
BMI, kg/m^2	21.7±3.7	21.8±3.6	21.0±4.2	0.98
MNA-SF score	9.5±2.8	10±2.5	7.3±3.1	
• Normal nutrition status	286 (29)	273 (32.5)	13 (7.8)	
• Risk of malnutrition	547 (54)	478 (56.8)	69 (41.6)	<0.05*
• Malnutrition	174 (17)	90 (10.7)	84 (50.6)	
MUAC (cm)	24.7±2.9	24.8±2.9	23.9±2.7	<0.05[#]

Data presented as mean ± standard deviation or n (%)

*Chi square test

Student t-test

Table 3.1 shows the characteristics of 1007 older adult inpatients (420 males and 587 females, mean age 75.5±7.3 years). 24% of subjects suffered from neurologic disorders or esophageal disorders or respiratory & latrogenic disorders. The mean BMI of subjects was 21.7±3.7 kg/m^2. By using MNA-SF questionnaires, we observed that about 17% of older adult inpatients had malnutrition, more than half (54%) had risk of malnutrition and only 29% of them had normal nutritional status. Half of dysphagic older adult inpatients suffered from malnutrition and about 42% had risk of malnutrition. These rates were higher than in the non-dysphagia group and the difference is statistically significant (p<0.05). Using MUAC indicators to compare the dysphagia and non-dysphagia groups showed differing results. The dysphagia groups had MUAC smaller than the non-dysphagia group and had a significant difference with p<0.05.

Table 3. 2. Feeding practices for older adult inpatients with and without dysphagia (n=1007)

Feeding practice	Dysphagia status		p-value
	Non-dysphagia (n=841)	Dysphagia (n=166)	
Oral intake by soft foods/regular foods	98.6%	78.3%	<0.05*
Tube feeding	1.4%	21.7%	

*Chi square test

Table 3.2 indicates the feeding practice for older adult inpatients with and without dysphagia. 78.3% of dysphagic older adults had oral intake by soft foods/regular foods and 21.7% of the dysphagia group had tube feeding. Only 1.4% had tube feeding in the non-dysphagia group. The difference is statistically significant (p<0.05).

| | Food intake Severe decrease | Food intake Moderate decrease | Food intake No decrease |

TUBE FEEDING (N=36) — 56% | 44% | 0%

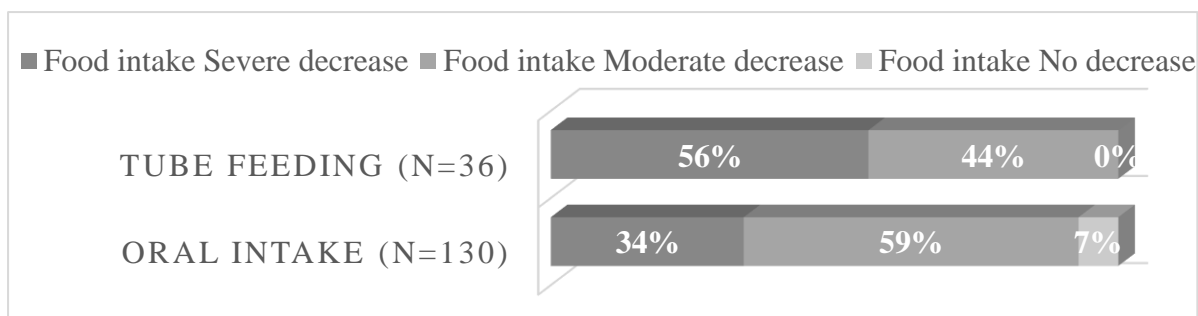ORAL INTAKE (N=130) — 34% | 59% | 7%

Figure 3. 1. The feeding practices and declining food intake over the prior three months for dysphagia elderly inpatients (n=166).

Figure 3.1 indicates the feeding practices and the decline in food intake over the prior three months for dysphagia older adult inpatients. Almost all dysphagia patients experienced reduced food intake. In particular, all dysphagia patients who were using tube feeding at the time of this research had experienced reduced oral food intake previously and so had been prescribed tube feeding.

Table 3. 3. Pneumonia status and feeding practices in dysphagic older adult inpatients (n=166)

| Pneumonia status | Feeding practice | |
	Oral intake by soft foods/regular foods (n=130)	Tube feeding (n=36)
Yes	32%	67%
No	68%	33%

Table 3.3 shows the relationship between pneumonia status and feeding practice in dysphagic older adult patients. About one third of oral intake by soft foods/regular foods and about two thirds of tube feeding dysphagic older adults suffered from pneumonia.

3.5. Discussion

In this study, more than one thousand older inpatients in Vietnamese hospitals were screened for nutritional status by MNA-SF questionnaires. The results indicated that about 71% of older adult inpatients were malnourished (17%) or at risk of malnutrition (54%). The malnutrition rate in this study was higher than in studies in some countries in Northeast Asia (Japan, China, Taiwan) with results showing that about 50% were malnourished or at risk of malnutrition (13). These are alarming numbers about the nutritional status of older adult inpatients.

Malnutrition and dysphagia have a close relationship (14, 15). It is understandable that this study showed that half of the dysphagia group were suffering from malnutrition and nearly half (42%) were at risk of malnutrition according to the MNA-SF. The results also show that the dysphagia group had MUAC less than that of the non-dysphagia group with $p<0.05$. This is similar to another study in Japan that concluded that MUAC correlated with dysphagia in hospitalized older adult patients (16). To help patients get out from the vicious cycle of dysphagia and malnutrition, besides rehabilitation, nutrition plays an essential role. A report concluded that it is important to provide an adequate amount of nutrients to maintain body weight and muscle during rehabilitation in patients with dysphagia (17).

During the period of this research, with dysphagic patients in Vietnam, the two common feeding practices were oral intake of soft foods/regular foods and enteral nutrition by nasogastric tube feeding. The results show that about 78.3% of dysphagia patients eat soft foods/regular foods and the remainder use tube feeding. In addition, the results of the study also indicated almost all dysphagia older adult patients with oral intake by soft foods/regular foods and all dysphagic patients who used tube feeding at research time had reduced food intake over the prior 3 months so they were prescribed tube feeding. Many dysphagic patients cannot eat well, have reduced energy intake and become malnourished.

Oral intake by a texture-modified diet is known as a priority choice for dysphagic patients in developed countries. It is extremely helpful if dysphagia patients can enjoy eating orally like normal people. The other study showed that oral intake with a dysphagic diet helps to improve Quality of Life and decreases the use of tube feeding for dysphagic patients (18). A dysphagic diet is safe for patients with swallowing difficulties and is advised by systematic review (5). Swallowing function is also significantly improved by oral intake (19). In addition, tube feeding carries a hidden risk of pneumonia, even higher than with oral intake of a texture-modified diet (7). In this study, we also observed that about two thirds of tube feeding and one third of oral intake of soft foods/regular foods dysphagic older adults suffered from pneumonia. A study by Iwamoto (17) showed the relationship between route of feeding and outcome in dysphagic patients. The patients who had oral intake with a texture-modified diet did not die (discharge or hospital transfer) and the patients with tube feeding had a high death rate. Early oral intake also helps dysphagic patients to be discharged from the hospital sooner (20). In addition, there is a strong relationship between dysphagia, malnutrition and pneumonia as shown by Sura and co-workers' study (21).

Dysphagia screening and dietary management have not been established in Vietnamese hospitals and communities. This lack may lead to poor nutritional status and may delay treatment in dysphagic older adult patients. To improve this situation, dysphagia detection skills using simple methods such as RSST, WST, as well as a special texture-modified diet, should become widespread. Dietitians can provide instruction on how to prepare a texture-modified diet for patients and patients' families. The dysphagic patients can receive a better diet at home. In this way, malnutrition and pneumonia in dysphagic older adults may be alleviated. In hospitals, Nutrition Support Teams for dysphagia should be established to assess the swallowing function of dysphagic patients and to evaluate whether the provided meals are appropriate for them. It is time for priority to be given to Vietnamese dysphagia patients being treated with oral consumption of a texture-modified diet instead of soft foods/regular foods or tube feeding.

In this study we found some points of concern. First, malnutrition issues make treatment in the hospital more difficult, patients' treatment can be delayed, there is increased risk of complications, delayed rehabilitation, and increased risk of mortality, as is well-known. Many older adults may be malnourished before admission. Through this data, Vietnam and Asian countries which have the same situation as Vietnam need to pay attention to the nutritional status of older adults by screening nutritional status through the local health center. Furthermore, dietitians need to have nutrition education appropriate to this population. Second, by using simple screening tools such as MNA-SF, RSST and WST, not only hospitals but also community health centers can screen nutritional status and dysphagia. Finally, dysphagia is a common issue with older adults but many countries including Vietnam haven't yet developed a proper nutrition diet for them. It is time to improve nutritional status in older adults in general and dysphagia patients in particular.

The limitation in this study is that it is a cross-section study which was conducted in three large hospitals in the northern area of Vietnam so the results are not representative for the entire country. But with a sample size of more than one thousand patients, we expect that the difference from rates for the whole country would not be great.

In conclusion, the nutritional status of Vietnamese older adult inpatients in general and of dysphagic older adults specifically was poor. At present, feeding practices for dysphagic patients are not optimal and priority must soon be given to oral intake of a texture-modified diet.

3.6. References

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CHAPTER 4. MALNUTRITION IS ASSOCIATED WITH DYSPHAGIA IN VIETNAMESE OLDER ADULT INPATIENTS - STUDY 1

4.1. Abstract

Background and Objectives: The number of older adults is increasing rapidly in Vietnam. They suffer from various health problems, including malnutrition and dysphagia. By using a simple screening questionnaire such as the Mini Nutritional Assessment - Short Form (MNA-SF) and 10-item Eating Assessment Tool (EAT-10), nutritional and dysphagic status were screened in this study. The study aimed to determine the prevalence of and relationship between malnutrition and dysphagia in Vietnamese older adult inpatients. Methods and Study Design: The study was designed as a cross-sectional study and conducted in three large hospitals in northern Vietnam. The data about nutritional status and dysphagia status of 1007 older inpatients were collected by dietitians. Results: There were 71.6% of subjects at malnourished (MNA-SF score < 8) and risk of malnutrition (MNA-SF score: 8–11). The prevalence of dysphagia by EAT-10 was 24.6%. The risk of dysphagia was independently associated with higher risk of malnutrition, with an odds ratio of 3.21 (95% CI: 1.93-5.31, p<0.001). In addition, malnutrition was also an independent predictor for risk of dysphagia, with an odds ratio of 3.09 (95% CI: 1.84-5.17, p<0.001). Conclusions: Malnutrition and dysphagia prevalence were high; and malnutrition and dysphagia have a strong relationship among older adult inpatients in Vietnam. Therefore, nutritional and dysphagia screening at hospital admission are very important and recommended.

4.2. Introduction

Vietnam is one of the countries with the fastest population aging in the world. In 2019, the proportion of the population aged 65 and over was about 7.7% and it will double in about 15 years.[1] Aging is associated with a decline in several physiological functions that can impact nutritional status, including reduced lean body mass, digestion ability, changes in the oral cavity, sensory function deficits, changes in fluid and electrolyte regulation and chronic illness. A term often mentioned in older adults is "frailty". Frailty develops as a consequence of age-related decline in multiple physiological systems, which collectively results in a vulnerability to sudden health status changes triggered by relatively minor stressor events. Frailty and malnutrition have a strong relationship and may be overlapped, as has been found in hospitalized older adults.[2-4] It is important to identify patients at risk for malnutrition at an early stage, to start interventions to improve their nutritional status and prevent frailty. However, malnutrition screening has not yet become common in Vietnamese hospitals. The Mini Nutritional Assessment – Short Form (MNA-SF) is a simple tool to screen for nutritional status and also can be useful for frailty screening in older adults.[5] Therefore, by using this simple tool, a large older adult inpatient population in some Vietnamese hospitals can be screened for nutritional status.

Malnutrition has many related risk factors. Among these, dysphagia (difficulty in swallowing) is a problem of concern in older adults. Dysphagia affects up to 30% of those admitted to the hospital.[6] In developed countries, patients are screened and assessed for dysphagia, then a texture modified diet (TMD) and thickening liquid are served for the dysphagia patients. However, in Vietnam, dysphagia has not yet become a concern. Dysphagia screening and TMD have not been implemented in Vietnamese hospitals. Dysphagia patients consume soft food (porridge) and liquid without thickening agents, or are prescribed tube feeding. A simple dysphagia screening tool that has high sensitivity and specificity such as the 10-item Eating Assessment Tool (EAT-10) may be suitable to apply in the present situation in Vietnamese hospitals. EAT-10 is a symptom-specific tool, commonly used in clinical practice, and useful in documenting a subjective evaluation of dysphagia or initial symptom severity.[7]

This study aimed to determine the prevalence of and relationship between malnutrition and dysphagia in Vietnamese older adult inpatients.

4.3. Methods

Settings and Sample

The study was designed as a cross-sectional study and was conducted from 2018 to 2019. This research was implemented under the Declaration of Helsinki and approved by the Hanoi Medical University's ethical committee, number 1318. The study population consisted of older adult inpatients being treated in three large general hospitals in Vietnam: Hanoi Medical University Hospital (500 beds), Dong Da General Hospital (800 beds) and National Geriatric Hospital (500 beds).

Subjects were recruited for the study from all newly admitted patients, i.e., patients in the first 48 hours after admission, by random selection (using a random number table) from admission registers.

The sample size was about one thousand subjects who met the inclusion criteria: (1) hospitalized older adults in the above three hospitals, (2) age 65 or over. The exclusion criteria included: (1) refusal to participate in this study, (2) mute, deaf or psychotic and (3) use of a ventilator, coma, trauma or injury. All potential subjects completed questionnaires and were screened using swallowing tests (Figure 4.1).
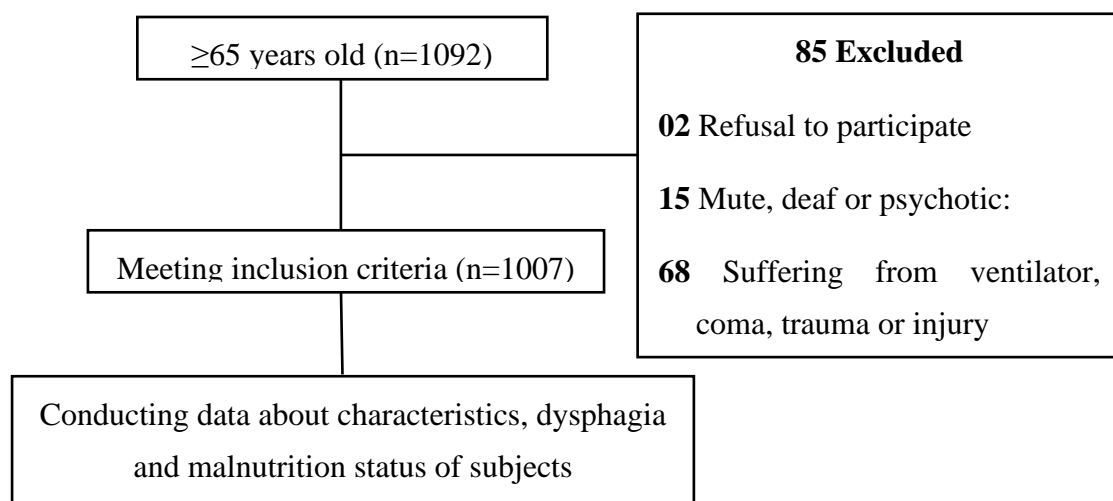
Figure 4. 1. Diagram of study participants

Data collection

All the questionnaires were administered by investigators. The investigators were dietitians who were trained to collect the study data. Before implementing the actual study, we conducted a pilot study on 50 patients to revise the instruments.
Below is the information that we obtained.

