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**Ritgerð til meistaraáráðu
í næringarfræði**

**Mat á fæði með breyttri áferð og næringarþörf
sjúklinga sem fá fæði með breyttri áferð á
Landspítala**

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Evaluation of texture modified diet and nutritional needs of patients receiving texture modified diet at Landspítali

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Master's thesis in Nutrition
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Evaluation of texture modified diet and nutritional needs of patients receiving texture modified diet at Landspítali

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Ágrip

Fæði með breytti áferð er nauðsynlegt einstaklingum með tyggingar- eða kyngingarvanda til að þeir geti nærst betur. Fæðuáferð sem ekki á nægjanlega vel við getur haft slæmar afleiðingar til að mynda leitt til ásvelgingar vegna þess að vökvi fer ranga leið og hafnar í öndunarvegi sem leitt getur til lungnabólgu og jafnvel dauða. Sjálfsmynd og reisin eru þættir sem gjarnan eru ekki settir í samhengi við fæðu og máltíðir en þeir sem ekki geta borðað sjálfir eða eiga í vandræðum á matmálstímum, hrakar í sjálfsmynd sinni og tapa auðveldlega áhuga á næringu sem auðveldlega getur leitt til vannæringar.

Vannæring er algeng meðal aldraðra og sjúklinga á öllum aldri en sérstaklega hjá þeim sem eru á fæði með breyttri áferð. Ráðleggingar gegn þeim skaðvaldi sem vannæring er fela í sér orku- og próteinbætt fæði, næringardrykki og ráðgjöf um næringu og stuðning út úr vandanum. Þrátt fyrir þetta og áralanga þekkingu á vannæringu vantar enn leiðir til að fækka þeim sem verða vannærðir sérstaklega meðal þeirra sem þurfa fæði með breyttri áferð. Þó eru jákvæð teikn á lofti er snýr að framförum sem felast í notkun IDDSI staðla sem bætt hafa ástandið víða í heiminum.

Rannsóknir hafa sýnt fram á að þörf er á aukinni þekkingu er snýr að næringu þeirra sem þarfnast fæðis með breyttri áferð. Tuttugu sjúklingar á völdum öldrunardeildum Landspítá, sem allir voru á fæði með breyttri áferð voru beðnir um að svara tveimur spurningalistum. Annar var Nutrition Day Questionnaire (nDay questionnaire) and Quality Assurance Questionnaire (QAQ) sem hannaður var af rannsakanda. Skráðar voru upplýsingar um aldur, kyn, hæð, þyngd, munn- og tannstatus, og kyngingu. Afgangar af matarbökkum vigtaðir, fæðuneysla metin og borin saman við áætlaða þörf.

Niðurstöður leiða líkum að því að sjúklingarnir voru almennt sáttir með sem þeir fengu, fyrir utan að hitastig máltíða mætti verið hærra að mati sumra. Sjúklingar voru jafnframt ánægðir með þjónustu á deild. Niðurstöður sýndu einnig að sjúklingarnir voru að jafnaði aðeins að borða um helming þeirrar fæðu sem þeim var sendur, og á sama tíma aðeins helming þeirra orku og próteina sem þeir þörfnuðust. Karlar reyndust vera að borða heldur meira. Það var eftirtektarvert hversu stór hluti af þeirri fæðu sem skömmtuð var, var ekki borðuð þrátt fyrir almenna ánægju með matinn.

Þetta leiðir til þess að orku og próteininntaka er aðeins um helmingur af því sem sjúklingarnir þarfnast og sömuleiðis önnur næringarefni sem leiðir til verra næringarástands, auk þess að hægja á bata og draga úr lífsgæðum.

Key words:

Texture modified diet, malnutrition, undernutrition, swallowing difficulties, dysphagia.

Abstract

A texture-modified diet (TMD) is an essential way for many people to nourish themselves. Inappropriate food texture can have profound consequences, such as undernutrition, fatal choking and fluids entering the airway causing pneumonia and even death. Self-esteem and dignity are factors rarely considered with food and meals, but those who cannot feed themselves or have difficulties during mealtimes quickly lose interest in nourishment, leading to undernutrition.

Undernutrition is commonly observed among the elderly and hospitalized patients of all ages. Recommendations include energy- and protein-enriched diet, oral nutrition supplements and nutritional counselling. However, there is still a lack of resources to reduce the number of people who become undernourished, specifically among those who also have swallowing difficulties. However, the development of the International Dysphagia Diet Standardisation Initiative (IDDSI framework) on TMD has already led to worldwide improvements.

According to studies more knowledge is needed on the nutritional intake of patients on TMD, and interest lies within Landspítali food services on how the patients experience the food served and services. Suggestions for improvements are also sought.

Twenty patients at selected elderly wards, all prescribed a TMD, were approached to answer two questionnaires. The validated Nutrition Day Questionnaire (nDay questionnaire) and Quality Assurance Questionnaire (QAQ) the latter developed by the author of this study. Anthropometric parameters including age, sex, height, and weight, and information on mouth, teeth and swallowing status were collected through a leading nurse, leftovers were weighed, and intake was assessed and compared to estimated needs.

Results indicate that patients were, in general, satisfied with their TMD meals, except that some felt that the temperature should be higher. Services at the wards were regarded as satisfying. Results also indicated that the patients were, on average, only consuming about half of the food they were provided with and, at the same time, about the same amount of calories and protein needed; the male subjects were, however, consuming more. Therefore, energy and protein intake are only about half of what is needed and evidently the situation is the same for other valuable nutrients, this leading to compromised nutritional status, slower and worse recovery and less quality of life.

Key words:

Texture modified diet, malnutrition, undernutrition, swallowing difficulties, dysphagia.

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Ethical Aspects

Ethical aspects could be related to arising issues on the subject's appetite and a connection to their food intake. Also, in cases where the researcher might find that the subject's diet order from the ward is not according to their need and abilities, the patient's nurse will be notified with proper arguments for a different diet order.

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List of definitions

COPD	Chronic obstructive pulmonary disease, lung disease causing restricted airflow and breathing problems.
ICD Code	International Classification of Diseases, contains medical codes for diseases, signs and symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or diseases https://en.wikipedia.org/wiki/ICD-10
M1	Texture modified diet with a soft texture
M2	Texture modified diet where meat is grinded, and potatoes and vegetables are mixed
M3	Texture modified diet where meat, fish, potatoes and vegetables are all mixed
SASP	Senescence-associated secretory phenotype is a phenotype associated with senescent cells wherein those cells secrete high levels of inflammatory cytokines, immune modulators, growth factors, and proteases

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Abbreviations

TMD	Texture Modified Diets
NCPT	Nutrition Care Process Terminology
GPP	Good practice point
IDDSI	International Dysphagia Diet Standardisation Initiative
nDayQ	The Nutrition Day questionnaire
QAQ	Quality Assurance Questionnaire
ESPEN	European Society for clinical Nutrition and Metabolism
NNR2023	Nordic Nutritional Recommendations 2023
OP diet	Energy and protein enhanced diet (Orku og protein baett faedi)
CHO	Carbohydrates
M1	Mauk 1, Soft diet
M2	Mauk 2, Grinded diet
M3	Mauk 3, Mixed diet
F4	Thick liquid diet
ONS	Oral nutrition supplements
GLIM	Global Leadership Initiative on Malnutrition
ASPEN	America Society of parenteral and Enteral Nutrition
IDDSI	The International Dysphagia Diet Standardization Initiative
ICD code	International Classification of Diseases
BW	Body weight
E%	Energy percent
BMI	Body mass index
Kcal	Kilocalorie, a measure of energy.
E%	Percent of total energy intake per day
SASP	Senescence-associated secretory phenotype
NRI	Nutrition Risk Index
MS	Multiple sclerosis
MND	Motor Neuron Disease
VFSS	Video fluoroscopic swallowing study
FEES	Fibreoptic endoscopic evaluation of swallowing
NCM®	Full Nutrition Care Manual
ESSD	European Society for Swallowing Disorders
RCT's	Randomized controlled trials

Introduction

Propper nutrition, food and meals are fundamental to human health and well-being. Not only essential for energy and nutrients but as a part of daily life through togetherness and care, sharing traditions and celebration.