Demographic data

Data such as age, gender, diagnosed diseases were collected from medical records.

Dysphagia screening

10 item - Eating assessment tool (EAT-10) questionnaire

EAT-10, a self-reported validated questionnaire that assesses the perception of swallowing difficulty, was used to evaluate dysphagia risk. There are 10 simple questions with a total score of 40 points and the cut-off point is 3. If the total score ≥ 3 points, it means the patient may have problems swallowing efficiently and safely.[7]

Nutritional parameters

Anthropometric measurement

If patients could stand, weight and height were measured by Tanita scales BC-760-WH (Tokyo, Japan) and Seca height meter 217 (Germany), respectively. Weight was gathered in the morning before eating and after toilet. Patients removed their shoes and wore only hospital clothes. Body mass index (BMI) was calculated using base weight and height. If patients could not stand, we used circumference of the leg as an indicator to screen nutrition by MNA-SF.[8]

Mini nutritional assessment – short form (MNA-SF)

Various scales have been used to perform a quick initial nutritional assessment. The MNA-SF is used globally. Although it does not require special equipment, it has high sensitivity and specificity for assessing malnutrition risk in older adults in multiple settings, including hospitals.[9, 10] The MNA-SF consists of 6 questions about reduction in food intake over the past 3 months, weight loss during the past 3 months, mobility, psychological stress or acute disease in the past 3 months, neuropsychological problems, and BMI and it is scored 0–14. Nutritional status is categorized as normal nutritional status, at risk of malnutrition, and malnourished by MNA-SF scores of 12–14, 8–11, and 0–7, respectively.[8]

Mid-upper arm circumference (MUAC)

MUAC was measured with a dedicated tape. MUAC is the circumference of the arm (usually measured on the non-dominant side) in centimeters at the mid-point between the acromion (the lateral extension of the spine of the scapula, forming the highest point of the shoulder) and the olecranon (the bony projection of the ulna at the elbow).[11]

Muscle strength

Muscle strength was assessed using hand-grip strength. A hand dynamometer (MP-HDM03-BK, China) was used to measure hand-grip strength. The mean of three measurements from each hand was recorded. In cases of parenteral nutrition or paralysis, a mean of three measurements was used from the dominant hand.

Statistical analysis

All statistical analyses were performed using the Stata version 12.0 software. Categorical variables were expressed as the number of patients (percentage), and quantitative variables, including parametric and nonparametric values evaluated by the histogram, were expressed as mean ± standard deviation (SD) such as age and MUAC. Comparisons between groups were made using the Chi square test and Student's t-test for categorical variables and quantitative variables, respectively. The strength of the association between the risk of malnutrition and dysphagia, and physical outcomes were also tested using multivariate logistic regression models and expressed by odds ratio (OR) and confidence interval (CI). P-values of less than 0.05 were considered statistically significant for all the analyses.

4.4. Results

Table 4. 1. Characteristics of subjects classified by nutritional status (n=1007)

Characteristics	Overall (n=1007)	Malnutrition/Risk of malnutrition (n=721)	Non-malnutrition (n=286)	p-value
Age, (Mean± SD)	75.5±7.2	76.4±7.6	73.4±6.0	<0.05[†]
Female, n (%)	587 (58.3)	409 (56.7)	178 (62.2)	0.11[‡]
Disease				
Neurologic disorders, n (%)	113 (11.2)	97 (13.5)	16 (5.6)	
Esophageal disorders, n (%)	63 (6.3)	51 (5.1)	12 (4.2)	
Respiratory & Iatrogenic disorders, n (%)	65 (6.5)	56 (5.6)	9 (3.1)	
Other, n (%)	766 (76.0)	517 (51.3)	249 (87.1)	
Pneumonia, n (%)	136 (13.5)	123 (17.1)	13 (4.5)	<0.05[‡]
EAT-10 score ≥3, n (%)	248 (24.6)	224 (31.1)	24 (2.4)	<0.05[‡]

Hand-grip strength (kg), (Mean± SD)	14.3±7.4	13.4±7.3	16.3±7.3	$<0.05^{\dagger}$
BMI (kg/m^2), (Mean± SD)	21.7 ± 3.7	20.6 ± 3.3	24.2 ± 3.1	$<0.05^{\dagger}$
MUAC (cm), (Mean± SD)	24.7 ± 2.9	23.9 ± 2.7	26.5±2.5	$<0.05^{\dagger}$
Denture, n (%)	301 (29.9)	210 (29.1)	91 (31.8)	$0.42^{\ddagger}$

[†] Unpaired Student's *t*-test, [‡] Chi-square test

Table 4.1 shows the characteristics of subjects classified by nutritional status. The older adult patients considered in the study were composed of 1007 subjects (41.7% male, 58.3% female) with a mean age of 75.5±7.2 years. There were about 24% of subjects suffering from diseases related to dysphagia such as neurologic disorders, esophageal disorders and respiratory & latrogenic disorders. Pneumonia prevalence was 13.5%. The dysphagia rate by the EAT-10 tool was 24.6%. The mean of hand-grip strength, BMI and MUAC were 14.3 kg and 21.7 kg/m^2 and 24.7 cm, respectively. There were about 30% of subjects with dentures. There were 71.6% of subjects who suffered from malnutrition/ risk of malnutrition. The malnutrition group had a mean age which was higher than that of the non-malnutrition group (76.4 and 73.4 years old). Pneumonia and dysphagia prevalence in the malnutrition group was also higher than in the non-malnutrition group. Hand-grip strength, BMI and MUAC for the malnutrition group was lower than for the non-malnutrition group. The differences had statistical significance with p<0.05.

Table 4. 2. Relationship between nutritional status (MNA-SF) and dysphagia status (EAT-10) (n=1007)

MNA-SF items	Overall (n=1007) N (%)	Dysphagia (n=248) N (%)	Non-dysphagia (n=759) N (%)	p-value
Food intake declined over the past 3 months				
Severe decrease	105 (10.4)	51 (20.5)	54 (7.1)	<0.05
Moderate decrease	443 (44.0)	112 (45.2)	331 (43.6)	

No decrease	459 (45.6)	85 (34.3)	374 (49.3)	
Involuntary weight loss during the last 3 months				
Weight loss greater than 3 kg	87 (8.6)	39 (15.8)	48 (6.3)	
Does not know	181 (18.0)	74 (29.8)	107 (14.1)	<0.05
Weight loss between 1 and 3 kg	313 (31.1)	66 (26.6)	247 (32.5)	
No weight loss	426 (42.3)	69 (27.8)	357 (47.1)	
Mobility				
Bed or chair bound	126 (12.5)	71 (28.6)	55 (7.3)	
Able to get out of bed/chair, but does not go out	315 (31.3)	103 (41.5)	212 (27.9)	<0.05
Goes out	566 (56.2)	74 (29.9)	492 (64.8)	
Psychological stress in the past three months				
Yes	194 (19.3)	68 (27.4)	126 (16.6)	<0.05
No	813 (80.7)	180 (72.6)	633 (83.4)	
Neuropsychological problem				
Severe dementia or depression	32 (3.2)	19 (7.7)	13 (1.7)	
Mild dementia	428 (42.5)	136 (54.8)	292 (38.5)	<0.05
No psychological problems	547 (54.3)	93 (37.5)	454 (59.8)	
Body mass index (BMI)				
BMI less than 19	185 (18.4)	50 (20.2)	135 (17.8)	
BMI 19 to less than 21	156 (15.5)	33 (13.3)	123 (16.2)	<0.05
BMI 22 to less than 23	195 (19.4)	32 (12.9)	163 (21.5)	
BMI 23 to greater	292 (29.0)	47 (19.0)	245 (32.3)	
Calf circumference (CC)				
CC less than 31	122 (12.1)	71 (28.6)	51 (6.7)	<0.05
CC 31 or greater	57 (5.6)	15 (6.0)	42 (5.5)	

Screening score				
12-14 points: Normal nutritional status	286 (28.4)	24 (9.6)	262 (34.5)	
8-11 points: At risk of malnutrition	547 (54.3)	112 (45.2)	435 (57.3)	<0.05
0-7 points: Malnutrition	174 (17.3)	112 (45.2)	62 (8.2)	

Chi-square test

Table 4.2 indicates the relationship between nutritional status by MNA-SF and dysphagia status by EAT-10. The malnutrition prevalence in the dysphagia group was higher than in the non-dysphagia group (about 90% and 65%, respectively). In detail, the rate of severely declined food intake over the past 3 months in the dysphagia group was more than in the non-dysphagia group (about 21% and 7%, respectively). The percentage of patients in the dysphagia group who had involuntary weight loss greater than 3 kg during the last 3 months was higher than in the non-dysphagia group (16% and 6%, respectively). Dysphagia subjects had reduced mobility, psychological stress and neuropsychological problems that were more severe than in the non-dysphagia group. In addition, BMI and calf circumference of the dysphagia group were also lower than in the non-dysphagia group.

Table 4. 3. Logistic Regression Multivariate model for risk of malnutrition/malnutrition (MNA-SF) according to gender, age, risk of dysphagia (EAT-10), pneumonia, MUAC, hand-grip strength and denture.

Indicators	OR (95% CI)	p-value
Gender (male vs female)	0.51 (0.34-0.78)	<0.01
Age (years)	1.03 (1.00-1.05)	0.03
EAT-10 (no vs yes - risk of dysphagia)	3.21 (1.93-5.31)	<0.001
Pneumonia (no vs yes)	2.31 (1.19-4.51)	0.01
MUAC (cm)	0.71 (0.66-0.76)	<0.001
Hand-grip strength (kg)	0.96 (0.93-0.99)	0.01
Denture (no vs yes)	0.99 (0.70-1.39)	0.96

Table 4.3 shows the logistic regression multivariate model for risk of malnutrition (MNA-SF) according to gender, age, risk of dysphagia (EAT-10), pneumonia, MUAC, hand-grip strength and denture. The analysis described gender, age, EAT-10, pneumonia, MUAC, hand-grip strength as independent predictors for MNA-SF, with odds ratio of 0.51 (95% CI: 0.34-0.78, p<0.01), 1.03 (95% CI: 1.00-1.05, p=0.03), 3.21 (95% CI: 1.93-5.31, p<0.001), 2.31 (95% CI: 1.19-4.51, p=0.01), 0.71 (95% CI: 0.66-0.76, p<0.001), 0.96 (95% CI: 0.93-0.99, p=0.01), respectively.

Table 4. 4. Logistic Regression Multivariate model for risk of dysphagia (EAT-10) according to gender, age, risk of malnutrition (MNA-SF), BMI, MUAC, hand-grip strength and denture.

Indicators	OR (95% CI)	p-value
Gender (male vs female)	0.80 (0.53-1.22)	0.30
Age (years)	1.03 (1.00-1.05)	0.04
MNA-SF (risk of malnutrition/malnutrition and non-malnutrition)	3.09 (1.84-5.17)	<0.001
BMI (kg/m^2)	1.03 (0.96-1.10)	0.35
MUAC (cm)	0.94 (0.86-1.02)	0.19
Hand-grip strength (kg)	0.94 (0.91-0.97)	<0.001
Denture (no vs yes)	1.19 (0.82-1.74)	0.36

Table 4.4 indicates the logistic regression multivariate model for risk of dysphagia (EAT-10) according to gender, age, MNA-SF, BMI, MUAC, hand-grip strength and denture. The analysis described age, MNA-SF, hand-grip strength as independent predictors for EAT-10, with an odds ratio of 1.03 (95% CI: 1.00-1.05, P=0.04), 3.09 (95% CI: 1.84-5.17, p<0.001), 0.94 (95% CI: 0.91-0.97, p<0.001), respectively.
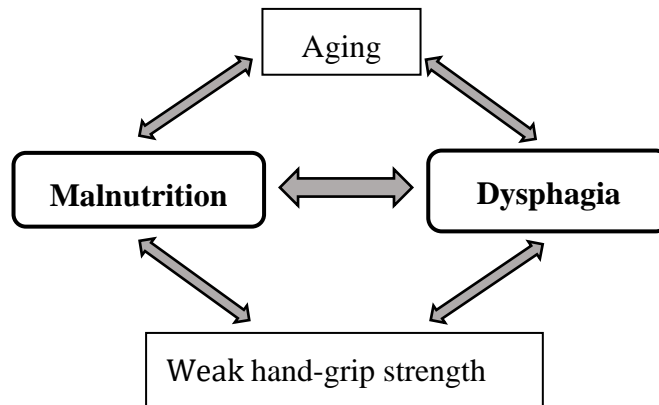
Figure 4. 2. A conceptual diagram about malnutrition and dysphagia

Figure 4.2 shows a conceptual diagram about malnutrition and dysphagia which was based on results in table 4.3 and 4.4.

4.5. Discussion

This may be the first study in Vietnam which was conducted with a large number of older adult inpatients at hospital admission to assess prevalence, predictors of malnutrition, and dysphagia risk. The present study showed that there was high prevalence of risk of malnutrition/malnutrition and dysphagia. In addition, malnutrition and dysphagia have a strong relationship.

Malnutrition and dysphagia were common problems among older adult inpatients at the admission stage in Vietnam. More than half of the subjects were at risk of malnutrition, and about 17% were malnourished by MNA-SF. The risk of dysphagia prevalence was 24.6% by EAT-10. In the malnutrition group, hand-grip strength, BMI and MUAC were lower than in non-malnutrition group. These are three indicators which are easily measured by simple equipment and also are good parameters to screen malnutrition alongside MNA-SF questionnaires.[12–14] In addition, in this study, by using a simple screening tool with high sensitivity and specificity like EAT-10, dysphagia could also be screened.[7] In the dysphagia group, the rate of malnutrition and risk of malnutrition were higher than in the non-dysphagia group. In detail, some other indicators in the dysphagia group, such as decreased food intake over the past 3 months, involuntary weight loss during the last 3 months, mobility, psychological stress, neuropsychological problem, BMI and CC, were also worse than in the non-dysphagia group.

Nutrition status and dysphagia screening are not routinely done in most Vietnamese hospitals; only some large hospitals can perform them. Timely screening is necessary, as early identification is one of the most important and effective ways to prevent and reduce the prevalence of malnutrition and dysphagia risk. Through this study, some suitable nutritional and dysphagia screening methods were introduced to Vietnamese hospitals and step by step dietitians will transfer to nurses the skills to set up nutritional and dysphagia screening systems in hospitals.

In addition, older adult patients with nutrition problems can be identified in the community before admission by applying the simple screening tools in this study. It is very important and recommended to have early malnutrition detection systems in place in the community to prevent malnutrition and dysphagia. When admitted to the hospital, patients without malnutrition can make a better recovery, and reduce length of hospital stay and medical costs.[15] MNA-SF can be used not only in hospitals but also for community nutritional status screening.[16] After nutrition screening by MNA-SF or other tools, with patients with a risk of malnutrition or malnutrition, nutrition assessment and diagnosis should be implemented. Global Leadership Initiative on Malnutrition (GLIM) criteria was established recently to diagnose malnutrition.[17] We would like to apply the GLIM criteria in further studies on the Vietnamese population.