To nourish should be enjoyable, not an obligation, as food and meals can be a wonderful experience. However, for some people, it isn't, for example, people with no appetite due to nausea or physical and mental illnesses. People with dementia or disabilities are often unable to nourish themselves and become discouraged and indifferent, and those with severe food allergies can be anxious in relation to mealtimes. Finally, those who need special diets due to medical conditions or procedures are often unmotivated to eat and drink, included are those in need of texture modified diets (TMD).

The TMD is commonly selected for the sick and frail, as elderly patients often lack the ability to cut, chew, and swallow their food, so they need to receive their food soft, grinded, or mixed with an abundant amount of sauce. For such a diet, the risk is that it looks and tastes very similar meal after meal. Unless the personnel in the kitchen have the skills and ability to work with various means of spices, colours, shapes and patterns as it can start the first aspect of the meal sensation just like with meals with regular texture.

The reasons for the need for TMD are of different origins. It can be due to less strength in the hands or facial muscles due to sickness and low energy and protein intake. As a result of stroke, neural disease, shaking hands and low coordination, or poor oral health. This patient group is often admitted for extended periods, leading to a risk of monotonous meals and flavours and decreased food intake.

This diverse group of patients, from young children to the aged population, are clients of Landspítali - The National University Hospital of Iceland, hereafter named Landspítali and many other hospitals worldwide. Therefore, the task of hospital food services and the wards can often be complicated and challenging.

People are brought up within a different food culture. It is normal to have likes and dislikes, and some are allergic to certain food(s), influencing what they can eat without risking their life and health. People also have different views towards the importance of nutrition and respect for food. Fortunately, today, there is a great motion towards better preservation of food supplies, and it is even considered in nutritional recommendations, for example, the Nordic Nutritional Recommendations from 2023 (NNR 2023) (1), where a greater emphasis is put on protein sources from plants, mainly beans and pulses, and less on animal protein in the context of sustainability and human health.

Landspítali menu and its foundations

At Landspítali Food Services, there is a menu team of nutritionists and chefs that make the main three-week rotating menu from one season to another. The yearly menu is built

on three to four cycles in addition to the Easter and Christmas menu and several other special celebrations during the year. The European Society for Clinical Nutrition and Metabolism (ESPEN) hospital guidelines lay the foundation for recommendations (2, 3). The clinical nutritionist of the menu team then writes out and calculates the speciality diet menus, but ESPEN speciality diet recommendations lay the foundation for these (3) as will future science and continuing education on clinical and hospital nutrition.

Diet types of selection at Landspítali

The Landspítali patient menu is a three-week rotating menu of two hot meals served daily, with alterations during the seasons of the year, special occasions, and major holidays. All variants and speciality diets are based on the main menu. For more detailed information on the menu and diet selections of Landspítali food services, see Appendix A.

Table 1 An overview of A2 diet, EPA diet and energy distribution of meals at Landspítali.

	A2** diet	A2 diet % distribution	EPE diet	EPE diet % distribution	Meal Energy distribution	%
Energy	2000 kcal		1700 kcal		Breakfast	25
Protein	90 g	18 %	85 g	20 %	Lunch	30
Fat	80 g	37 %	85 g	45 %	Midday	10
CHO*	225 g	45 %	150 g	35 %	Dinner	25
Sodium	< 3000 mg				Evening	10

*CHO = Carbohydrate **A2 diet, regular patient diet, aimed at elderly patients other than those that need energy and protein enhancement. OP diet, energy- and protein-enhanced diet.

Table 1 gives an overview of energy, macronutrient, and sodium amount and percent distribution for A2 and OP diets, and criteria for energy distribution for the five meals of the day.

Five different variants of a TMD are produced, including liquid (F1) and thick liquid diet (F4), and three of these menus (M1, M2, M3) harmonize with the A2 and OP menus, as the elderly generation is a larger proportion of those that receive TMD at Landspítali. The liquid diet menus are based on appropriate soups on the A1/A2 menu, and these are then protein and energy enriched with protein powder and milk. Finally, there are speciality and allergy diets of several kinds, for example, fat-reduced diet (40 g / day), sodium restricted diet (<2000 mg sodium / day), kidney diet (low in sodium, potassium, and phosphorus), protein reduced diet (50 g / day and 60 g / day), low residue diet, microbe free diet, and iodide free diet. The most requested allergy diets at Landspítali are gluten free, lactose free and nut free diet. (Appendix A).

The texture-modified diets at Landspítali

A brief description on the four types of TMD, included in this study, follows but is explained in greater details in the Landspítali guidelines on diet types and services (Appendix A). The texture-modified diets are described in the section on hospital diets. The food services develop these guidelines that are necessary to make it safe and clear for the ward staff to order the correct diet and to order correctly in accordance with the change in needs or progress of the patient. These guidelines are also shared with food services of other Icelandic institutions upon request for the good of all patients in Iceland and it is also used in teaching.

The texture-modified diets produced at Landspítali and are the focus of this study are soft diet (M1), ground diet (M2) and mixed diet (M3), M standing for “mauk”, defining this type of texture modification. As mentioned above, the texture-modified meals are as similar as possible each day to the A2 and EPE diet types. However, the TMDs vary according to the level of modification. For each lunch and dinner, a total of fifty servings are produced for M1 (20), M2 (20) and M3 (10) and four for F4. The texture-modified diet provides extra energy from the additional amounts of sauces and/or butter, mashed potatoes instead of regular potatoes (M2, M3), timbals instead of mixed vegetables (M2 and M3) and often energy and protein-fortified soups or desert rather than the regular desert. For thick liquid diet i.e. F4, the fourth TMD included in this study, the hot soups are modified from the general liquid diet (F1) with thickening agents such as regular food starches i.e. maize or potato starch.

The M1 texture-modified diet

The M1 texture-modified diet produced and served at Landspítali is considered soft or easy to chew and resembling the IDDSI name and level “minced moist food Level five orange” with the NCPT code ND-1.2.1.9. (4)(5) (Appendix B). It consists of several food items that are generally soft or small bites that are easy to chew and swallow and not likely to get choked on, like small, hard beans and peas. Items on the soft diet menu should be soft enough to be smashed with a fork.

The diet consists of a soft fish, either, boiled or baked, sometimes blended with soft and allowed vegetables and topped with melted cheese and even some sauce. Sometimes, an omelette is served. The meat served is lamb, chicken, pork, beef, and sometimes a mixture of two or three in meat balls for example. It is important for both fish and meat to preserve it in moist heat between production and serving to preserve the softness and prevent it from drying out, but also for quality purposes related to temperatures to prevent microbe growth.

Potatoes, mashed potatoes, and potato gratin are served but not rice or pasta. The vegetable is chosen to meet the needs of patients on a soft diet and the softness of it is carefully guided by the kitchen staff. Especially types with large and hard stems, for

example broccoli and cauliflower, then cuts are chosen that have minimum stems. Larger amount of sauce is served, 1.2 dl and 1 dl for hot and cold respectively.

The M2 texture modified diet

The M2 texture modified diet produced and served at Landspitali is regarded as a grinded diet or mechanically altered food. It is built on the same base as M1 diet with the same variation in fish and meat, but omelette is not served. Resembling the IDDSI name and level “minced moist food Level five orange” with the NCPT code ND-1.2.1.9. (4)(5) (Appendix B) but is more mechanically altered. It consists of several soft items that are easy to chew and swallow, do not crumble, and not likely to get choked on. In general, the fish is not grinded, but the meat is. The patients only receive mashed potatoes and mixed vegetables or “timbals” (see an example in Figure 1 pg. 16). They receive the same amount of hot sauce as M1 but not cold sauces. If there is no sauce and only butter, double the amount (20 g) will be served.