The relationship between malnutrition and dysphagia and some factors such as gender, age, pneumonia, BMI, MUAC, hand-grip strength and denture were observed in this study. The results of logistic regression multivariate models showed that gender, age, EAT-10, pneumonia, MUAC, hand-grip strength were independently associated with higher risk of malnutrition. In addition, predictor risks leading to dysphagia in this study were age, malnutrition (MNA-SF) and handgrip strength. Pneumonia is among the top ten leading causes of death in Vietnam.[18] Risk factors leading to pneumonia that are usually mentioned include tobacco use and influenza. However, with high rates of aging and dysphagia in Vietnam, aspiration pneumonia also should be a concerning problem. Additionally, malnutrition also has an effect on the risk and outcome of pneumonia.[19] Hand-grip strength is also a predictor of nutrition status and dysphagia in this study. Hand-grip strength can be easily measured in hospitals. Hand-grip strength may reflect the muscle strength of the whole body, including muscles involved in swallowing functions.[20] Consequently, the proportion of older adult patients who had low hand-grip strength in the dysphagia group was higher than in the non-dysphagia group.[21]

The pathogenesis of dysphagia in older adults is probably complex and, controversially, sometimes referred to as presbyesophagus.[22] In this study, we first hypothesized malnutrition as the dependent variable and dysphagia as one of the independent factors. And the results of this study showed that dysphagia was a high risk factor that can lead to malnutrition. And then the opposite hypothesis was made and the results indicate that malnutrition was also one of the high risk factors that lead to dysphagia. Another study has also shown results similar to our study.[23] Therefore, malnutrition and dysphagia are like a vicious cycle and have a strong relationship.

At the time of this study, TMD had not yet been established. Tube feeding or soft food, for example porridge or noodles, was being served to patients. Thickening agents had not yet been used in the diet of dysphagia patients. In 2015, the International Dysphagia Diet Standardization Initiative (IDDSI) was established and it became necessary to classify textures of foods served in Vietnamese hospitals.[24] Further TMD improvement strategies in hospitals should be implemented to support the nutritional status of dysphagia patients. In addition, the creation of guidelines for nutritional management of patients with swallowing disorders and the development of effective methods of nutrition education are needed.[25-27] This may be the way to break the vicious circle of malnutrition and dysphagia among Vietnamese older adult patients.

Conclusion

Malnutrition and dysphagia prevalence were high; and malnutrition and dysphagia have a strong relationship in older adult inpatients in Vietnam. Therefore, the role of nutritional and dysphagia screening at admission hospital are very important and they are recommended.

4.6. References

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CHAPTER 5. APPLY THICKENED LIQUID ON STROKE PATIENTS WITH DYSPHAGIA - STUDY 2

Nguyen TL, **Tran PT,** Bùi TH, Phạm TTC. Application of thickened liquid on stroke patients with dysphagia. Journal of food and Nutrition sciences 5:23–28, 2018.

5.1. Abstract

Purpose: To determine the viscosity of liquid added 1%, 2%, 3% xanthan-gum. Thence, applying viscosity levels of thickened liquid on stroke patients with dysphagia. **Subjects and methods**: viscosity of thickened liquid was measured by Rotational Viscometer B type. Dysphagia was assessed by MASA tool and thickened liquid was applied on stroke patients in Vietnam Friendship Hospital. **Results**: Viscosity of water + 1% xanthan-gum is 250-1000mPa.s, 2% and 3% are 1000-5000 mPa.s and 5000-9000 mPa.s, respectively by using Rotational Viscometer B type. The average of water by oral intake was 826.6±444.3 ml/day. Stroke patients with severe difficulty swallowing consumed less water and responded well with higher viscosity of liquid follow standard. **Conclusion**: The viscosity of water (maximum 3% xanthan-gum) was proportional to the severity of dysphagia levels.

5.2. Introduction

Worldwide, about 8% of the population is affected by dysphagia. Difficulty swallowing is caused by nerve or structural damage in the upper digestive system, which can lead to unsafe swallowing of foods and liquids [1] . In Vietnam, there is a study that shows that the rate of dysphagia in stroke patients is quite high, estimated at 33-81% [2, 3] . Nationally, the stroke rate is 1.62% and the elderly (60 years of age and older) have a higher risk of stroke than young people [4] . Fluids can lead to pneumonia or even death in patients with difficulty swallowing [1] . Therefore, changing the liquid structure, specifically increasing the liquid viscosity with thickening agents such as starch (starch), gua-gum, xanthan-gum is becoming popular and important in many countries. Countries in the world such as the US, France, Japan, ... with products such as Thick& easy, Simply-thick, Softia S.... Thickened liquid has brought effective treatment to reduce dehydration, pneumonia, increased quality of life in patients with dysphagia with diseases such as stroke, Parkinson's, head and neck cancer, dementia syndrome... [5] . Currently, xanthan-gum is the third generation (latest) of thickener, which improves the limitations of color (transparency), taste, thickening time, viscosity stability compared to two generations ago were starch and gua-gum [6] . Around the world, the terms for the thickened liquids are quite different such as American (Thin, Nectar-Like, Honey-Like, Spoon-Thick), Japanese (Less midly thick, Midly thick, Moderately thick, Extremely thick, Over Extremely Thick)... with data on different viscosity [1] . Tested on Xanthan-gum (Japanese Softia S product): liquid containing 1% Softia S - Midly thick (50-150 mPa.s), 2% Sofita S - Moderately thick (150-300 mPa.s) and 3% Softia S - Extremely thick (300-500 mPa.s). Currently, Vietnam does not have a scale to classify the degree of consistency (viscosity) of liquids for patients with difficulty swallowing. Therefore, the objective of the study is to determine the standard viscosity of the liquid (water) at three levels of 1%, 2%, 3% xanthan-gum based on the type B rotary viscometer, and then applying standard viscosity fluids on levels of dysphagia in stroke patients.

5.3. Methods

5.3.1. Objective 1: Determine standard fluid viscosity:

- Research object: liquid (water)
- Research location: Representative office of Asian Nutrition and Food Culture Research Center at Hanoi Medical University.

Research method: basic research

- Viscosity measurement technique
- Tool:

+ Rotary viscometer type B (Rotational Viscometer B type, Barcelona) measuring unit mPa.s

+ Thickener: Xanthan - gum (Softia S: Nutri company in Tokyo, Japan)

- Procedure: Using viscometer: speed 12 rpm (SP=12 rpm), measure liquid with thickener added, measure at 0, 5, 10, 15, 30, 60 minutes later when stirring. Taking the average result after 5 measurements. Making sure the liquid temperature is 20 ^{o}C.

5.3.2. Objective 2: Apply standard viscous liquids on levels of dysphagia in stroke patients

- Research subjects: stroke patients aged 60 years and older volunteered to participate in the study.
- Research location: Neurology Department of Huu Nghi Hospital.
- Study design: a cross-sectional descriptive study
- Sample size: 85 patients

$$n = Z^2{}_{(1-\frac{\alpha}{2})} \times \frac{p.(1-p)}{\Delta^2} = 85$$

Formula to calculate sample size:

- $\alpha = 0.05$
- $p = 0.33$ (percentage of stroke patients with dysphagia is 33%) [3]
- $d = 0.1$

Sample selection : Convenient sample selection

- Procedure: the patients in the inclusion criteria after assessing dysphagia by the MASA (Mann Assessment of Swallowing Ability) questionnaires were given 3ml of liquid with different standard viscosity based on the study results of objective 1. If the patient shows signs of aspiration (choking, wet sound) switch to a more viscous liquid. When the patient meets 3ml of liquid with the standard viscosity, the test will continue with 30ml of liquid at that viscosity. Water intake in 24 hours of stroke patients were collected.

5.4. Results and discussion

5.4.1. Standard viscosity of fluids based on three grades
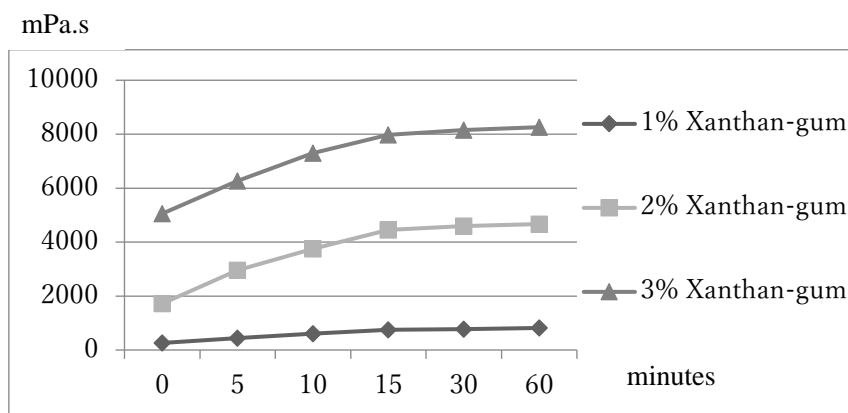
Figure 5. 1. Change in standard viscosity of thickener liquids with time at 20 $^\circ$C using a type B rotary viscometer

Figure 5.1 shows that the viscosity at all three levels of liquid consistency increases with time and is relatively stable after 15 min. It can be seen that at low density (1% xanthan-gum) viscosity ranges from 250-1000 mPa.s, medium density (2% xanthan-gum) ranges from 1000-5000 mPa.s, high density (3% xanthan-gum) ranges from 5000-9000 mPa.s.

The resulting thickener added liquid viscosity after 15 minutes is relatively stable. This is similar to the study in Japan [7] .

Table 5. 1. Liquid properties at different levels of density

	Less dense (Middle thick)	Moderate dense (Moderately thick)	High dense (Extremely thick)
*	1%	2%	3%
#	250-1000	1000-5000	5000-9000
+	50-150	150-300	300-500
Sensation when	The "drinking" movement is appropriate for this level of consistency. When put into the oral cavity, the liquid spreads to the entire oral	The feel is thicker and the "drinking" action is appropriate for this level of consistency. Flows slowly in the oral cavity	Clear feeling of high density and cohesion. Effort is needed to move fluid in the oral cavity. The action of "eating" with a

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swallowing	cavity. There is no solid sensation so there is no need to strain when swallowing. Easily suck up liquid with a straw.	and does not spread, easily attaches on the tongue. A bit difficult to suck with a straw.	spoon is appropriate for this level of consistency. Not suitable for use with a straw.
Appearance	The liquid flows down easily when tilting the spoon. After tilting the cup, the liquid flows out, with some remaining in the cup.	The liquid flows slowly when tilting the spoon or after tilting the cup, the liquid flows out, there is still liquid layer in the cup.	When tilting the spoon, the shape tends to stay the same and is difficult to flow. Even if the cup is tilted, the liquid does not flow out or comes out slowly with a rough pattern.

*: Xanthan gum (Softia S)

#: Viscosity measured with type B rotary viscometer (B-Type Viscometer (12 rpm) mPa.s)

+: Viscosity measured compared with E-Type Viscometer JSDR (mPa.s) [8]

Table 5.1 shows the properties of liquids when measured with a type B rotary viscometer, which has quite a clear difference in viscosity compared with a type E type. However, when judging for morphology, the appearance and the sensation of swallowing the product at different levels of consistency, our study gave similar results [8]. Currently, there is no document showing the relationship between the two types of viscometers.

The American association called National Dysphagia Diet also offers viscosity levels of 4 levels (thin 0-50 mPa.s, nectar-like 51-350 mPa.s, honey-like 351-1750 mPa.s, spoon-like >1750 mPa.s) but based on a shear rate of 50 s $^{-1}$ and a temperature of 25 $^{\circ}$C [9]. In short, in countries where viscometers are used, different measuring conditions will give different results for the viscosity of a liquid.

5.4.2. Application of standard fluid viscosity with levels of dysphagia in stroke patients

According to the MASA dysphagia assessment tool in this study, the rate of stroke patients with dysphagia was 25.9%. This result is similar to the study of Nguyen Thi Huong (33.3%) [3]. However, this result is lower than the study of Phan Nhut Tri (81%) [2]. The difference may be due to the GUSS (Gugging Swallowing Screen) tool used as screening, so the number of patients with dysphagia will be higher than using the MASA dysphagia assessment tool. Or

because the sample size of Phan Nhut Tri is 200 more than this study is 85 subjects and the influence of regional factors can also cause the difference in the rate of dysphagia.

Table 5. 2. Average oral water consumption of stroke patients by degree of dysphagia

	Normal (n=63) $\overline{X} \pm SD$	Mild difficulty swallowing (n=7) $\overline{X} \pm SD$	Moderate dysphagia (n=6) $\overline{X} \pm SD$	Severe dysphagia (n=9) $\overline{X} \pm SD$	Total (n=85) $\overline{X} \pm SD$
Oral fluid intake (ml/d)	931.5 ±375.2	895.0 ±241.5	651.4 ±613.2	155.6 ±288.2	826.6 ±444.3

The mean oral water intake of stroke patients was 826.6±444.3 ml/day. In addition, table 5.2 also shows that the more severe the difficulty in swallowing, the less water is consumed. A large difference can be seen between normal fluid intake (931.5±375.2 ml/day) and severe dysphagia (155.6±288.2 ml/day). The reason for this difference is that for patients with difficulty swallowing, there will be a fear of drinking water due to choking leading to less water consumption. Furthermore, normal water can make a danger to the dysphagic patients, if there is no liquid with a standard viscosity, the preferred choice of safety in current clinical practice in Vietnam is to give tube feeding. Therefore, patients with difficulty swallowing would be at risk of dehydration, slow recovery, reduced quality of life and increased hospital fees. Around the world, stroke patients with dysphagia have been given liquid thickeners to overcome the previous bad outcome [9] .

Table 5. 3. Response of dysphagia stroke patients to standard fluids

	Normal (X)	Mild difficulty swallowing (X)	Moderate difficulty swallowing (X)	Severe difficulty swallowing (X)
Water	63	1	0	0
Water+Xanthangum 1% (250-1000 mPa.s)	0	6	2	0
Water+Xanthangum 2% (1000-5000 mPa.s)	0	0	4	1

Water+Xanthangum 3% (5000-9000 mPa.s)	0	0	0	8

Table 5.3 shows that patients with more severe dysphagia respond better to liquids with higher viscosity, however too high viscosity can be dangerous for the patient so only high viscosity should be used. Viscosity within permissible standards (1%-3% thickener). This is similar to proven studies in the world [10] .

5.5. Conclusion and recommendations

In this study in Vietnam, the research team gave the results of measuring liquid viscosity on three levels of consistency using xanthan-gum with a type B rotary viscometer as follows: Less dense (1% xanthan-gum) ranges from 250-1000 mPa.s, medium dense (2% xanthan-gum) ranges from 1000-5000 mPa.s, high dense (3% xanthan-gum) ranges from 5000-9000 mPa.s.

The average amount of water consumed by stroke patients is 826.6 ± 444.3 ml/day and the more severe dysphagia, the less water was consumed.

Patients with more severe dysphagia responded better to liquids with higher standards of viscosity.