The M3 texture modified diet

The M3 texture modified diet produced and served at Landspitali is regarded as a “mixed” or “blender-ised” diet in many ways similar to the IDDSI standard “pureed food Level 4 green” (NCPT code ND-1.2.1.10 (ND-1-2-1.3) (4)(5) (Appendix B) except that sauce is served on M3.

The M3 diet is built on the same base as the M2 diet with the exemption that fish and meat are finely mixed. The patients only receive mashed potatoes and mixed vegetables or “timbals”. They receive the same amount and type of hot sauce as M2. Deserts are without particles and thicker than normal diet. Double texture, for example apple puree with liquid cream should not be served, rather whipped cream.

Figure 1 An example of vegetable timbals.



Snacks for texture modified diets

The snacks provided by the food services are a very important factor in the energy and sometimes protein intake of each patient. Snack items for patients at Landspítali are of various kinds and its caloric value can be up to 300 kcal / serving. Each snack meal should provide no less than 10 % of the daily energy provided by the food services or a total of 20 %. New experiences and information have informed us that the snacks are not always offered to the patients and sometimes they are offered only one type and asked to select between the two types that are sent. This is not the intended protocol and can rid the patients of important calories and protein and the opportunity enjoy a sweet cake or a pudding.

There are many variations to the snacks that are offered to the texture modified diet, but the individual preference and ability of the patients must be evaluated beforehand and on an individual basis.

The F4 thick liquid diet

The F4 thick liquid diet is regarded as liquid consistency between honey and spoon thickness NCPT code ND-1.2.1.6. and ND-1.2.1.7 (4) (5) (Appendix B). The F4 thick liquid diet menu is a three-week rotating menu built on the same soups as served on the liquid diet and, therefore, same as the regular menu but with needed modification and thickened to achieve a “pudding-like” texture - that best describes this texture type. F4 meals are served from the serving line at breakfast, lunch and dinner.

For lunch and dinner, two soups are served: milk-based and cream soup, milk-based and fruit soup or cream soup and fruit soup. Sometimes, a pudding replaces one of two items.

The thickening is done with food starch (maize, potatoes) or Thick-it™ powders, resulting in a “pudding-like” texture. The starch that the soup powder contains also provides thickening qualities when liquid and temperature is applied during the food production process.

The protein and energy enrichment that is applied to creamy and milk-based soups of the F4 diet is made of protein powder, skim milk powder and whole milk, which also gives a thicker consistency. However, it is important that it won't thicken too much; therefore, milk is used but not cream, even though the latter will give more energy.

The author's passion for the topic

After working at Landspítali for over three decades, things have changed in many aspects. However, what has not changed is the patients' need for food they have an appetite for and foods that suit them in relation to their ability to consume, chew, and swallow. With an increasing number of elderly patients at the hospital, these patients are also on the rise.

Therefore, this project assessed texture-modified food and meals produced and served at Landspítali Food Services. The importance is both related to nutrition, appeal,

and safety, but improper food for someone with difficulties swallowing can be dangerous and even fatal.

Due to the great importance of food and nutrition for quality of life and human health, research and evaluation on the topic must be ongoing in relation to new knowledge, new health complications, and new challenges towards the future of human living on Mother Earth.

More frequent meals and supplemental meals are welcomed and important for all patients; however, for those on a special diet, such as a protein-reduced diet, the correct snack needs to be served to ensure that the nutritional calculations are not offset.

Review of the literature

Hospital diets and catering services

According to Cederholm et al “the minimum requirements of hospital and care catering are to serve a variety of foods that are suitable and adapted to all types of patients with a variety of energy and nutrient densities” (2).

The healthcare industry includes various services, including the hospital food services sector. The variety of customers depends on each organization; some include patients, staff, relatives, visitors, and contractors, but some only patients (6).

Good and suitable meals are an important part of daily life, and for the patient, they play a crucial role in the healing process, improving the overall hospital experience and „contributing to the efficiency of healthcare operations“ (3).

The importance of food services

To explain the concept of food services, the professional factors and systems in which meals are produced, served and delivered for hospital patients and sometimes other clients such as employees, patient relatives and other guests. The system includes the food service premises, the system(s) gathering and storing the raw material, equipment, and technology for meal production and distribution, and finally, human resources necessary to manage production, serving and finally the distribution.

Each hospital’s food services department plays a key role within the hospital setting and is an essential part of the treatment and wellbeing of each patient (3). According to Thibault et al., “Hospital food delivery should differ regarding the patient's abilities, type of hospitalization, and perspectives. Meals should meet patient's preferences and abilities to eat, adaptation of food portion size, modified texture if needed, best conditions to increase meal intake (varied choice and hot dishes)” (3). The importance of the hospital food services is high as proper nutrition is crucial for the proper healing and recovery process of each patient and contributes to shorter hospital stays and improved outcomes. “Pleasant dining experiences can boost patient morale and contribute to a positive perception of the healthcare facility” (3).

Responsibilities of food services

Most of us think that hospital diets are an essential part of care and a key to successful treatment, but it is also a part of the patient's life during the hospital stay, breaking up monotonous days. Food should, therefore, be associated with pleasure, and meals meet expectations. Here, food services, delivery services, and ward employees all work as a team, taking part in ordering, preparing raw materials, cooking, serving, and delivering the meal. This is obvious and based on "good practice point" (GPP) rather than researched and written in the literature (3).

ESPEN encourages hospitals, rehabilitation centres and nursing home facilities to use high quality produce and aim for sustainability while food waste is limited as much as possible (3). These are worthy recommendations and partly relate to the new Nordic Recommendations 2023 (1) mentioned above. Also, has the EAT-Lancet Commission encouraged that their recommendations are followed as much as possible by the food services and the wards (3).

However, concerning the food waste part, it is often a complicated factor because sometimes the care giver and/or the nutritionist are using all means to feed the patient with little or no appetite. Preventing food waste at the same time can be difficult as various foods are offered and sometimes only one or two are liked and eaten by the patient.

Challenges in hospital food services

Like within any other business there are various challenges and obstacles in the food service business. First, food and meals are very personal matters for most people, and there are likes, dislikes and special needs, including TMD, that most patients want to control to ensure that their own expectations and needs are met. Second, food services work with more sensitive raw materials that are of a different origin compared to other departments of the hospital; the pharmacy is probably the one that resembles the food services in this matter. When you have sensitive produce, you must plan carefully what part of the stock is to be used and pay good attention during food production to deliver the best quality food and meals (3).

Other common factors for food services in general are meeting the diverse dietary needs and preferences of patients of different ages, in different medical conditions, and with a different background. Budgetary constraints often demanded by the directory board limit the variability of high gourmet produce and „balancing affordability with nutrition and taste is an ongoing challenge“ (3).

Finally, quality control maintenance through the whole delivery process to keep temperature and taste at highest is a challenge especially in large operations (3) and where the establishments are distributed within a large area as in the case of Landspítali.

It is recommended by Cederholm et al. that the prescription of a patient's diet should be accompanied by a nutritionist, physician and dietitians and be integrated into

the hospital's nutrition care plan for appropriate evaluation (3). However, it can be speculated that the nurse is the primary selector when it comes to ordering patients' diet at Landspítali and so is usually at other hospitals, as can be reflected in the words by Thibault et al., on hospital nutrition. "In hospitals throughout Europe and worldwide, the practices regarding hospital diets are very heterogeneous" (4). They continue "Hospital diets are rarely prescribed by physicians" (4). The most likely reason for this is that the nurse usually has the most in-depth professional connection to the patient and overall insight into his or her health situation. While the physician is more deeply involved in other tasks related to the patient's treatment, medication and prognosis.

Thibault et al. continue stating, "sometimes the choices of diets are based on arbitrary reasons and often prescriptions are made independently from the evaluation of nutritional status, and without taking into account the nutritional status" (3). This reflects the focus of this chapter, as patient dietary orders cannot be arbitrary in the healthcare sector. Dietary orders must be followed, and orders must be structured, be a part of a holistic treatment plan and be based on the nutritional status.