5.6. References

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CHAPTER 6. TEXTURE-MODIFIED DIETS NEED TO BE IMPROVED IN VIETNAMESE HOSPITALS - STUDY 3

Thao Phuong Tran*, Linh Thuy Nguyen, Keiko Hirose, Shigeru Yamamoto. Texture-modified diets need to be improved in Vietnamese hospitals. Accepted in the Journal of Medical Investigation. 69 ( ) 2022.

6.1. Abstract

Purpose: The aim of this study is to compare the nutritional status of older adult inpatients consuming Texture-Modified Diets (TMD) to older adult inpatients consuming regular diet. **Methods:** The study was designed as cross-sectional and was conducted in three large hospitals in northern Vietnam. The data for 344 older adult inpatients were collected in 2021 by dietitians. **Results:** The result showed 104 subjects were prescribed TMD. The textures of hospital diets have still not been adequately developed. In particular, the hospitals had not yet developed pureed meals. All older adult inpatients (74.7 ± 6.8 years old, 52.9% female) had 28.8% malnutrition by the GLIM criteria. The TMD group had a malnutrition prevalence two times higher than the regular diet group. Total energy intake from hospital meal and outside snack in the regular diet group was higher than in the TMD group about 150 kcal. Although energy provided from hospital diet in both groups were similar, hospital meal wastage in TMD group was higher than regular diet group. **Conclusion:** the older adult inpatients on TMD may have a nutritional status worse than those consuming a regular diet. Hospital diets need to be improved in texture and quality.

6.2. Introduction

Vietnamese older adults are rapidly increasing. The number of Vietnamese aged 65 and older is projected to grow from 7.9% in 2020 to 16.3% of the population in 2040 (1). A previous study on about one thousand older adult inpatients showed the rate of malnutrition and risk of malnutrition in older adult inpatients was 17% and 54% by the Mini Nutritional Assessment-Short Form (MNA-SF), respectively (2). The Global Leadership Initiative on Malnutrition (GLIM) presented malnutrition diagnostic criteria for standardizing clinical practice based on the recommendations of global clinical nutrition societies. Currently, many countries are using this tool to assess malnutrition. It is important to take steps toward accurately assessing the ratio of malnourished Vietnamese older adult inpatients with the GLIM tool.

One of the factors leading to malnutrition in older adults is difficulty in chewing and swallowing. A previous article showed that the dysphagia prevalence was 16.5% in older adult inpatients by the Repetitive saliva swallowing test (RSST) and Water swallowing test (WST). The ratio of elderly with reduced oral function was about 6% (3). Dysphagia is becoming a problem among older adult inpatients in Vietnam.

In patients suffering from problems with chewing and swallowing, a regular diet is unsuitable. In early 2019, the International Dysphagia Diet Standardization Initiative (IDDSI) concept was published (4). One of the most common ways of managing dysphagia is the provision of a texture-modified diet (TMD) (chopped, minced, pureed) and thickened liquids. The traditional Vietnamese soft diet is rice porridge which is cooked with finely chopped meat and diced vegetables. In addition, the liquidized diet is mixed with various ingredients such as rice, egg, meat, oil, vegetables, etc. In the past few years, the role of thickening agents for dysphagia patients has been expanded by dietitians. However, technical capability, thickening agent availability, and availability of speech therapy specialists can lead to differences in the applicability of the thickening agents to the diet of swallowing disorder patients in each hospital.

Many factors such as aging, diseases, and medicines may lead to reduced energy intake in older adult inpatients. Therefore, the quality of the hospital diet is very important because it will directly affect the food intake of patients. While studies have focused on both aesthetics and safety of the food, there has been a lack of standardization in the evaluation of meal satisfaction of TMD (5). In some Vietnamese hospitals, clinical diets are served and TMD has gradually improved. Because of a lack of systemic support for nutrition practice, dietary intakes of patients are not followed, and evaluation of hospital meals is also not implemented officially.

It is necessary to conduct a survey to evaluate the present nutritional practice situation in order to provide direction for improving Vietnamese hospital diets in the future.

Therefore, the aim of this study is to compare the nutritional status of older adult inpatients consuming TMD to older adult inpatients consuming a regular diet.

6.3. Methods

Setting and Sample.

The study was designed as a cross-sectional study and was conducted in 2021. This research was conducted in accordance with the Declaration of Helsinki and approved by the Hanoi Medical University's ethical committee, number 512/GCN-HĐĐĐNCYSH-ĐHYHN. The study population consisted of older adult inpatients being treated in three large general hospitals in northern Vietnam.

Subjects were recruited for the study from all newly admitted patients, i.e., patients in the first 48-72 hours after admission, by random selection (using a random number table) from admission registers.

The sample size was 344 subjects who met the inclusion criteria: (a) hospitalized older adults aged 65 or over, (b) consuming hospital diets with no need to control nutrients because of disease. The exclusion criteria included: (a) refusal to participate in this study, (b) lack of ability to answer questionnaires. All subjects received written information explaining the purpose of the research and signed consents were obtained in accordance with ethical requirements.

Data collection.

All the questionnaires were filled out by investigators. The investigators were dietitians who are responsible staff members in the nutritional department of each hospital. Researchers carried out training for investigators about research data collection. Before implementing the actual study, we conducted a pilot study on 20 patients to revise the instruments and adapt the model for each hospital.

Below is the information that we obtained.

Demographic data

Data such as age, gender, diagnosed disease, number of medicines, length of hospital stay, discharge situation were collected from medical records.

Nutrition parameters

Anthropometric measurement. If patients could stand, weight and height were measured with a Tanita scale BC-760-WH (Tanita, Tokyo, Japan) and Seca Germany. Weight was collected in the morning before eating and after toilet. Patients removed their shoes and wore only hospital clothes. Body mass index (BMI) was calculated using base weight and height. If patients could not stand, we used the circumference of the leg as an indicator to screen nutrition by MNA-SF (6).

Mini nutritional assessment – short form (MNA-SF). Various scales have been used to perform a quick initial nutritional assessment. The MNA-SF is used globally. Although it does not require special equipment, it has high sensitivity and specificity for assessing malnutrition risk in older adults in multiple settings, including hospitals. MNA-SF consists of six sections: appetite or eating problems, recent weight loss, mobility impairment, acute illness/ stress, dementia or depression, and BMI. It contains a total of 14 points; a score of 12–14 is within the normal range, 8–11 indicates risk of malnutrition, and ≤ 7 indicates malnutrition. All assessments were performed per the MNA-SF user guide.

The Global Leadership Initiative on Malnutrition (GLIM). Malnutrition was assessed using the criteria of the GLIM definition, which is based on phenotypic criteria including change in body weight, low BMI, and reduced muscle mass, as well as etiologic criteria including reduced food intake or assimilation, and disease burden. The GLIM definition includes 2 steps. First, a validated nutritional risk screening tool is used to identify individuals at risk of malnutrition; in this study we used the MNA-SF. Second, for people at risk of malnutrition, malnutrition is defined by the detection of at least 1 phenotypic and 1 etiologic criterion (7).

Dietary survey. The hospital diet had been supplied by 7-day cyclic menus. Normal hospital diets were constructed to meet at least the Vietnamese Recommendation Dietary Allowance (RDA) for low activity level. Based on height of the individual, ideal body weight (IBW) was calculated. An individual diet was calculated based on 30-35 kcal/kg IBW for energy, 1-1.2g/kg IBW for protein. Dietary intake of patients was conducted by the 24-hour dietary record. Patients recorded all food intake including the rate of staple food, main dish and side dish intake from hospital meals and the number of outside snacks in one day at admission.

Based on the Vietnamese Food Composition Table 2017, diets of patients were calculated by dietitians.

Classifications of meal forms. At present, Vietnamese hospital foods's development hasn't followed any standard. In this study, textures of food which were used in the three hospitals were classified according IDDSI testing methods (4). Textures of food in IDDSI were classified into 5 levels include regular/easy to chew level 7 (RG7), soft & bite-sized level 6 (SB6), minced & moist level 5 (MM5), pureed level 4 (PU4) and liquidized level 3 (LQ3). In detail, SB6: soft and moist with no separation of liquid, chewing is required, can be mashed or broken down with pressure from a spoon or fork, bite-sized pieces (15 mm); MM5: soft and moist with no separation of liquid, holds its shape on the plate, small lumps (4 mm) easily squashed with tongue; PU4: no separation of liquid from solid, holds its shape on a plate, spoon or fork, no visible lumps and not sticky; LQ3: can't be piped, layered or molded on a plate, smooth texture with no "bits", can't be eaten by fork, no oral processing/chewing required-can be swallowed directly (8). In this study, TMD includes SB6, MM5, PU4 and LQ3. The meal forms were classified according to IDDSI by dietitians in each hospital.

Hospital meal evaluation. Patients evaluated hospital diets including staple foods, main dishes and side dishes based on factors such as hardness, amount, taste and size. In addition, temperature, appearance and overall satisfaction level with hospital meals were also evaluated. The satisfaction survey design used hedonic scales (1-5) to assist with ease of completion and is explained in detail in table 6.1. Medical staff may affect the responses of meal evaluation, so researchers instructed subjects to answer the question sheet by themselves.

Table 6. 1. Rank of hospital meal evaluation

Score	1	2	3	4	5
Hardness	Very hard	Hard	Normal	Soft	Very soft
Amount	Very little	Little	Normal	Much	Very much
Taste	Very poor	Poor	Normal	Good	Very good
Size	Very small	Small	Normal	Big	Very big
Temperature	Very cold	Cold	Normal	Hot	Very hot
Appearance	Very bad	Bad	Normal	Good	Very good

Overall liking	Very bad	Bad	Normal	Good	Very good

Eating assistance levels were recorded with 3 levels: independent, partially assisted and fully assisted. The independent level meant that patients were able to eat without any assistance. The partially assisted level meant that patients received partial support from medical staff such as holding a patient's hand to help them guide food to their mouth. The fully assisted level meant that the medical staff fed the patient with complete support.

Dysphagia screening

Repetitive saliva swallowing test (RSST). Patients were asked to swallow their own saliva as many times as possible in 30 seconds; the examiner determined the absence of laryngeal elevation during swallow by observing and/or feeling laryngeal movement. If a patient was unable to perform three consecutive swallows with two retests, he/she suffered from dysphagia. If a patients was able to swallow 3 times or more, then the Water Swallowing Test would be administered (9).

Water Swallowing Test (WST). The examiner would offer 3ml water for the subject to drink; if patients choked or their voice changed, patients suffered from dysphagia. If there was no choking or voice change, subjects continued to drink 30 ml water. Subjects who had choking or voice change were dysphagic. If there was no choking or voice change, patients were normal (9).

Eating assessment tool questionnaire (EAT-10). EAT-10, a self-reported validated questionnaire that assesses perception of swallowing difficulty was used to evaluate dysphagia risk. There are 10 simple questions with a total score of 40 points and the cut-off point is 3. If total score ≥ 3 points, it means the patient may have problems swallowing efficiently and safely (10).

The Simplified Nutritional Appetite Questionnaire (SNAQ)

The SNAQ was developed as a self-assessment screening tool with four questionnaires including appetite, how full after eating, food tastes and number of meals per day. SNAQ score <15 indicates significant risk of at least 5% weight loss within six months (11).

The Oral Health Assessment Tool (OHAT)

The OHAT is non-dental healthcare professionals tool with an eight category screening tool that includes the lips, tongue, gums and tissue, natural teeth, dentures, oral cleanliness and dental pain to assess oral health, including those with dementia (12).

Statistical analysis

All statistical analyses were performed using the Stata version 12.0 software. Categorical variables were expressed as the number of patients (percentage), and quantitative variables, including parametric and non-parametric values evaluated by the histogram, were expressed as mean ± standard deviation (SD) such as age, BMI, or median (interquartile range) (IQR) such as nutrients from snack intake. Comparisons between groups were made using the Chi-square test for categorical variables and Student's *t*-test or Mann-Whitney *U*-test for quantitative variables. P-values of less than 0.05 were consider statistically significant for all the analyses.

6.4. Results

Table 6. 2. Characteristics of subjects (n=344)

Variable	Overall (n=344)	RG7 (n=240)	TMD (n=104)	p-value
Age, years (mean ± SD)	74.7 ± 6.8	74.5 ± 6.9	75.1 ± 6.6	0.39[†]
Female, n (%)	182 (52.9)	125 (52.1)	57 (54.8)	0.64[#]
Aetiologies known to be associated with dysphagia				
Alzheimer's disease, n (%)	2 (0.6)	1 (0.4)	1 (0.9)	
Non-Alzheimer's dementia, n (%)	1 (0.3)	1 (0.4)	0 (0.0)	
Stroke, n (%)	46 (13.4)	21 (8.8)	25 (24.0)	
Parkinson's disease, n (%)	0 (0.0)	0 (0.0)	0 (0.0)	
BMI (kg/m^2) (mean ± SD)	21.1 ± 3.0	21.4 ± 3.0	20.6 ± 2.9	<0.05[†]
MNA-SF score (mean ± SD)	9.8 ± 2.6	10.3 ± 2.4	8.9 ± 2.8	<0.05[†]
0-7: Malnutrition, n (%)	52 (15.1)	22 (9.2)	30 (28.8)	
8-11: Risk of malnutrition, n (%)	173 (50.3)	120 (50.0)	53 (51.0)	<0.05[#]
12-14: Normal nutrition status, n (%)	119 (34.6)	98 (40.8)	21 (20.2)	
Malnutrition (GLIM), n (%)	99 (28.8)	53 (22.1)	46 (44.2)	<0.05[#]

Mealtime independence				
Independent, n (%)	306 (89.0)	231 (96.3)	75 (72.1)	
Partial assistance, n (%)	30 (8.7)	8 (3.3)	22 (21.2)	<0.05[#]
Total dependence, n (%)	8 (2.3)	1 (0.4)	7 (6.7)	
Snack consumption, n (%)	256 (74.4)	171 (71.3)	85 (81.7)	0.07[#]
Oral Nutritional Supplements (ONS) consumption, n (%)	63 (18.3)	29 (12.1)	34 (32.7)	<0.05[#]
Parenteral nutrition, n (%)	6 (1.7)	1 (0.4)	5 (4.8)	<0.05[#]
Dysphagia (RSST, WST), n (%)	51 (14.8)	11 (4.6)	40 (38.4)	<0.05[#]
EAT-10 score ≥3: dysphagia, n (%)	69 (20.1)	17 (7.1)	52 (50.0)	<0.05[#]
OHAT score (mean ± SD)	2.4 ± 2.2	2.1 ± 1.8	3.0 ± 2.7	<0.05[†]
0-3: healthy, n (%)	257 (74.7)	194 (80.8)	63 (60.6)	
4-8: changes, n (%)	83 (24.1)	45 (18.8)	38 (36.5)	<0.05[#]
9-16: unhealthy, n (%)	4 (1.2)	1 (0.4)	3 (2.9)	
SNAQ score (mean ± SD)	14.0 ± 2.1	14.2 ± 2.0	13.5 ± 2.0	<0.05[†]
≤14 scores: risk of reducing weight, n (%)	212 (61.6)	131 (54.6)	81 (77.9)	<0.05[#]
Medicine number (mean ± SD)	4.4 ± 2.5	4.3 ± 2.6	4.9 ± 2.4	<0.05[†]
Length of hospital stay, days (mean ± SD)	8.6 ± 4.1	8.1 ± 3.9	9.8 ± 4.3	<0.05[†]
Discharge situation				
Home, n (%)	322 (93.6)	232 (96.7)	90 (86.5)	
Transfer to other care facilities, n (%)	22 (6.4)	8 (3.3)	14 (13.5)	
Death, n (%)	0 (0.0)	0 (0.0)	0 (0.0)	
Other, n (%)	0 (0.0)	0 (0.0)	0 (0.0)	

[†]Unpaired Student's *t*-test and [#]Chi-square test were used to compare RG7 and TMD groups.

Table 6.2 shows the characteristic of subjects. There were 344 older adults inpatients from three large hospitals in northern Vietnam recruited in this research. About 30% subjects ate

TMD (21% SB6 diet, 8% MM5 diet and 1% LQ3 diet). Mean age of older adult inpatients was 74.7 years old and female ratio was 52.9%. The BMI was 21.1 ± 3.0 kg/m^2. BMI of the RG7 group (21.4 ± 3.0 kg/m^2) was higher than the TMD group (20.6 ± 2.9 kg/m^2). Result of nutrition assessment by GLIM showed that there were 28.8% malnutrition. The rate of malnutrition in the TMD group (44.2%) was two time higher than the RG7 group (22.1%). The prevalence of subjects who could be independent to eat in the RG7 group (96.3%) was higher than the TMD group (72.1%). More than 70% subjects consumed snacks outside. There was no difference in the snack consumption rate in either group but ONS consumption and parenteral nutrition in the RG7 group were higher than in the TMD group. Dysphagia prevalence was 14.8% by RSST,WST and 20.1% by EAT-10. Dysphagia rate in the TMD group by both clinical tests (RSST, WST) and EAT-10 were also higher than the RG7 group. According to OHAT scores, there were about 75% subjects had healthy oral status. The RG7 group's healthy oral status (about 81%) was higher than the TMD group (about 61%). With appetite evaluation by SNAQ scores, the TMD group had a score lower than the RG7 group. The number of medications of the TMD group (4.9 ± 2.4) was higher than the RG7 group (4.3 ± 2.6). The length of hospital stay of the TMD group (9.8 ± 4.3) was greater than for the RG7 group (8.1 ± 3.9).

Table 6. 3. Nutrition intake of older adult inpatients (n=344)

Nutrients	Type of diet	Hospital diet intake (Mean ± SD)	P-value[†]	Snack outside intake (Median (IQR))	P-value[‡]	Total daily nutrient intake (Mean ± SD)	P-value[†]
Energy (kcal)	Total	1308 ± 238		127 (0-249)		1444 ± 229	
	RG7	1358 ± 240	<0.05	112 (0-256)	0.28	1490 ± 225	<0.05
	TMD	1194 ± 188		144 (37-217)		1340 ±204	
Protein (g)	Total	58 ± 10		4 (0-6)		62 ± 10	
	RG7	62 ± 9	<0.05	3 (0-6)	<0.05	65 ± 9	<0.05
	TMD	50 ± 8		5 (2-8)		55 ± 8	
Lipid (g)	Total	32 ± 10		3 (0-6)		36 ± 9	
	RG7	35 ± 10	<0.05	1 (0-6)	<0.05	38 ± 9	<0.05

	TMD	28 ± 8		5 (0-7)		32 ± 9
Carbohy drate (g)	Total	196 ± 42		20 (0-37)		218 ± 43
	RG7	200 ± 43	<0.05	16 (0-42)	0.93	222 ± 44
	TMD	187 ± 35		23 (6-31)		208 ± 39
Fiber (g)	Total	8 ± 3		0 (0-1)		9 ± 3
	RG7	9 ± 3	<0.05	0 (0-1)	0.79	10 ± 3
	TMD	7 ± 3		0 (0-2)		8 ± 3

[†]Unpaired Student's *t*-test, [‡]Mann-Whitney *U*-test

Table 6.3 indicates the nutrition intake of older adult inpatients. From the hospital diet, they consumed 1308 ± 238 kcal, 58 ± 10 g protein, 32 ± 10 g lipid, 196 ± 42 g carbohydrate and 8 ± 3 g fiber. Energy and nutrients intake of the RG7 group were higher than the TMD diet with $p<0.05$. With snack intake, energy, protein, lipid, carbohydrate and fiber intake were 127 (0-249) kcal, 4 (0-6) g, 3 (0-6) g, 20 (0-37) g and 0 (0-1) g, respectively. There were no differences in energy, carbohydrate and fiber intake from snacks between the two groups but protein and lipid intake showed differences. In total daily nutrient intake, energy, protein, lipid, carbohydrate and fiber intake were 1444 ± 229 kcal, 62 ± 10 g, 36 ± 9 g, 218 ± 43 g and 9 ± 3 g, respectively. We observed differences between the RG7 and TMD groups in energy and nutrients intake with $p<0.05$.

Table 6. 4. Energy and protein requirements, hospital meal wastage and RDA comparison (n=344)

Nutrients	Type of diet	Requirement (Mean ± SD)	P-value[†]	Hospital meal wastage (Median (IQR))	P-value[‡]	<100% RDA (%)	<75% RDA (%)
Energy (kcal)	Total	1736 ± 144		402 (227-610)		87	31
	RG7	1744 ± 156	0.09	372 (181-552)	<0.05	85	26
	TMD	1719 ± 110		495 (356-726)		92	42
	Total	67 ± 4		5 (0-15)		53	8

Protein (g)	RG7	67 ± 4	0.15	2 (0-8)	<0.05	39	4
	TMD	66 ± 4		16 (10-23)		85	18

[†]Unpaired Student's *t*-test, [‡]Mann-Whitney *U*-test

Table 6.4 indicates the energy and protein requirements, hospital meal wastage and RDA comparison. Energy and protein requirements in both groups were similar. But hospital meal wastage in the TMD group was higher than the RG7 group with p<0.05. The deficiency prevalence compared with RDA was quite high. The rate of subjects who consumed less than 75% RDA of energy and protein were 31% and 8%, respectively. In general, the rate of less than 75% RDA consumption in the TMD group was higher than RG7 group.

Table 6. 5. Evaluation of hospital meals

Indicators		Overall (n=344) (Median (IQR))	RG7 (n=240) (Median (IQR))	TMD (n=104) (Median (IQR))	P-value
Stable food	Hardness	3 (3-3)	3 (3-3)	3 (3-3)	0.06
	Amount	3 (3-4)	3 (3-4)	3 (3-4)	0.83
	Taste	3 (3-3)	3 (3-3)	3 (3-3)	0.51
Main dish	Hardness	3 (3-3)	3 (3-3)	3 (2-3)	<0.05
	Amount	3 (3-3)	3 (3-3)	3 (3-3)	0.07
	Taste	3 (3-3)	3 (3-3)	3 (2-3)	0.06
	Size	3 (3-3)	3 (3-3)	3 (3-4)	<0.05
Side dish	Hardness	3 (3-3)	3 (3-3)	3 (3-3)	0.47
	Amount	3 (3-3)	3 (3-4)	3 (3-3)	0.09
	Taste	3 (2-3)	3 (2-3)	3 (3-3)	0.98
	Size	3 (3-3)	3 (3-3)	3 (3-3)	0.09
Temperature		2 (2-3)	2 (2-3)	2 (2-3)	0.58
Appearance		3 (2-3)	3 (2-3)	2 (2-3)	<0.05
Overall liking		3 (2-3)	3 (2-3)	3 (2-3)	<0.05

Mann-Whitney *U*-test

Table 6.5 shows the evaluation of hospital meals. With stable food and side dishes, the two groups were equally satisfied with the hospital meals. About concerning the main dish, hardness and size indicators, there were difference in satisfaction between the two groups. The TMD group found the food harder and in larger pieces than they preferred. In general, the temperature of hospital meals was still colder than patients expected. The appearance of dishes for the TMD group was also not evaluated highly; it was lower than the RG7 group with $p<0.05$. With overall liking, the median scores were normal rank but IQR was between normal and low satisfaction and the TMD group's satisfaction level was lower than the RG7 group's with $p<0.05$.

6.5. Discussion

This study reports on the characteristics of 344 older adult inpatients in three large Vietnamese hospitals with regard to their nutritional status and characterizes TMD prevalence and hospital meal evaluation by older adult inpatients who received treatment diets in these hospitals. About 30% of the subjects consumed TMD. In the RG7 group, results of dysphagia (RSST, WST, EAT-10) and oral health (OHAT) screening showed that about 4-7% of subjects had a risk of dysphagia and about 20% of subjects had abnormalities in oral care. Therefore, problems with incorrect ordering of food texture for patients when they are admitted may exist in Vietnamese hospitals. Currently, TMD is commonly used for patients who suffer from difficulty in chewing and swallowing. Without a dysphagia and oral care screening system and medical teamwork, it is difficult to provide suitable food textures for patients.

Malnutrition is a widespread problem for older adult inpatients and is a matter of concern in hospitals where clinical conditions such as dysphagia, or conditions that affect eating and drinking, can exacerbate an already poor oral intake. This study showed the proportion of malnutrition by nutritional diagnosis using GLIM was near one-third of subjects (about 29%). This malnutrition rate is quite similar to a study in Japan (33% by GLIM) (13). The TMD group's malnutrition ratio was two times higher than the RG7 group's.

Hospital diet is a part of treatment. Diet quality is one of the biggest challenges for clinical management (14, 15). Inadequate dietary intake may be contributing to the high prevalence of malnutrition (16). Although, the energy and protein requirements of the RG7 and TMD groups were not significantly different. However, we observed hospital meals and total daily consumption of energy and nutrients in the TMD group were lower than in the RG7 group. A study which was published in 2005 indicated that energy and protein intake can be significantly

lower for patients prescribed TMD as compared with the regular hospital diet (17). In addition, the hospital meal wastage for the TMD group was higher than for the RG7 group. And the deficiency rate compared with RDA in the TMD group was higher than in the RG7 group. Farrer et al. surveyed the reasons for food wastage. Clinical reasons associated with swallowing or disease were reported as the most common reason for food wastage (18). Besides, the results of the hospital meal satisfaction survey also showed that the TMD group had a lower evaluation than the RG7 group and in general the hospital meal evaluation was not high. A study on 95 Korean patients receiving TMD indicated a significant relationship between the percentage of plate waste and the overall satisfaction level of patients receiving TMD (19). Furthermore, in this study, the TMD group also had lower appetite than the RG7 group. A Japanese study by using logistic regression analysis showed the consumption of TMD is associated with poor appetite. The reason of poor appetite on these subjects may be dysphagia or low quality of TMD. TMD may lead to poor appetite because of changes in appearance, texture, and taste, which are thought to have negative psychological effects (20). Therefore, it is neccessary to have strategies to improve quality and reduce the food waste of TMD which will lead to a better nutritional status and clinical outcomes among the patients.

In addition, although the snack consumption rate in both groups was the same, the TMD group preferred to use ONS at snack time to supply more energy and protein and especially because they are easy to swallow. It is also understandable that the results showed that the protein and lipid from the snack intake of the TMD group were higher than for the RG7 group. Snacks of the RG7 group may come from sweet foods, for example fruit or cake, which are popular with Vietnamese, so we could not find any difference in carbohydrate intake, fiber and energy in snacks between the two groups. Previous reviews suggest older adults consume more energy with small and nutrient-dense ONS (21). However, more studies are required to conclude whether providing ONS contributes to a higher nutrition intake with TMD patients (22).

Although dietary intake is a good reflection of patient acceptance of meals, food quality, feeding assistance, and mealtime environment also contribute to nutritional intake (14). Other medical staff members should understand rates of malnutrition, low energy and nutrient intake and feeding care support for older adult patients in cooperation with dietitians in the treatment process. The development of TMD is different in different hospitals in Vietnam. The number of dietitians in hospitals and knowledge about the texture of food are still limited. Basically,

hospitals in this investigation were able to supply a regular diet, a soft &bite-sized (not all hospitals), a minced & moist diet and a liquidized diet. Because the cost of meals is not covered by insurance and the cost of meals needs to be reduced to match people's incomes, expensive cooking equipment, for example steam convectors, slicing machines, high wattage mixers and hot and cold serving carts, are rarely used in Vietnamese hospitals. This may lead to difficulty in preparing some types of TMD, which need to be soft, smooth and higher energy density. In addition, temperature directly affects the taste acceptability and safety of food (23). Given the lack of hot and cold serving carts, other ways such as warm containers (warmed tableware, warm boxes) should be considered to supply warm hospital meals for patients. Besides, dietitians should cooperate well with cookers to apply updated knowledge about cooking science to improve TMD based on present resources in Vietnamese hospitals.

In this study, the vitamin and mineral content of meals was not analyzed. But the low intakes of energy and nutrients suggest that vitamin and mineral requirements were unlikely to be met. The thickening fluids were also not investigated. This is a cross-sectional study so we could not conclude that TMD led to malnutrition on Vietnamese older adult inpatients. Subjects in TMD group may suffer from dysphagia, poor appetite and/or the other problems. And previous study also showed that dysphagia and malnutrition have the strong relationship on Vietnamese older adult inpatients (24). In this study, base on the result of energy intake and hospital meal evaluation, we think that TMD group may have poorer nutritional status than RD7 group.

In conclusion, the older adult inpatients on TMD may have a nutritional status worse than those consuming a regular diet. Patients on TMD should receive nutritional support by a dietitian. Hospital diets need to be improved in texture and quality.

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CHAPTER 7. THE EFFECTS OF POOR ORAL HEALTH ON NUTRITIONAL STATUS IN VIETNAMESE OLDER ADULTS - STUDY 3

7.1. Abstract

Background: The number of Vietnamese older adults is increasing rapidly. Malnutrition and oral health problem are problems of concern. The purpose of this study is to compare nutritional status in Vietnamese older adult inpatients with healthy oral and those with changes/unhealthy oral.

Methods: The study was designed as cross-sectional and was conducted in three large hospitals in northern Vietnam, 2021. The data about nutritional status and oral health status assessed by Oral Health Assessment Tool (OHAT) for 344 older adult inpatients were collected by dietitians.

Results: The results show that about one fourth of subjects had oral changes/unhealthy conditions. The rate of malnutrition in the oral changes/unhealthy group (49.4%) was two times higher than in the oral healthy group (21.8%) with $p<0.05$. The main oral health problems were related to natural teeth and cleanliness. Protein intake of the oral changes/unhealthy group was lower than for the healthy group, about 3g with $p<0.05$.

Conclusion: The nutritional status among older adult inpatients with oral changes/unhealth was poorer than for those with oral health. The food texture of the hospital meal should be improved.

7.2. Introduction

Vietnam is one of the fastest-aging countries in the world. The proportion of the population aged 65 and over increased the fastest (accounting for 7.7%). By 2050, the number of people 60 years and over will more than double from 11.9 million to 29 million people, making up almost one-third of the total population (1). Malnutrition is a concerning problem for this population. In a previous study, the result of malnutrition screening by the Mini Nutritional Assessment - Short Form (MNA-SF) showed that about 70% of older adult inpatients suffer from malnutrition and risk of malnutrition at hospital admission (2). Recently, the Global Leadership Initiative on Malnutrition (GLIM), which is used to assess nutritional status, was established. Many countries have been using this tool to assess nutritional status in their own countries. It is necessary to update the data about nutritional status in Vietnamese older adults by using the GLIM criteria.