As discussed below each patient should be re-evaluated regularly every three to five days according to the ESPEN recommendations, especially those on a special diet (2). This is to ensure that changes are detected, and appropriate actions taken for the well-being and safety of the patient.

Personal communication with the patient or relatives is essential, as is reporting back to the ward and food services on the action to be taken to correct the situation. A follow-up within two to five days is also essential. (2)

The requirements for hospital diets

It should be mandatory to provide all patients with access to nutritionally relevant and sound meals regularly throughout the day, at least from 7 AM to 7 PM. The meals should be prepared and served with care for the patient and look appetizing "for the eye" in relation to appearance, colour, and arrangement on the plate and tray. The temperature must be correct to meet requirements for quality and safety but also for palatability and texture. It is recommended that the patients can choose between several menus (2).

Factors relating to altered food texture, speciality diets, allergies, and certain cultural aspects must always be considered when selecting raw materials, menu design, and delivering the correct meal to the bedside. However, at the ward, limitation or specialty diet should always be the last resort because such diets are usually not only limiting in nutrients and energy content, but also in appeal and variety (2).

Recommendations in the field of hospital clinical nutrition

There are several acknowledged recommendations to be used in the hospital setting. To mention the most prominent ones; those on behalf of ESPEN on hospital diet (3), the recommendations by The American Society for Parenteral and Enteral Nutrition (ASPEN)

(7), the new Nordic Recommendations (1) and the International Dysphagia Diet Standardization Initiative (IDDSI) guidelines on texture modified diet (5).

The general objectives of the guidelines are to “increase the awareness of physicians, dietitians, nurses, kitchen managers, and stakeholders towards the pivotal role of hospital food in hospital care, to contribute to patient safety within nutritional care, to improve coverage of nutritional needs by hospital food, and reduce the risk of malnutrition and its related complications.” (3). Also, to provide as much as possible evidence-based recommendations regarding the diets needed in hospitals, rehabilitation centres, and nursing homes, their indications, the management of diet supply to improve the prescription of hospital diets and to reduce the risk of malnutrition, and to achieve good patient safety within nutritional care” (3). The ESPEN recommendations are relevant topics of nutrition in hospital settings and in other institutions where patients and clients are supported by meals, nutritional regimens, and safe means of food consumption (3).

Energy and macronutrient recommendations

Energy- and macronutrient recommendations are built on scientific knowledge and standardized by different organizations and administration bodies for different groups of people and for different purposes (1, 2, 3).

In the hospital setting clinical recommendations apply. For standard and hospital diet the energy recommendations are 27 kcal and 30 kcal / kg BW / day respectively, including texture modified diet (3). Using the approach of kcal / kg BW is more precise on an individual basis compared to the use of E% of total energy per day however the latter is the criteria in creating menus and calculating for population groups.

The recommended proportions of the macronutrients are as follows. For standard diet; carbohydrate 50 – 60 % of the total energy, fat 30 – 35 % and protein 5 – 20 % (3). For hospital diet; carbohydrate 45 - 50 %, fat 35 - 40 % and protein 10 – 20 % (3).

Protein recommendations

Recommendations within the hospital setting are embedded within clinical recommendations, for example, those created by ESPEN (3). These are presented as for standard, 0.8 – 1.0 g / kg BW / day and hospital diet 1.2 – 1.5 g / kg BW / day.

In relation to the ageing process and “gradual and progressive loss of muscle mass along with lowered strength and physical endurance” in sarcopenia, ESPEN recommends an abundant amount of protein (even up to 2 g / kg BW / day) (3), along with physical exercise including strength and endurance training. Further, as stated by Deuts et al., “An imbalance between protein supply and protein need can result in loss of skeletal muscle mass because of a chronic disruption in the balance between muscle protein synthesis and degradation” (8). Loss of muscle mass related to ageing is primarily due to decreased muscle protein synthesis rather than increased breakdown (8).

From a literature search, it can be concluded that further studies are needed on the optimal amount of protein *per meal* for elderly patients and if *more frequent meals with protein* are more beneficial than a larger serving less frequently. For patients suffering from Chronic obstructive pulmonary disease, heart failure or undergoing dialysis, the needs are higher. A safe protein intake level was found to be up to 1.6 g / kg BW / day (8, 9).

Table 2 A summary of clinical recommendations for older patients.

Daily need / kg BW	Energy kcal / kg BW	Protein g / kg BW	Protein %	CHO %	Fat %
ESPEN, Standard (3)	27		5 - 20	50 - 60	30 - 35
ESPEN, Hospital (3)	30	1.2 - 1.5 Even up to 2	10 - 20	45 - 50	35 - 40
Deutz et al (8)		1 - 1.2** 1.2 - 1.5***			
Bauer et al (9)		1.0 - 1.5*			
Iceland Directorate of health (10, 11)	27 - 30	1.2 - 1.5			
New Nordic (1)		1.2 - 1.4 ***			
Germany, Austria, Switzerland (12)		1.0			

*With and without disease **Healthy***Malnourished

Table 2 presents an overview of selected recommendations for caloric and protein intake for older patients. Also presented are ESPEN recommendations on the proportion of protein, carbohydrates and fat for menu planning of standard and hospital diet.

Malnutrition, introduction and definitions

Malnutrition is a concept that covers both under and over-nutrition. Describing the condition where there is an imbalance in the need and intake of energy and protein and/or other nutrients, having negative effects on the body and the bodily functions. The ideology has been known for over thirty years but the first paper to cover the subject, "The Skeleton in the Hospital Closet", was published in 1994 (13).

Malnutrition as undernutrition is a serious condition and has two subtypes of malnutrition, referring to macro- and micronutrients (12) macronutrients being protein, carbohydrates, fat, and ethanol and micronutrients referring to vitamins and minerals (electrolytes). Malnutrition can be defined as "a state resulting from lack of intake or uptake of nutrition that leads to altered body composition (decreased fat free mass) and body cell mass leading to diminished physical and mental function and impaired clinical outcome from disease" (2). "Malnutrition can result from starvation, disease, or

advanced ageing (e.g. >80 years), alone or in combination” (2). Among the elderly, under nutrition is common, either in the hospital, nursing homes or free-living (2, 11). The following describes the ideology, causes and consequences of malnutrition (12).

Under nutrition:

Describing deficiency of nutrients.

Caused by: Inadequate diet, malabsorption of nutrients from food.

Consequences: Invisible, for example if overweight but undernourished.
Visible, wasting of muscle and fat.

Macronutrient undernutrition:

Describing deficiency of protein, carbohydrates and/or fat, also called protein-energy undernutrition.

Caused by: Imbalanced and lack of a variety diet.

Consequences: Lack of energy for maintenance and survival.
Lack of protein, the building blocks of muscles.
Breakdown of body tissues, shut down of functions not vital for life, for a conservation of energy.

Micronutrient undernutrition:

Meaning deficiency of vitamins and minerals.

Caused by: Imbalanced and a lack of a variety diet.

Consequences: Even though needed in very small amounts, for all types of bodily functions, consistent shortage will have serious and lasting effects (14).

Overnutrition:

Although ESPEN does not regard overnutrition as a problem among the elderly (2), overnutrition is explained below for clarification and an increased overview of the whole malnutrition concept. Also, relating to a factor specified in Figure 3, in the model of a downward spiral in the development of malnutrition in higher age, where overfeeding/high caloric intake and sedentary lifestyle are on the top (15), playing a role in the development of malnutrition.

Overnutrition can refer to excessive, and therefore an imbalance, in the intake of energy, macro- and micronutrients. „The World Health Organization has recently added overnutrition to its definition of malnutrition to recognize the detrimental health effects that can be caused by excessive consumption of nutrients”. “This includes the effects of overweight and obesity, which are strongly associated with a list of non-communicable diseases. It also includes the toxicity that can result from overdosing specific micronutrients.” (14).

Figure 2 Diagnoses tree of malnutrition; from at risk for malnutrition, basic definition of malnutrition to aetiology-based diagnoses (2).