Besides malnutrition, oral health problems are also an issue of concern in older adults. There are many risk factors for oral diseases in older adults, for example reduced saliva secretion, side effects of medication, chronic diseases such as diabetes mellitus, chronic respiratory diseases, cardiovascular diseases and cancer (3). The oral cavity is the first part of the digestive tract, responsible for biting the food, chewing, adding saliva for bolus formation, and transporting it into the stomach. Oral health problems may lead to difficulty in eating and reduced food intake. In addition, poor oral health at hospital admission is a potential higher mortality risk predictor and also can have an increasingly negative impact on general health and quality of life of older adults (4).

Some studies related to oral health status in Vietnam were implemented in the community. A study indicated was a high prevalence of tooth loss and a high number of lost teeth among Vietnamese older adults. In detail, the mean tooth loss was 7.6±7.0 teeth. 27.1% of participants had lost 1–3 teeth, 23.6% 4–6 teeth, 27.1% 7–16 teeth and 13.6% >16 teeth (5). A report implemented in Vietnam showed there were 48.4% of older adults who brushed their teeth at least twice a day, 34% had never visited a dentist, and 27.8% often had difficulty chewing food (6). Based on these data, oral health issue on Vietnamese older adult should be a matter of concern.

Nutrition and diet also can affect the development and integrity of the oral cavity and the progression of oral diseases. Besides, oral health status on older adult is related to modify dietary treatment in hospital. As knowledge of the link between oral and nutrition health

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increases, dietetics practitioners and oral health care professionals must learn to provide screening, education, and referrals as part of comprehensive patient care. This also include in International Dietetic and Nutrition Terminology (7).

Consideration of tooth loss alone is not sufficient for proper dietary treatment and a complex tool is necessary to evaluate oral health status. A systematic review showed that in measurement properties of oral health for non-dental healthcare professionals, the Oral Health Assessment Tool (OHAT) is one of the most complete in oral health items and has the best methodological quality in combination with positive quality criteria on measurement properties (8). In this study, OHAT was used by dietitians to screen and assess oral health status.

We would like to determine whether present nutrition practice in hospitals is appropriate for older adult inpatients with poor oral health. Therefore, the purpose of this study is to compare nutrition status in older adult Vietnamese inpatients with healthy oral and those with changes/unhealthy oral.

7.3. Methods

Setting and Sample

The study was designed as a cross-sectional study and was conducted in 2021. This research was conducted in accordance with the Declaration of Helsinki and approved by the Hanoi Medical University's ethical committee, number 512/GCN-HĐĐĐNCYSH-ĐHYHN. The study population consisted of older adult inpatients being treated in three large general hospitals in northern Vietnam.

Subjects were recruited for the study from all newly admitted patients, i.e., patients in the first 48-72 hours after admission, by random selection (using a random number table) from admission registers.

The sample size was 344 subjects who met the inclusion criteria: (a) hospitalized older adults aged 65 or over, (b) consuming hospital diets with no need to control nutrients because of disease. The exclusion criteria included: (a) refusal to participate in this study, (b) lack of ability to answer questionnaires. All subjects received written information explaining the purpose of the research and signed consents were obtained in accordance with ethical requirements.

Data collection

All the questionnaires were filled out by investigators. The investigators were dietitians who are responsible staff members in the nutritional department of each hospital. Researchers carried out training for investigators about research data collection. Before implementing the actual study, we conducted a pilot study on 20 patients to revise the instruments and adapt the model for each hospital.

Below is the information that we obtained.

Demographic data

Data such as age, gender were collected from medical records.

Nutrition parameters

Anthropometric measurement. If patients could stand, weight and height were measured with a Tanita scale BC-760-WH (Tanita, Tokyo, Japan) and Seca Germany. Weight was collected in the morning before eating and after toilet. Patients removed their shoes and wore only hospital clothes. Body mass index (BMI) was calculated using base weight and height. If patients could not stand, we used the circumference of the leg as an indicator to screen nutrition by MNA-SF (9).

Mini nutritional assessment – short form (MNA-SF). Various scales have been used to perform a quick initial nutritional assessment. The MNA-SF is used globally. Although it does not require special equipment, it has high sensitivity and specificity for assessing malnutrition risk in older adults in multiple settings, including hospitals. MNA-SF consists of six sections: appetite or eating problems, recent weight loss, mobility impairment, acute illness/ stress, dementia or depression, and BMI. It contains a total of 14 points; a score of 12–14 is within the normal range, 8–11 indicates risk of malnutrition, and ≤ 7 indicates malnutrition. All assessments were performed per the MNA-SF user guide.

The Global Leadership Initiative on Malnutrition (GLIM). Malnutrition was assessed using the criteria of the GLIM definition, which is based on phenotypic criteria including change in body weight, low BMI, and reduced muscle mass, as well as etiologic criteria including reduced food intake or assimilation, and disease burden. The GLIM definition includes 2 steps. First, a validated nutritional risk screening tool is used to identify individuals at risk of malnutrition; in this study we used the MNA-SF. Second, for people at risk of malnutrition, malnutrition is defined by the detection of at least 1 phenotypic and 1 etiologic criterion (10).

Dietary survey. The hospital diet had been supplied through 7-day cyclic menus. Normal hospital diets were constructed to meet at least the Vietnamese Recommendation Dietary Allowance (RDA) for low activity level. Based on height of the individual, ideal body weight (IBW) was calculated. An individual diet was calculated based on 30-35 kcal/kg IBW for energy, 1-1.2g/kg IBW for protein.

Dietary intake of patients was conducted by the 24-hour dietary record. Patients recorded all food intake including the rate of staple food, main dish and side dish intake from hospital meals and outside snacks in one day at admission. Based on the Vietnamese Food Composition Table 2017, diets of patients were calculated by dietitians.

Eating assistance levels were recorded with 3 levels: independent, partially assisted and fully assisted. The independent level meant that patients were able to eat without any assistance. The partially assisted level meant that patients received partial support from medical staff such as holding a patient's hand to help them guide food to their mouth. The fully assisted level meant that the medical staff fed the patient with complete support.

The Oral Health Assessment Tool (OHAT)

The OHAT is a tool for non-dental healthcare professionals with an eight category screening tool that includes the lips, tongue, gums and tissue, natural teeth, dentures, oral cleanliness and dental pain to assess oral health, including for those with dementia (11).

Each item is coded 0, 1 or 2. A score of 0 corresponds to absence of disorder, a score of 1 indicates a noticeable but not pathological change in the criterion assessed, and a score of 2 indicates pathological features. The total OHAT score ranges from 0 to 16 and can be classified into three categories:

- [0; 3], healthy mouth, to be maintained by usual care.

- [4; 8], changes observed and monitoring required, as there are areas of weakness.

- [9; 16], unhealthy mouth: care needs to be planned and the specialized opinion of a dental surgeon should be recommended.

In this study, the oral change group and the unhealthy group were combined in the tables in the result section.

Dysphagia screening

Eating assessment tool questionnaire (EAT-10). EAT-10, a self-reported validated questionnaire that assesses perception of swallowing difficulty was used to evaluate dysphagia risk. There are 10 simple questions with a total score of 40 points and the cut-off point is 3. If total score ≥ 3 points, it means the patient may have problems swallowing efficiently and safely (12).

The Simplified Nutritional Appetite Questionnaire (SNAQ)

The SNAQ was developed as a self-assessment screening tool with four questions including appetite, how full after eating, food tastes and number of meals per day. SNAQ score <15 indicates significant risk of at least 5% weight loss within six months (13).

Statistical analysis

All statistical analyses were performed using the Stata version 12.0 software. Categorical variables were expressed as the number of patients (percentage), and quantitative variables, including parametric and non-parametric values evaluated by the histogram, were expressed as mean± standard deviation (SD) such as age, BMI, or median (interquartile range) (IQR) such as energy wastage. Comparisons between groups were made using the Chi-square test for categorical variables and Student's *t*-test or Mann-Whitney *U*-test for quantitative variables. P-values of less than 0.05 were consider statistically significant for all the analyses.

7.4. Results

Table 7. 1. Relationship between oral heath status and some indicators (n=344)

Indicators	Total (n=344)	Oral healthy (n=257)	Oral changes/unhealthy (n=87)	p-value
Age (years), (mean ± SD)	74.7 ± 6.8	74.5 ± 6.9	75.3 ± 6.9	0.95[†]
Female, n (%)	182 (52.9)	134 (52.1)	48 (55.1)	0.57[#]
EAT-10 (≥ 3 scores), n (%)	69 (20.1)	39 (15.2)	30 (34.5)	<0.05[#]
SNAQ (<15 scores), n (%)	212 (61.6)	148 (57.6)	64 (73.6)	<0.05[#]
BMI (kg/m^2) (mean ± SD)	21.1 ± 3.0	21.4 ± 2.9	20.5 ± 3.0	<0.05[†]

MNA-SF (scores), (mean ± SD)	9.8 ± 2.6	10.3 ± 2.4	8.7 ± 2.7	<0.05[†]
Malnutrition (GLIM), n (%)	99 (28.8)	56 (21.8)	43 (49.4)	<0.05[#]
Mealtime independence				
Independent, n (%)	306 (89.0)	238 (92.6)	68 (78.2)	
Partial assistance, n (%)	30 (8.7)	16 (6.2)	14 (16.1)	
Total dependence, n (%)	8 (2.3)	3 (1.2)	5 (5.7)	

[†]Unpaired Student's *t*-test, [#]Chi-square test

Table 7.1 shows the relationship between oral health status and some indicators. We didn`t observe any difference between age and gender between the two groups. The dysphagia and appetite reduction prevalence in the oral changes/unhealthy group were higher than in the healthy group with p<0.05. For nutritional status, BMI and MNA-SF scores the in oral healthy group were higher than for the oral changes/unhealthy group with p<0.05. The malnutrition rate in the oral healthy group (21.8%) was less than in the oral changes/unhealthy group (49.4%) with p<0.05. The oral healthy group had a mealtime independence rate higher that the oral changes/unhealthy group.
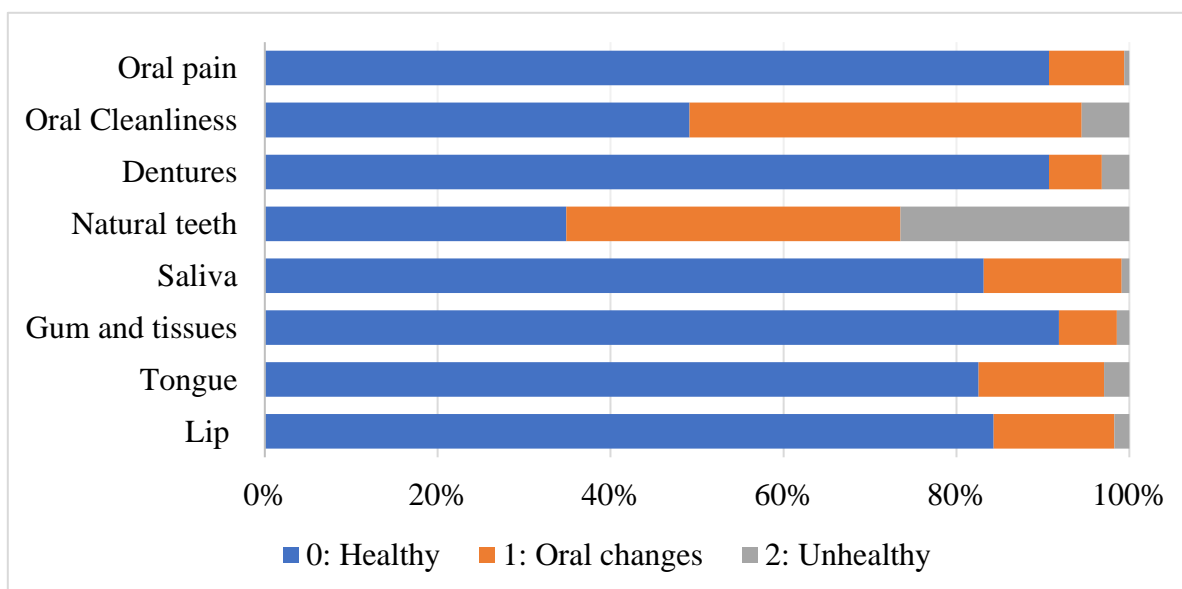
Figure 7. 1. OHAT category scores for older adult inpatients

Figure 7.1 indicates OHAT category scores for older adult inpatients. The items for lip, tongue, gum and tissues, denture and oral pain had a healthy rate which was higher than 80%.

The healthy rate for the natural teeth and oral cleanliness items reached only about 35% and 50%, respectively. This means oral cleanliness and natural teeth problems (decayed or broken teeth/roots) were the most concerning problems in this population.

Table 7. 2. The relationship between oral health status and dietary intake (hospital meals and outside snack)

Dietary intake	Total (n=344)	Oral healthy (n=257)	Oral changes/unhealthy (n=87)	p-value
Energy (kcal)	1444 ± 229	1456 ± 227	1410 ± 236	0.10
Protein (g)	62 ± 10	63 ± 9	60 ± 10	<0.05
Lipid (g)	36 ± 9	37 ± 9	35 ± 10	0.09
Carbohydrate (g)	218 ± 43	219 ± 44	215 ± 41	0.38

Unpaired Student's t-test

Table 7.2 shows the relationship between oral health status and dietary intake (hospital meals and outside snack). In total, the oral healthy group and the oral changes/unhealthy group had the same energy, lipid and carbohydrate intake. Only in protein intake, the oral changes/unhealthy group was lower than the healthy group with p<0.05.

Table 7. 3. Hospital-served meals and wastage

	Total (n=344)	Oral healthy (n=257)	Oral changes/unhealthy (n=87)	p-value
Energy serve (kcal) (Mean ± SD)	1736 ± 144	1730 ± 140	1756 ± 155	0.16[†]
Energy wastage (kcal) (Median (IQR))	402 (227-610)	400 (217-577)	462 (299-633)	<0.05[⌃]
Protein serve (g) (Mean ± SD)	67 ± 4	67 ± 4	67 ± 4	0.12[†]

Protein wastage (g) (Median (IQR))	5 (0-15)	5 (0-15)	8 (2-20)	<0.05[↗]

[†]Unpaired Student's *t*-test

[↗] Mann-Whitney *U*-test

Table 7.3 indicates the hospital-served meals and wastage. There was no difference between the two groups about served energy and protein from the hospital diet but energy and protein wastage in the oral healthy group was less than in the oral changes/unhealthy group.

7.5. Discussion

This study investigated the relationship between oral health status and nutritional status in older adult inpatients. This study shows that the oral changes/unhealthy group had poorer nutritional status than the healthy group by BMI, MNA-SF and GLIM. Although energy and macronutrient from hospital-served meals were the same for both groups, we observed a difference in protein intake; in the oral changes/unhealthy group it was lower than in the healthy group, with p<0.05. The energy and the other macronutrients intake in the oral changes/unhealthy group were also a little lower than in the healthy group but there was no significant difference. In Vietnamese hospital food, the sources supplying carbohydrate for patients are usually rice, porridge, noodles. These are quite soft and easy to chew. In addition, meat such as pork, chicken, beef or fish is preferred as a protein source. Boiled, stir-fried, fried are common as the cooking method for the main dish. For patients with chewing difficulties, normal food is cut into small pieces. Special soft food cooking methods have not been developed in hospitals yet. If methods such as freeze-thawing (with/without enzyme infusion), enzyme impregnation, high-pressure technology, pulsed electric fields, and sonication are used, color and flavor can be maintained while adjusting the soft texture to various needs (14). Because of masticatory ability problems, a lack of protein intake for a long time may lead to muscle loss, sarcopenia and frailty (15, 16). A study showed that the prevalence of sarcopenia was quite high with about 55% among Vietnamese older adult outpatients (17). It is necessary to chose suitable cooking methods to improve the texture of hospital food.

The results of the oral health assessment with OHAT show that natural teeth and oral cleanliness problems are the worst items for older adult inpatients. With Vietnamese older adult patients, oral care behavior was still not good and the dentist visit rate was low (6). In the past, the custom of eating betel nuts or dyeing teeth black to clean them may have affected the oral

care habits of older adults (18). Besides, various factors affect oral health problems, including diseases. Another study on cancer patients indicates the main oral health problems are tongue and saliva (19). However, the subjects in this study did not have diseases and did not need to adjust nutrients in their diet, so the result is representative for normal older adult inpatients. It is necessary to have more strategies for motivating oral care in older adults specifically and in the community in general in Vietnam (5, 6).

In conclusion, the nutritional status in older adult inpatients with changes/unhealthy oral was poorer than in those with healthy oral. The food texture of hospital meals should be improved.

7.6. References

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CHAPTER 8: DYSPHGIA FIELD DEVELOPMENT VISION IN VIETNAM

8.1. Screening and assessment dysphagia

In this study, we used simple dysphagia screening tools in the world to implement in Vietnamese hospitals. With these tools, the non-specialist medical staff also can screen dysphagia for patients and apply it in the community. It is necessary knowledge and skill for the dietitian to give suitable dietary treatment for dysphagia patients. Under Vietnamese conditions, almost all hospitals have lacked speech therapy (ST) specialists and dysphagia assessment techniques such as video fluoroscopy (VF) and video endoscopy (VE). However, the number of ST is increasing, and these dysphagia assessments are updated gradually. Furthermore, the dysphagia screening/assessment should be routine work in Vietnamese hospitals.

8.2. Hospital diet and dysphagia food

Hospital diet is a part of treatment for patients. Therefore, hospital diet should be paid by health insurance. Quality of diet also need to be improved to help patients to increase food intake and recover earlier. With dysphagia diet, the transferring technique to produce thickening agents in Vietnam is necessary to have a suitable price and easier to approach for the population. In addition, a dysphagia diet should be considered to add in medical insurance in the future. The international standard for dysphagia diet (IDDSI) is recommended to apply in Vietnamese hospitals. Based on study 3, the hospital diets were surveyed and described detailly in table 8.1.

Table 8. 1. Hospital's meal was classified according to IDDSI

Food type	Regular/easy to chew (RG7)	Soft & bite-sized (SB6)	Minced & moist (MM5)	Pureed (PU4)	Liquidized (LQ3)
Hospital A	Rice, spring roll, pork, quail eggs, cabbage	Rice, meatball with tomato sauce, minced meat with quail eggs, finely cut cabbage	Porridge with pork and green bean	No	Rice, potato, green bean, cabbage, egg, oil, pork, fiber powder

Hospital B	Rice, fried tofu, chicken, fried fish, boiled pumpkin, stir-fried water spinach	No	Porridge with minced pork and carrot	No	Plain rice flour, soybean flour, egg, vegetable oil, soybean sprouts
Hospital C	Rice, processed pork, stir-fried beef with carrot, stir-fried pumpkin, fish sauce, vegetable soup	No	Porridge with minced pork	No	Rice, potato, oil, egg, powdered milk

In people's regular diet, a nutrition transition is occurring in Vietnamese dietary patterns. People are reducing consumption of staple foods, vegetables and intake of fruits and main dishes is greater than before (1). In the main dish, various types of food such as fish, meat, eggs, spring rolls... may be served in the same meal. But only one or two kinds of vegetables are served, and methods of cooking vegetables are not varied; boiling and stir-fried are most common. Because of worries about food safety, fresh vegetables (salads) are almost never served in hospitals, and cooked vegetables are preferred. Supplying sufficient amounts of vegetables and fiber may be the most challenging for dietitians because vegetables are not tasty like meat or fish. Therefore, sophistication in menu design such as color, shape, nutrients, ... are considered carefully by dietitians in developed countries. In this way, the vegetable intake of patients can be increased. The usual soup served is vegetable soup, with added salt and monosodium glutamate. Fish sauce is the traditional sauce in Vietnam, especially in northern areas. Main dishes and vegetables also can be dipped in fish sauce.

In the soft&bite-sized diet, cutting food into small pieces is done in the hospital. When the hospital kitchen is not able to do this, patients or family will cut food from the regular diet by themselves. With the development of food science in advanced countries, freeze-thawing (with/without enzyme infusion), enzyme impregnation, high-pressure technology, pulsed

electric fields, and sonication are used, color and flavor can be maintained, while adjusting soft texture to various degrees (2). The appearance of these foods is better than that of cut foods and may increase patients' nutrient intake. In the Vietnamese context, proteolytic enzymes (such as Bromelain from pineapple, Papain from papaya) or high-pressure technology may be suitable for softening foods (3,4).

With a minced & moist diet, the traditional cooking method is to mix porridge with minced meat and vegetables. The amount of this diet is quite large, about 400-500 ml/meal; for one day it is about 1500ml. Energy density is only about 0.6 kcal/ml. Consequently, most patients can not consume the full amount, leading to higher hospital meal wastage. By observation in other countries, separating the staple food (porridge), main dish, and side dish may be a better way to help patients to consume their diet because of the amount of each dish is not too much and the amount of nutrients for each patient can be estimated more accurately than when all the ingredients are mixed in one pot and then separated for many individual diets. In addition, protein powder and oil should be considered to increase energy density in the diet. Reshaped diet and 3D moulding are being developed in many countries to improve the appearance of TMD (5,6).

In a liquidized diet, menus are created and cooked in the hospital or are ordered from an outside company. This diet was originally usually used for tube feeding patients but recently patients who have difficulty in swallowing may also be offered this diet with an added thickening agent. The usual energy density is about 0.8 kcal/ml. The taste is from various foods and has been improved gradually. Using commercial products for liquidized diets may help to reduce work for hospital kitchens because the number of patients who use a liquidized diet in Vietnamese hospitals is still low, it takes time to cook the food, special mixers are needed, and it is more difficult to manage food safety than with other types of food.

Improving hospital diet in general and dysphagia diet in specific is a time-consuming process and needs the effort of dietitians, chefs, and the whole system. It is worth to contribute on the effectiveness of treatment for patients.

8.3. Dysphagia food labeling requirement

The dysphagia food becomes popular in developed countries (such as Japan, America, Australia) like commercial food. In order to help dysphagia patients can consume outside food safely, a food label based on dysphagia levels is necessary to be established. And IDDSI is the only available international standardized framework for labeling dysphagia diets. In Vietnam,

there has been still many limitations in food label regulation, but I hope in near future dysphagia food label can be established.

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Appendix 1: Questionnaire

    1. Version for research in chapter 1-4

Data collected day: **Place:**

Investigator:

QUESTIONARE ABOUT DYSPHAGIA SCREENING AND NUTRITIONAL STATUS OF GENERAL HOSPITALIZE PATIENTS

I.   General information

A101. ID:

A102. Medical record number:

A103. Name:

A104. Age: ...... years old

A105. Gender: 1. Male   2. Female

A106. Diagnosis disease: .....

A107. Function disease:

1. Neurologic disorders: stroke, parkinson, muscle disease
2. Head and neck cancer
3. Esophageal disorders (structural disorders, motility disorders, gastroesophageal reflux disease,…)
4. Respiratory and latrogenic disorder (artificial airways, tracheotomy...)
5. Other: ...

A108. Pneumonia   1.Yes   2. No

II.   Oral function

A201	Opening degree	Higher 3 fingers	Lower 3 finger
A202	Take your tongue forward	Can	Can not

A203	Move your tongue left and right	Can	Can not
A204	Push the buccal mucosa with your tongue	Can	Can not
A205	Inflating both cheeks	Can	Can not
A206	Current number of teeth	...../28-32 teeth	
A207	Denture	No	Yes
A208	Atrophy of the tongue papilla	No	Yes
A209	Lingual surface drying	Saliva little	Saliva enough

III.   Hand grip strength test

Hand Strength: .... kg

A. Left   B. Right   C. No

IV.   Dysphagia screening

Repetitive Saliva Swallowing test (RSST)

Eating position: 1) 30 degrees 2) 45 degrees   3) 60 degrees   4) 90degrees

<3   times/30s   ≥ 3 times/30s
(<u>Dysphagia</u>)
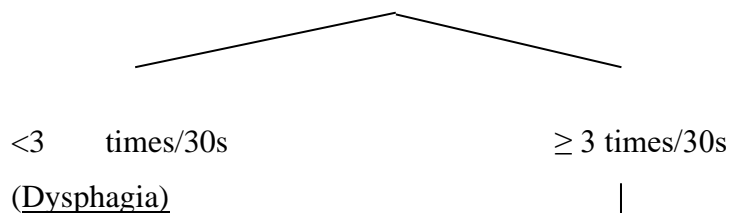
Water-swallowing test

Drink 3ml of water at normal temperature

No choking, no wet sound   Choking, wet sound (<u>Dysphagia</u>)

Drink 30ml of water at normal temperature

1 time swallow without choking, wet   Abnormal symptoms
    sound (5second) (Normal)
                                (chocking and/or wet sound) (<u>Dysphagia</u>)

V.   EAT-10 questionnaires

VI.   Nutrition assessment

2. Version for research in chapter 6-7

D3. Cố gắng sức khi nuốt chất lỏng không?
- Không gặp vấn đề đó
- Hiếm khi gặp
- Thỉnh thoảng gặp
- Thường gặp
- Luôn luôn gặp

D4. Cố gắng sức khi nuốt thức ăn rắn không?
- Không gặp vấn đề đó
- Hiếm khi gặp
- Thỉnh thoảng gặp
- Thường gặp
- Luôn luôn gặp

D5. Cố gắng sức khi nuốt viên thuốc không?
- Không gặp vấn đề đó
- Hiếm khi gặp
- Thỉnh thoảng gặp
- Thường gặp
- Luôn luôn gặp

D6. Nuốt bị đau?
- Không gặp vấn đề đó
- Hiếm khi gặp
- Thỉnh thoảng gặp
- Thường gặp
- Luôn luôn gặp

D7. Khó nuốt ảnh hưởng đến sự thích thú trong ăn uống?
- Không gặp vấn đề đó
- Hiếm khi gặp
- Thỉnh thoảng gặp
- Thường gặp
- Luôn luôn gặp

D8. Thực phẩm bị dính ở họng khi nuốt
- Không gặp vấn đề đó
- Hiếm khi gặp
- Thỉnh thoảng gặp
- Thường gặp
- Luôn luôn gặp

D9. Bị ho khi ăn
- Không gặp vấn đề đó
- Hiếm khi gặp
- Thỉnh thoảng gặp
- Thường gặp
- Luôn luôn gặp

D10. Nuốt gây ra căng thẳng
- Không gặp vấn đề đó
- Hiếm khi gặp
- Thỉnh thoảng gặp
- Thường gặp
- Luôn luôn gặp

Ea. OHAT (Nhập viện)

E1a. Môi (nhập viện)
- Khỏe mạnh/Bình thường, Ẩm, hồng
- Hơi tệ/Khô, Nứt nẻ, Đỏ góc miệng
- Bệnh lý/Sưng tấy hoặc nổi cục Vết đốm đỏ, vết đốm trắng Chảy máu do loét Chảy máu từ góc miệng Loét

E2a. Lưỡi (nhập viện)
- Khỏe mạnh/Bình thường, ẩm, hồng
- Hơi tệ/Bất thường, vết nứt, nổi mẩn đỏ, lớp phủ ở lưỡi
- Bệnh lý/Vết đốm đỏ, vết đốm trắng, loét sưng

E3a. Lợi và nướu (nhập viện)
- Khỏe mạnh/Bình thường, ẩm, hồng
- Hơi tệ/Khô, bóng, thô ráp, đỏ, sưng tấy, một vết loét / vết loét dưới răng giả
- Bệnh lý/Sưng, xuất huyết, răng lung lay, vết trắng, nổi mẩn đỏ, đau áp lực

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E4a. Nước bọt (nhập viện)
- Khỏe mạnh/Ẩm, có nước bọt
- Hơi tệ/Khô, màng nhầy dính, ít nước bọt, khô miệng
- Bệnh lý/Đỏ và khô, hầu như không có nước bọt, nước bọt nhớt, có cảm giác khát

E5a. Răng thật (nhập viện)
- Khỏe mạnh/Răng không bị sâu hay gãy
- Hơi tệ/1-3 răng sâu hoặc gãy răng/ chân răng hoặc mòn răng, tập trung
- Bệnh lý/Trên 4 răng sâu, gãy, mòn răng, răng rời rạc, dưới 3 răng vĩnh viễn, không có răng giả

E6a. Răng giả (nhập viện)
- Khỏe mạnh/Bình thường, răng giả, không có răng giả bị gãy
- Hơi tệ/Một vị trí răng giả, hàm giả đeo 1-2 giờ/ngày
- Bệnh lý/Trên 2 vị trí răng giả, hàm giả, không lắp được do mất răng giả hoặc răng giả không phù hợp, yêu cầu keo dán răng giả

E7a. Vệ sinh răng miệng (nhập viện)
- Khỏe mạnh/Sạch và không có mảng thức ăn hoặc cao răng trong miệng hoặc ở răng giả
- Hơi tệ/Mảng thức ăn/cao răng/mảng bám tại 1-2 vị trí, chứng hôi miệng
- Bệnh lý/Nhiều vị trí có mảng thức ăn/cao răng/mảng bám, mùi hôi miệng nặng

E8a. Đau răng (nhập viện)
- Khỏe mạnh/Không có hành vi hoặc đặc điểm thể chất cho thấy đau
- Hơi tệ/Các dấu hiệu đau bằng lời nói và / hoặc hành vi như kéo mặt, cắn môi, không ăn, nóng giận
- Bệnh lý/Có các dấu hiệu đau thực thể (sưng má hoặc nướu, gãy răng, loét), cũng như có phản nàn về đau răng hoặc có các dấu hiệu đau như kéo mặt, cắn môi, không ăn, nóng giận

F. MNA-SF (Mini Nutrition Assessment- Short Form) (nhập viện)

F. MNA-SF (Mini Nutrition Assessment- Short Form) (nhập viện)

Fa. Cân nặng hiện tại (kg) (Dùng dấu chấm để phân tách số thập phân)

_____

Fb. Chiều cao (m)(Dùng dấu chấm để phân tách số thập phân)

_____

F1. Khẩu phần ăn (lượng thức ăn) của đối tượng có giảm trong vòng 3 tháng vừa qua do mất ngon miệng, vấn đề về tiêu hóa, khó nhai hoặc khó nuốt không? (0-2)
- Khẩu phần ăn giảm rất nhiều
- Khẩu phần ăn giảm vừa
- Không giảm khẩu phần ăn