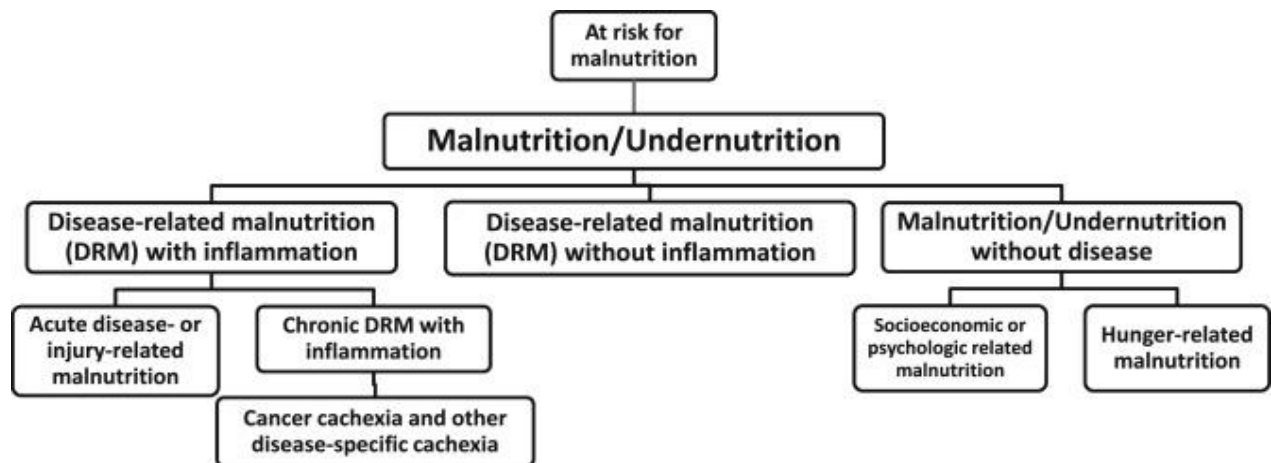


Figure 2 presents graphically the multiple stages of which malnutrition can evolve but according to the literature it “can result from starvation, disease or advanced ageing (e.g. >80 years), alone or in combination” (2). This is presented as such by ESPEN but a similar approach to a diagnostic criterion has been described by ASPEN (7). At the top is *being at risk for malnutrition*, diagnosed by a validated screening tool. “Any of two alternative sets of diagnostic criteria will confirm the diagnosis”, either reduced BMI (<18.5 kg / m²) or combined weight loss and lowered BMI, or “reduced gender-dependent fat free mass index” (2). The ASPEN criteria for malnutrition are “low energy intake, weight loss, loss of muscle mass, loss of subcutaneous fat, fluid accumulation, and loss of hand grip strength, whereof at least two should be fulfilled” (7).

When malnutrition or undernutrition (Figure 2) has been diagnosed further clarification of the origin can be done, if it is with or without disease and if with disease - if inflammation is present or not. If inflammation is diagnosed it can be either caused by acute disease or injury related. The other spectrum will be chronic disease related malnutrition for example cancer cachexia (2). Cachexia standing for a complicated metabolic syndrome in relation to illness where muscle mass, and sometimes also fat mass is lost. Often cachexia is associated with anorexia, an inflammatory process, insulin resistance, and increased protein turnover (14).

Malnutrition as undernutrition has its own ICD (16) and NCP (NC-4.1) (4), for medical recording purposes and nutritional intervention (4). The NCP coding of malnutrition describe the health consequences resulting from insufficient energy and/or nutrient intake, compared to physiologic needs and/or utilization (4).

Figure 3 Model of downward spiral in the development of malnutrition in higher age (15)

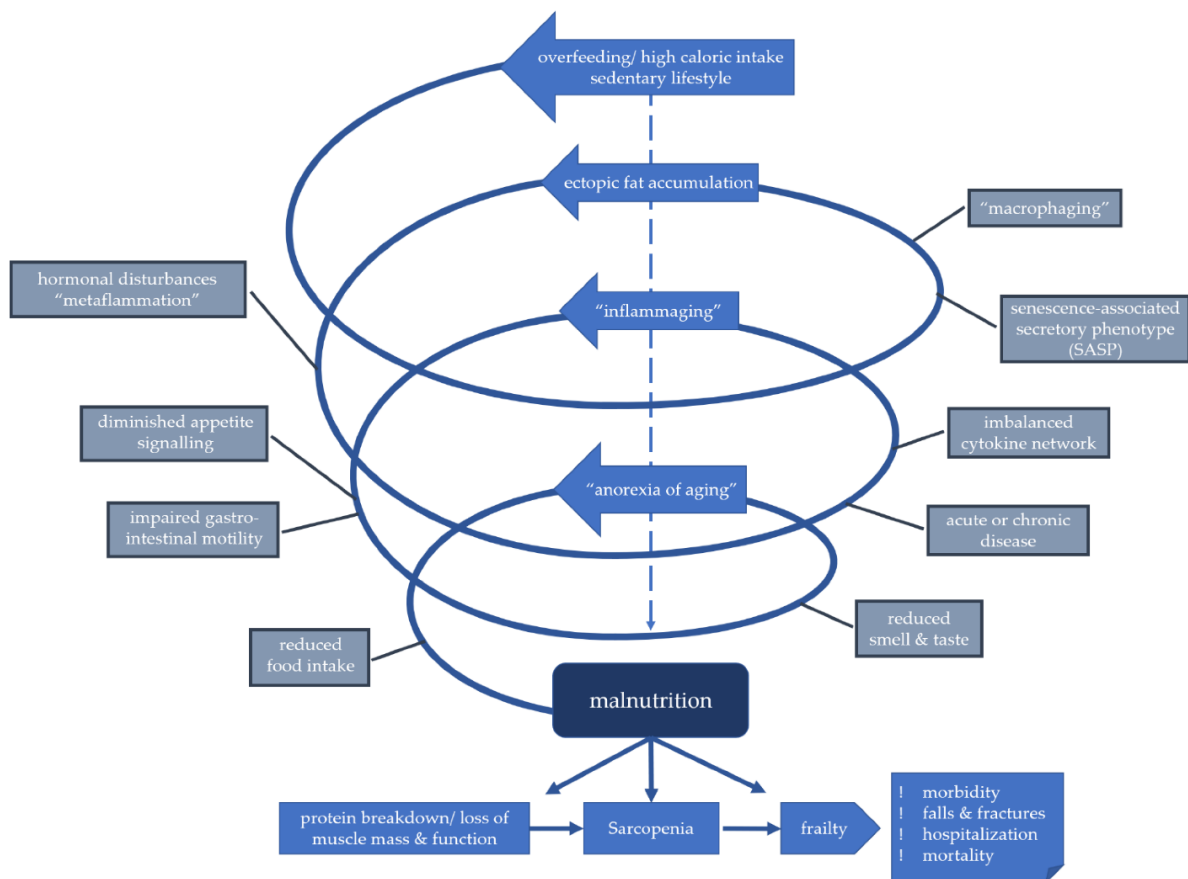


Figure 3 outlines the number of factors that interconnect in the development of malnutrition at higher ages. At the top is an interesting approach, starting with overfeeding and a sedentary lifestyle – emphasizing the part it can play leading up to malnutrition. On the left-hand side are factors including hormonal disturbances, diminished appetite signalling, impaired gastrointestinal motility, affecting bodily functions and leading to decreased food intake. On the other side are factors that often are not so visible, such as macrophaging, senescence-associated secretory phenotype (SASP), imbalanced cytokine network, acute or chronic disease, and reduced smell and taste sensation. On the bottom of the figure are the consequences of malnutrition but these are protein breakdown and loss of muscle mass, resulting in decreased function, leading to sarcopenia and frailty. Frailty leads to increased morbidity, a greater risk of falls and fractures, hospitalization and mortality (15).

Figure 4 The downward spiral of nutritional frailty (17)

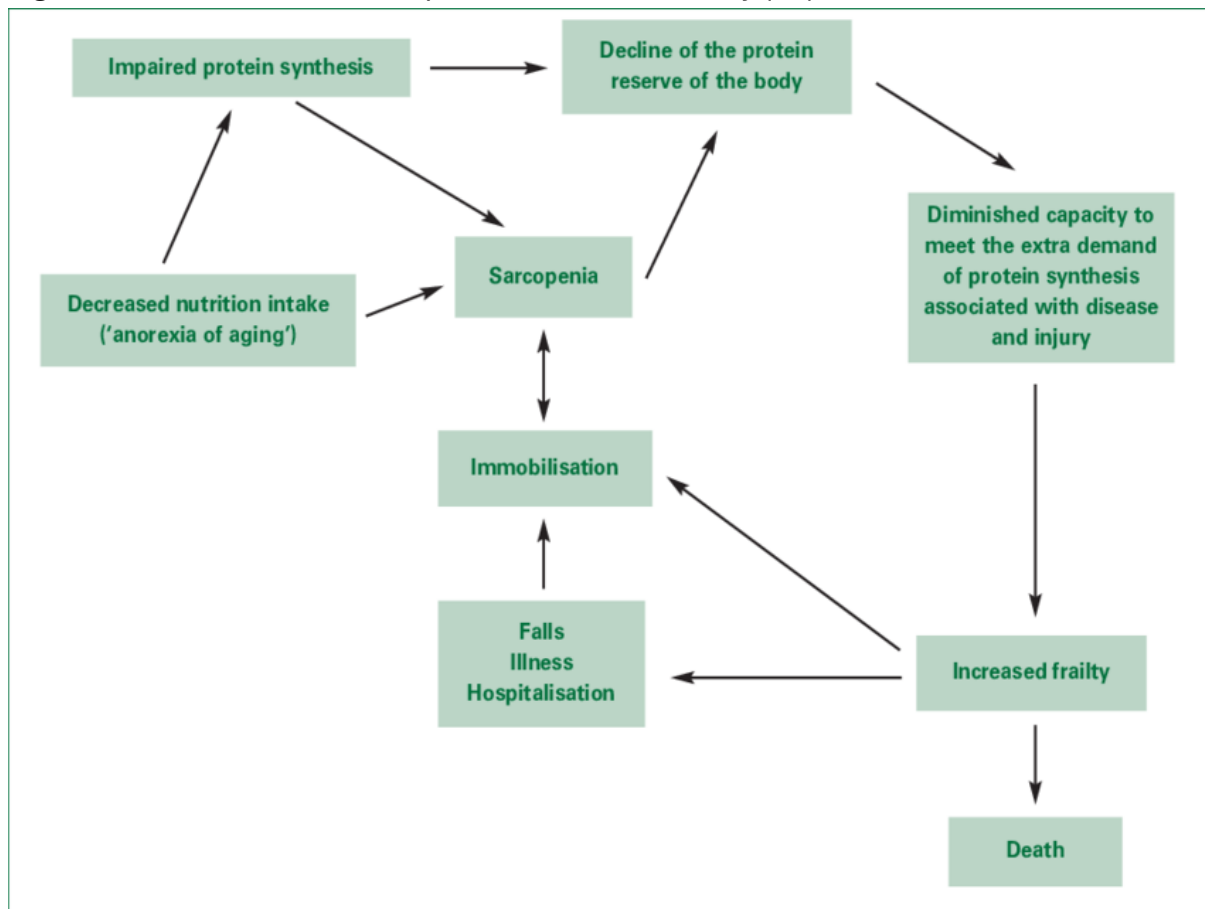


Figure 4 describes the connections between several factors connected to nutritional frailty, a type of decline associated with an acute and dramatic reduction in appetite and food intake. While frailty is a multifactorial process, poor nutritional status is considered a key contributor to its pathophysiology, and it is either a direct cause or a consequence of nutritional frailty (17). First, an incidence occurs, either illness, accident, or a general hospitalization. That can lead to immobilisation of some extent and possibly sarcopenia, which is also a result of decreased nutrient intake and impaired protein synthesis. Impaired protein synthesis further affects the reserve of total protein pool of the body that is also negatively affected by existing sarcopenia. The decline in protein reserves negatively affects the capacity to meet the extra demand of protein synthesis associated with disease and injury. This leads to increased frailty and even death but also increases the risk of further falls, illness, hospitalisation and immobilisation (17).

Malnutrition – the prevalence

In hospitals around the world, high numbers of patients suffer from malnutrition, but common numbers are 20 – 50 % of patients (2, 15). Falling within this range is the prevalence of malnutrition in Icelandic hospitals, as it has been estimated in the range of

20 – 60 % based on both on screening and diagnosis studies of separated patient groups (18 - 26). A large part of this patient group, are the elderly, who are frequently admitted in bad nutritional status or malnourished, or even directly due to malnutrition and frailty.

Many patients are already malnourished when admitted to the hospital and or nursing home. Unfortunately, in many patients' the risk of malnutrition even progresses during admission (22); this is true especially for elderly patients. The factors that are commonly observed in the malnourished patients and are described above in Figure 3 and Figure 4, are altered body composition where muscles are wasted resulting in loss of strength, decreased ability for physical activity and less balance leading to a higher risk of falls, broken bones, head injuries and often a fatal process that follows. In general, physical activity and mental function is decreased in those that are malnourished, and some other detrimental clinical outcomes are observed. Observational studies give a rise to the notion that "aging per se is not inevitably associated with malnutrition and that appropriate dietary intake and adequate nutritional status is strongly associated with a reduced risk of mobility limitations and improved quality of life" (23).

As malnutrition in hospital patients is associated with a poorer health outcome such as higher mortality rates, prolonged length of stay and hospital readmissions (22, 24, 25) preventing it and correcting the situation is extremely important especially when hospitals are overflowing so to speak. Likewise, poor nutritional status, especially over long periods of time, is detrimental to overall health, as it represses the immune system, increases rates of hospital infections, suppresses wound healing, induces muscle loss and increases stress for the patient (26). These negative factors of malnutrition effect the hospitals to a great extent, as well, and require greater resources and increase cost (26).

Consequences of malnutrition

Malnutrition has adverse effects on several clinical outcomes, including low body weight, loss of lean tissue and diminished mental and physical function. "However, there is evidence from observational studies that aging per se is not inevitably associated with malnutrition and that appropriate dietary intake and adequate nutrition status is strongly associated with a reduced risk of mobility limitation and improved quality of life (27).

According to Saunders et al. (26) malnutrition affects every organ system in terms of function and recovery, physiological and psychological. First to mention, muscle function as "weight loss due to depletion of fat and muscle mass, including organ mass, is often the most obvious sign of malnutrition" (26). If, however, "dietary intake is insufficient to meet requirements over a prolonged period the body draws on functional reserves in tissues such as muscle, adipose tissue and bone leading to changes in body composition". "With time, there are direct consequences for tissue function, leading to loss of functional capacity and a brittle, but stable, metabolic state (26).

The body's cardio-respiratory function is also affected as a "reduction in cardiac muscle mass is recognized in malnourished individuals", just as in other muscle

structures. “The resulting decrease in cardiac output has a corresponding impact on renal function by reducing renal perfusion and glomerular filtration rate” (26). Poor strength of the diaphragm and respiratory muscles decreases the patient's ability to cough in cases of respiratory tract infections.

Optimum gastrointestinal function is affected, as adequate nutrition is important for preserving its function. There are known changes in “intestinal blood flow, villous architecture and intestinal permeability”. “The colon loses its ability to reabsorb water and electrolytes, and secretion of ions and fluid occurs in the small and large bowel. This may result in diarrhoea, which is associated with a high mortality rate in severely malnourished patients” (26).

Immune function is affected, decreasing the body's resistance and increasing the risk of infection. Delayed wound healing is also well described in malnourished surgical patients. Finally, psychosocial effects are also well known, including apathy, depression, anxiety and self-neglect (26).