F2. Cân nặng đối tượng có giảm trong 3 tháng vừa qua không?
- Cân nặng giảm hơn 3kg
- Không biết
- Cân nặng giảm từ 1 đến 3kg
- Cân nặng không đổi

F3. Tình hình vận động của đối tượng như thế nào?
- Nằm tại giường hoặc ghế
- Có thể rời giường/ghế nhưng không ra khỏi nhà
- Vận động bình thường

F4. Đối tượng có chịu áp lực tâm lý hay mắc một bệnh cấp tính trong 3 tháng qua không?
- Có
- Không

F5. Đối tượng có vấn đề tâm thần kinh không?
- Sa sút trí tuệ hoặc trầm cảm nặng
- Sa sút trí tuệ vừa
- Không có vấn đề tâm thần kinh

Kết quả BMI là NaN

_____

F6A. Chỉ số khối cơ thể (BMI)= Khối lượng (kg) / (chiều cao(m))2
- BMI dưới 19
- BMI từ 19 đến 21
- BMI từ 21 đến dưới 23
- BMI lớn hơn hoặc bằng 23
- Không tính được

F6B. Chu vi bụng chân (CC) (tính bằng cm)
Nếu BMI không tính được, thay câu hỏi F6A bằng câu F6B. Không trả lời cả câu F6B nếu câu F6A đã hoàn thành
- CC < 31
- CC < 31

G. GLIM (nhập viện)

» G1. Phenotypic

G. GLIM (nhập viện)

G1. Phenotypic

Cân nặng trước giảm cân (kg)

_____

G1a. Giảm cân không mong muốn =NaN(%) (>5% trong 6 tháng hoặc >10% trong trên 6 tháng)
- Không
- Có

G1a1. n =NaN(%): Giảm 5-10% trong 6 tháng hoặc; 10-20% trong >6 tháng
CHỌN "KHÔNG" khi >10%/6 tháng hoặc >20%/>6 tháng
- Không
- Có

G1b. Chỉ số BMI= NaN (kg/m2) tuổi= (<18,5 nếu <70 tuổi hoặc <20 nếu ≥70 tuổi)
- Không
- Có

G1b1. BMI= NaN (kg/m2) BMI<20 nếu <70 tuổi hoặc <22 nếu ≥70 tuổi
CHỌN "KHÔNG" khi BMI<20 nếu <70 tuổi hoặc BMI<22 nếu ≥70 tuổi
- Không
- Có

G1c. Giảm khối cơ
- Không
- Có

G1c1. Giảm nhẹ đến trung bình
CHỌN "KHÔNG" khi giảm nghiêm trọng
- Không
- Có

» G2. Etiologic

G2. Etiologic

_____

G2a. Giảm lượng thức ăn (Năng lượng tiêu thụ ≤50% nhu cầu năng lượng trong >1 tuần hoặc bất kỳ sự giảm nào trong >2 tuần, hoặc mắc bệnh mãn tính liên quan đến tiêu hóa và hấp thụ)
- Không
- Có

G2b. Viêm, nhiễm khuẩn
- Không
- Có

Ha. Vị giác (nhập viện) SNAQ≤14 chỉ ra có nguy cơ giảm ít nhất 5%

H1a. Cảm giác thèm ăn (nhập viện)
- Rất kém
- Kém
- Trung bình
- Tốt
- Rất tốt

H2a. Khi ăn (nhập viện)
- Cảm thấy no sau khi ăn chỉ một vài miếng
- Cảm thấy no sau khi ăn khoảng 1/3 bữa ăn
- Cảm thấy no sau khi ăn trên nửa bữa ăn
- Cảm thấy no sau khi ăn hầu hết bữa ăn
- Khó có thể cảm thấy no

H3a. Vị thực phẩm (nhập viện)
- Rất tệ
- Tệ
- Trung bình
- Tốt
- Rất tốt

H4a. Số bữa ăn (nhập viện)
- Ít hơn 1 bữa/ngày
- 1 bữa/ngày
- 2 bữa/ngày
- 3 bữa/ngày
- Nhiều hơn 3 bữa/ngày

Ja. Khẩu phần ăn (nhập viện)

J1a. Food Intake Level Scale Thang mức độ thực phẩm tiêu thụ (nhập viện)
- Thực phẩm sẽ nuốt được cùng đường miệng trong 3 bữa ăn. Không sử dụng sonde
- Bệnh nhân ăn 3 bữa nhưng loại trừ những thức phẩm cụ thể gây khó nuốt
- Không có hạn chế chế độ ăn và bệnh nhân được nuôi dưỡng 3 bữa đường miệng, nhưng chỉ định thuốc được cân nhắc
- Không có hạn chế chế độ ăn, và bệnh nhân được nuôi dưỡng 3 bữa đường miệng (bình thường)

Mã chế độ ăn bệnh viện (nhập viện):

_____

J2a. Loại chế độ ăn (nhập viện)
- Thông thường
- Mềm & Miếng vừa ăn
- Xay & Ẩm
- Xay nhuyễn
- Xay lỏng

J3a. Ảnh ghi khẩu phần ăn(nhập viện)

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J4a. Dinh dưỡng qua ống sonde (nhập viện)
- Có
- Không

J5a. Dinh dưỡng tĩnh mạch (nhập viện)
- Có
- Không

J6a. Sử dụng sản phẩm bổ sung dinh dưỡng (VD: cao năng lượng, thủy phân, chất xơ hòa tan) (nhập viện)
- Có
- Không

Ia. Phân (nhập viện)

I1a. Số lần đại tiện/ngày (nhập viện)

_____

I2a. Tình trạng phân theo thang phân loại Bristol (1-7) (nhập viện)
- Loại 1. Từng cục rời rạc cứng và rất khó ra
- Loại 2. Giống như xúc xích khô và lổn cổn
- Loại 3. Giống như xúc xích khô và nứt nẻ
- Loại 4. Giống như xúc xích hay con rắn trơn tru và mềm
- Loại 5. Từng cục nhầy và mềm (rất dễ ra)
- Loại 6. Lọn cơn lầy nhầy
- Loại 7. Phân lỏng hoàn toàn (tiêu chảy)

K. Độ hài lòng của người bệnh với bữa ăn bệnh viện

» K1. Món cơm/cháo/ phở

K1A. Độ cứng
- Rất cứng
- Cứng
- Vừa
- Mềm
- Rất mềm

K1B. Lượng
- Rất ít
- Ít
- Vừa
- Nhiều
- Rất nhiều

K1C. Vị
- Rất không ngon
- Không ngon
- Bình thường
- Ngon
- Rất ngon

» K2. Món chính (Thịt/cá/...)

G2a. Giảm lượng thức ăn (Năng lượng tiêu thụ ≤50% nhu cầu năng lượng trong >1 tuần hoặc bất kỳ sự giảm nào trong >2 tuần, hoặc mắc bệnh mãn tính liên quan đến tiêu hóa và hấp thụ)
- Không
- Có

G2b. Viêm, nhiễm khuẩn
- Không
- Có

Ha. Vị giác (nhập viện) SNAQ≤14 chỉ ra có nguy cơ giảm ít nhất 5%

H1a. Cảm giác thèm ăn (nhập viện)
- Rất kém
- Kém
- Trung bình
- Tốt
- Rất tốt

H2a. Khi ăn (nhập viện)
- Cảm thấy no sau khi ăn chỉ một vài miếng
- Cảm thấy no sau khi ăn khoảng 1/3 bữa ăn
- Cảm thấy no sau khi ăn trên nửa bữa ăn
- Cảm thấy no sau khi ăn hầu hết bữa ăn
- Khó có thể cảm thấy no

H3a. Vị thực phẩm (nhập viện)
- Rất tệ
- Tệ
- Trung bình
- Tốt
- Rất tốt

H4a. Số bữa ăn (nhập viện)
- Ít hơn 1 bữa/ngày
- 1 bữa/ngày
- 2 bữa/ngày
- 3 bữa/ngày
- Nhiều hơn 3 bữa/ngày

Ja. Khẩu phần ăn (nhập viện)

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J1a. Food Intake Level Scale Thang mức độ thực phẩm tiêu thụ (nhập viện)

- ○ Thực phẩm dễ nuốt được dùng đường miệng trong 3 bữa ăn. Không sử dụng sonde
- ○ Bệnh nhân ăn 3 bữa nhưng loại trừ những thực phẩm cụ thể gây khó nuốt
- ○ Không có hạn chế chế độ ăn và bệnh nhân được nuôi dưỡng 3 bữa đường miệng, nhưng chỉ định thuốc được cân nhắc
- ○ Không có hạn chế chế độ ăn, và bệnh nhân được nuôi dưỡng 3 bữa đường miệng (bình thường)

Mã chế độ ăn bệnh viện (nhập viện):

_____

J2a. Loại chế độ ăn (nhập viện)

- ○ Thông thường
- ○ Mềm & Mỏng vừa ăn
- ○ Xay & Ấm
- ○ Xay nhuyễn
- ○ Xay lỏng

J3a. Ảnh ghi khẩu phần ăn(nhập viện)

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J4a. Dinh dưỡng qua ống sonde (nhập viện)

- ○ Có
- ○ Không

J5a. Dinh dưỡng tĩnh mạch (nhập viện)

- ○ Có
- ○ Không

J6a. Sử dụng sản phẩm bổ sung dinh dưỡng (VD: cao năng lượng, thủy phân, chất xơ hòa tan) (nhập viện)

- ○ Có
- ○ Không

Ia. Phân (nhập viện)

I1a. Số lần đại tiện/ngày (nhập viện)

_____

I2a. Tình trạng phân theo thang phân loại Bristol (1-7) (nhập viện)

- ○ Loại 1. Từng cục rời rạc cứng và rất khó ra
- ○ Loại 2. Giống như xúc xích khô và lợn cợn
- ○ Loại 3. Giống như xúc xích khô và nứt nẻ
- ○ Loại 4. Giống như xúc xích hay con trùn trơn tru và mềm
- ○ Loại 5. Từng cục nhầy và mềm (rất dễ ra)
- ○ Loại 6. Lợn cợn lầy nhầy
- ○ Loại 7. Phân lỏng hoàn toàn (tiêu chảy)

K. Độ hài lòng của người bệnh với bữa ăn bệnh viện

» K1. Món cơm/cháo/ phở

K1A. Độ cứng

- ○ Rất cứng
- ○ Cứng
- ○ Vừa
- ○ Mềm
- ○ Rất mềm

K1B. Lượng

- ○ Rất ít
- ○ Ít
- ○ Vừa
- ○ Nhiều
- ○ Rất nhiều

K1C. Vị

- ○ Rất không ngon
- ○ Không ngon
- ○ Bình thường
- ○ Ngon
- ○ Rất ngon

» K2. Món chính (Thịt/cá/...)

K2a. Độ cứng

- ○ Rất cứng
- ○ Cứng
- ○ Vừa
- ○ Mềm
- ○ Rất mềm

K2b. Lượng

- ○ Rất ít
- ○ Ít
- ○ Vừa
- ○ Nhiều
- ○ Rất nhiều

K2C. Vị

- ○ Rất không ngon
- ○ Không ngon
- ○ Bình thường
- ○ Ngon
- ○ Rất ngon

K2D. Kích cỡ

- ○ Rất nhỏ
- ○ Nhỏ
- ○ Vừa
- ○ To
- ○ Rất to

» K3. Món phụ (Rau)

K3a. Độ cứng

- ○ Rất cứng
- ○ Cứng
- ○ Vừa
- ○ Mềm
- ○ Rất mềm

K3b. Lượng

- ○ Rất ít
- ○ Ít
- ○ Vừa
- ○ Nhiều
- ○ Rất nhiều

K3c. Vị

- ○ Rất không ngon
- ○ Không ngon
- ○ Bình thường
- ○ Ngon
- ○ Rất ngon

K3D. Kích cỡ

- ○ Rất nhỏ
- ○ Nhỏ
- ○ Vừa
- ○ To
- ○ Rất to

K4. Nhiệt độ

- ○ Rất nguội
- ○ Nguội
- ○ Vừa
- ○ Nóng
- ○ Rất nóng

K5. Màu sắc/Bày trí

- ○ Rất không đẹp
- ○ Không đẹp
- ○ Bình thường
- ○ Đẹp
- ○ Rất đẹp

K6. Tổng quát mức độ hài lòng

- ○ Rất không hài lòng
- ○ Không hài lòng
- ○ Bình thường
- ○ Hài lòng
- ○ Rất hài lòng

Ngày nhập viện

yyyy-mm-dd _____

Ngày xuất viện

yyyy-mm-dd _____

A13. Tình trạng xuất viện

- ○ Ra viện
- ○ Chuyển viện
- ○ Tử vong
- ○ Khác

Ghi rõ

_____

Questionnaire's link:

https://ee.kobotoolbox.org/x/49J5fYCP

1. Version for research in chapter 1-4

Jumonji University

INFORMED CONSENT

Participant`s name:

Age:

Address:

After doctor informed about purpose, interests, obligations, the potential risks and benefits of the subjects participating in the study: "**NUTRITIONAL MANAGEMENT OF THE ELDERLY WITH DYSPHAGIA IN VIETNAM**".

I (or a representative of the family) agreed to voluntarily participate in this study (consent to draw blood for testing). I would like to adhere to the regulations of the research.

Hanoi, Date: __/__/2018

Signature of witness   Signature of participant

(Full name)   (Full name)

Jumonji University

INFORMED CONSENT

Participant`s name:

Age:

Address:

After doctor informed about purpose, interests, obligations, the potential risks and benefits of the subjects participating in the study: "**NUTRITIONAL STATUS OF OLDER ADULT INPATIENTS IN SOME VIETNAMESE HOSPITALS**".

I (or a representative of the family) agreed to voluntarily participate in this study (consent to draw blood for testing). I would like to adhere to the regulations of the research.

Hanoi, Date: __/__/2021

Signature of witness   Signature of participant

(Full name)   (Full name)

Appendix 3: Other article and book related to dysphagia field which were published.

1. Nguyen Thuy Linh and <u>Tran Phuong Thao</u>. (2018). Nutrition support for dysphagia patients. Medical Publishing House, Vietnam. This publication was supported by Jumonji University's fund.

2. Hien Ngo Thi Thu, Ngoc Ta Thi, Yen Ma Ngoc, Phuong Nguyen Mai, <u>Thao Tran Phuong</u>, Thu Truong Thi, Hang Dinh Thi Dieu, Linh Nguyen Thuy, Khan Nguyen Cong, Yoshihiro Tanaka, Shigeru Yamamoto. Effects of thinly sliced meat on time, number of chews and food intake in elderly people with tooth loss. 2, 121-127. 2020

Appendix 4: Conference and workshop which I presented this dysphagia research

1. "Dysphagia support for dysphagia patients" Workshop was organized the first time in Vietnam on 5th December 2018 at Hanoi Medical University. The workshop was supported by Nerima Hikarigaoka Hospital, Nutri company and Jumonji University.

2. "The 2nd Clinical Nutrition" Conference was organized on 6th June 2019 at Hanoi Medical University, Vietnam.

3. Clinical nutrition conference 2019 was organized on 8th November 2019 at National Institute of Nutrition, Vietnam.

4. Asian Congress of Dietitian was organized on 19th -21st August, Yokohama, Japan