According to Saunders, in cases of severe malnutrition, it is important to increase energy intake in small steps as “unbalanced or sudden excessive increases in energy intake also put malnourished patients at risk of decompensation and re-feeding syndrome” (26).

Sarcopenia and frailty

For the frail and sick elderly, sarcopenia and frailty are common and serious risk factors that need to be prevented or diminished as much as possible by proper nutrition, including energy and protein rich food and oral supplements and appropriate exercise for the age (28).

Before discussing recommendations on protein and energy, it is necessary to define two concepts for improved clarity one is sarcopenia and the other frailty. Sarcopenia is a condition that can be classified as primary-age related, and secondary disease related; immobility per se is also a factor. The condition is primarily caused, by a natural aging process, leading to progressive degeneration and loss of skeletal muscle mass, quality and strength. This leads to muscle atrophy and weakness mainly due to changes in muscle synthesis signalling pathways. The rate of muscle atrophy is mainly dependent on level of exercise, nutrition and co-morbidities. Sarcopenia is a component of frailty syndrome (28).

Frailty is a common clinical condition observed in aging and among older adults, encompassing a decline in physical function and physiological reserve (29). It is defined as “a biological syndrome with low reserve and low resistance to biomedical stressors; frailty results from cumulative declines across multiple biological systems and worsening frailty is associated with disability” (29). Physical abilities, including walking, are usually diminished and fatigue increases, body weight and muscles are lost. These frailty conditions can lead to disability, loss of independence, falls, fractures, heart disease, hospitalization and death (29). “The presence of frailty varies based on the assessment

technique; however, it is estimated that 4 – 16 % of the US population over 65 years old is living with frailty (29).

Screening for nutritional status

The purpose of screening patients for nutritional status is to find those with malnutrition or at risk but first the risk factors that can lead to malnutrition need to be found (14). Then, during the hospital admission or residency at care- or nursing home regular screening is necessary to follow up on the patient and his or her progression, recovery or decline and respond accordingly.

Active nutritional care and follow-up by a nutritionist is needed along with the work by nursing staff at the ward to prevent the well-known worsening of malnutrition during hospitalization (26). Also, as stated by Kyle et al., “the risk of moderate risk or severe risk by nutritional risk index was greater in patients assessed during hospitalization than in patients assessed at hospital admission, which suggests that patients evaluated later during hospitalization are at greater risk than patients evaluated in the early phase of hospitalization.

Ongoing assessment during hospitalization seems important to identify patients at increased risk for complications” (30). In a commentary note in the ESPEN recommendations, reduction in food intake is defined as food intake \leq 50 % of energy requirements for one week, or any reduction at all for a period longer than two weeks. It has been shown by the European multi-centre Nutrition Day® survey that food intake \leq 50 % of offered portions of lunch and dinner to hospitalized patients (n=26.249) was independently associated with two to eight times greater mortality (3).

Following screening for nutritional status and calculation of points (0 - 5+) the risk can be assessed according to green, yellow or red to stop the progress from getting worse and measuring the progress of re-nourishment as the patient progresses back from red to green so to say (21)(Appendix E, Appendix F).

The scale is as follows;

Green: 0 - 2 points, low risk of malnutrition.

Yellow: 3 - 4 points, certain probability of malnutrition.

Red: \geq 5 points, strong probability of malnutrition.

This scheme and protocol described below is intended to assist the health professional in applying correct and targeted plans and procedures because sometimes malnutrition is under diagnosed, and responsibility and procedures are unclear (11, 21).

If low risk: Unchanged selection of food. Follow up on the patient.
If energy- and protein intake is less than 75% of estimated need for energy and protein during more than one week or weight loss is more than 0.5-1 kg/week, treatment/dietary regimen of the patient needs to be re-evaluated by weighing and screening.

If some risk: Assess if the patient can nourish by mouth or not.
If yes, order/supply energy- and protein enhanced diet/meals.
Find possible obstacles for low intake.
Nutritional supplements (drinks).
If not able to nourish by mouth, prescribe enteral or parenteral nutrition.
Re-assessment by weighing and screening the patient.

If great risk: Individual counselling by a clinical nutritionist.
Individual therapy by a by a clinical nutritionist.
Assess if the patient can nourish by mouth or not.
Find possible obstacles for low intake.
If yes, order/supply energy- and protein enhanced diet/meals.
Nutritional supplements (drinks).
If not able to nourish by mouth, prescribe enteral or parenteral nutrition.
Re-assessment by weighing and screening the patient.

Malnutrition, treatment

Despite a long known detrimental effect on health and longevity, it is still noted that there is a lack of general knowledge on the detrimental effects of malnutrition. Not to mention what is the optimal way to start treatment and solve the issue and in fact that is very individually based and time consuming. There is no pill to give for malnutrition. Solutions depend on each patient and his or her conditions, status, and resources within the care system. For the elderly person, age related changes in the body increase the risk of malnutrition and it can affect the person physically- and mentally, along with slowing down the healing process and increase the risk of death (15). The most important steps to work on the issue are to diagnose nutritional problems, treat and inhibit the situation from getting worse.

The risk factors or causes of malnutrition are most commonly as follows (29)

- Poor or decreased appetite.
- Taste and smell alterations.
- Poor oral health and dental status.
- Dysphagia.
- Disease and disability.
- Lifestyle and low physical activity
- Social factors including poor economic status.
- Dementia and confusion.
- Depression and other psychological factors.

“For patients with, or at risk for, malnutrition, informed choices concerning food items and portion sizes must be made” (3). For those patients in long-term care, the risk of malnutrition is increased (32), and follow-up on these patients is extremely important. Including an action taken to alter the situation, such as a protein and energy-enriched diet or some means of nutrition support, enteral nutrition or parenteral nutrition (3).

Hospitalizations are usually short as the health care system is overburdened, and if malnutrition is diagnosed in a patient, there might not be enough time to reverse poor nutritional status during the hospital stay. This should shift the emphasis of treatment to the patient’s home after hospital discharge (27).

The standard care among older adults after discharge from the hospital is to be able to order meals on wheels, supplying one hot meal a day, but a recent study suggests that such service may be inadequate for frail and sick older adults at nutritional risk (15).

Energy- and protein enhanced meals

Following the discussion on malnutrition, one of the solutions recommended is an energy- and protein-enhanced diet (3). This diet type is described above; it is offered at Landspítali and is aimed at patients with malnutrition, for example, the sick and malnourished elderly, that has a low appetite and sometimes feeding difficulties and can therefore only consume small amounts of food at each setting.

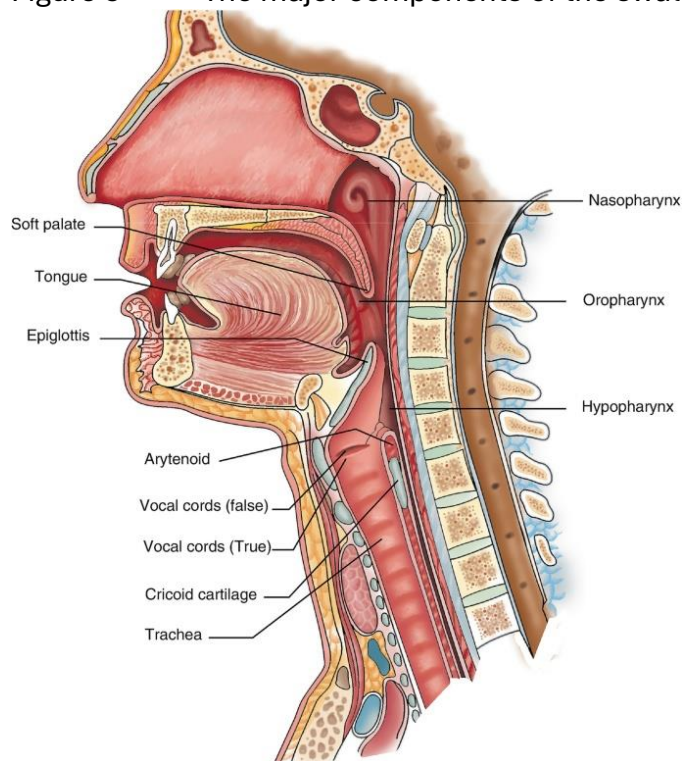
Swallowing

Swallowing is a partially automatic and complex process that involves the coordination of nerves and fifty different pairs of muscles in the face, neck, and oesophagus. It directs food and drink from mouth to stomach and it has several main actions to it.

Swallowing is performed by swallowing muscles, requiring precise coordination of muscle, nerves and brain. “Swallowing is initiated voluntarily by actions of the tongue on material in the mouth. Sensors within the mucosa of the mouth inform the brain of the size and physical characteristics of the food” (33). “When the food is

sufficiently broken down, the tongue separates the food into the part to be swallowed by pressing the tip of the tongue against the soft palate. The tongue then elevates and retracts against the palate, pushing the bolus of food back toward the pharynx, the topmost part of the throat” (33). “Although usually associated with food, the swallowing reflex can be initiated by other stimuli applied to the dorsum of the tongue, soft palate and epiglottis. During swallowing respiration is inhibited in whatever phase of breathing the swallowing is initiated. This aspect of the reflex prevents the inhalation of food” (34).

Figure 5 The major components of the swallowing process (34).



Those who have difficulties swallowing liquids and / or foods are regarded as having dysphagia, where oro-pharyngeal dysphagia is the most common one. There are many causes for dysphagia, according to studies it is mainly caused by diseases like stroke, frailty among the elderly, among care home residents, in patients with head and neck cancer, Parkinson’s patients and Alzheimer’s patients.

Clear signs and symptoms to be identified and quickly responded to are drool and production of excessive saliva, when there are signs of difficulties chewing and swallowing even to the point that food is brought back up, sometimes through the nose and a gurgly, wet-sounding voice when eating or drinking. If pain, cough, or choke when eating, drinking and during swallowing, a feeling that food is stuck in the throat or chest, when clearing throat frequently and when showing impaired breathing at mealtimes.

Also, if avoiding eating with others, taking long time to finish their meal, avoid food, playing with it or holding bolus in mouth for extended time. Finally, those who need help to eat and drink (35).

As people age, oral dysphagia becomes increasingly prevalent related to age-related changes in the oral cavity, pharynx, and oesophagus (#182 in ESPEN) (3). As stated by Thibault et al “the swallowing muscles are different from somatic muscles as they receive continuous stimulation from the respiratory centre but are inevitably affected by malnutrition and disuse and accumulating evidence is available regarding the negative influence on swallowing (#183 in ESPEN) (3).

Table 3 Main characteristics and consequences of swallowing difficulties (34, 35)

Main symptoms	Consequences
Complains about difficulties	Malnutrition
Food falls out of mouth	Malnutrition
Coughs while eating or after meals	Lung infection
Unexplained weight loss	Psychosocial consequences
Clears throat	Worsened long term recovery from illness
Wet voice, reduced quality of the voice	Prolonged admission time
	Increased healthcare cost

In Table 3, the main symptoms and consequences of swallowing difficulties are listed to explain the multiple severity when swallowing difficulties are evolving or already onset

Causes and consequences of swallowing difficulties

It is known that post 60 years of age, the above-mentioned steps of swallowing take a longer time without complications unless other factors start playing a role. When this function is periodically and repeatedly disturbed, the patient is regarded as having swallowing difficulties and these can be in different places in the mouth and throat and be for various reasons (36).

Swallowing difficulties are not regarded as a disease itself but rather a consequence of a disease or caused by damage to nerves and / or muscles involved in swallowing (37).

Swallowing difficulties are defined as a discomfort, pain or feeling of an obstruction in the throat within 15 seconds of a start of swallowing. This definition is helpful when distinguishing between a clinical swallowing difficulty and from other causes, for example heartburn or feeling of a lump in the throat or obstruction lower down the oesophagus but in those cases the food is stuck after swallowing. A person suffering from swallowing difficulties doesn't always feel this discomfort but can start coughing immediately after consuming food or drink (37, 38).

There are various and different causes for difficulties swallowing, other than old age, dementia, and related mechanical problems, but the type of dysphagia affecting the

elderly is named presbyphagia. The other causes are most commonly nerve disease, such as Parkinson's disease, multiple sclerosis (MS) and Motor Neuron Disease (MND), and the consequences of a stroke. Cancer, cancer therapy and its complications can affect the ability to consume food as well as ruin appetite. Swallowing difficulties can result from a weakness of the tongue leading to a difficult start of the first steps of swallowing requiring a strong and quick tongue movement backwards. Other mechanical factors, such as paralysis of the throat, can result in little, late or no elevation of the larynx at all (5, 11, 36, 37, 38).

Mechanical problems such as decreased strength of the jaw muscles, malfunction of pharynx or oesophagus are also to blame. Decreased or inhibited movement processes along with decreased coordination of hands towards using utensils, glasses, and cups also create difficulties. Other factors such as bad coordination of breathing and swallowing at mealtimes, lack of saliva and dry mucous membranes for example due to medication or X-ray therapy, taste alterations due to medication, loss of teeth and or badly fitting dentures. Loss of teeth and poor mouth status can be caused by various things including dry mouth, poor economic status, and other personal issues. Badly fitting dentures are a common consequence of malnutrition or when people cannot eat, resulting in weight loss and alterations in facial muscles and structure. Edentulism, a pathological condition, is also a cause for loss of multiple teeth (36).

Goal of swallowing assessment

The goal of swallowing assessment is to ensure proper nutrition, hydration, and safety. Assess if intake is to be oral or no oral and determine what type of diet is appropriate and safe, considering optimum quality of life for the patient by consuming meals, vs. the increased risk of pulmonary complications associated with penetration-aspiration. Dysphagia is associated with factors such as pneumonia, dehydration, malnutrition, and reduced quality of life, all these factors being either short- or long term therefore, precise assessment is needed especially if problems persist for a longer period.

Primary assessment and evaluation can be done at bedside but usually followed by instrumental evaluation such as video fluoroscopic swallowing study (VFSS) and/or fiberoptic endoscopic evaluation of swallowing (FEES). The consistency of the diet is then determined, if it should be soft, semisolid, or semi-liquid. Then proper swallowing techniques need to be implemented and followed up on and the status re-evaluated at regular intervals.

In the past, there have been ways to modify food to make it easier to swallow for those in need. "In 2002 the American Dietetic Association proposed standardized terminology and definitions of diet modification for patients with dysphagia. And the National Dysphagia Diet proposed definition of solid food textures and viscosity ranges for thin, nectar-like, honey-like, and spoon-thick liquids" (3, 5). However, now the IDDSI standards are becoming the most prevalent recommendations, and it is imperative that these be implemented worldwide (5). Today, IDDSI standards are the only texture-

modified diet recognized by Full Nutrition Care Manual (NCM®) and October 2021 the National Dysphagia Diet was no longer included in NCM®, as stated by ESPEN (3).

Actions in cases of swallowing difficulties

If swallowing difficulties are present and the person keeps on consuming food and drinks with undesirable textures, the risk is that the food enters the larynx, resulting in choking on the food. In cases of a stroke, swallowing difficulties can occur suddenly nondependent on the origin, spinal cord, or cerebral hemisphere. When diagnosis and swallowing tests have been undertaken, a proper diet texture can be selected. Grinding or mixing the food as needed, introducing a puree diet (the same soft and even texture of all meal components with no sauce) or thickening of liquids. However, if no movements are in the throat area when swallowing movement is encouraged sometimes a tube feeding is recommended. The swallowing test should be repeated within a certain period because swallowing difficulties sometimes recover partly or fully (36).

It is common that less saliva production causes trouble in swallowing. Even though the salivary glands change with age, their saliva production should not be less than before. On the other hand, medication can reduce saliva production resulting in dry mouth, same for some diseases and interestingly, panic attack reduces saliva production, particularly in young people. In cases of Parkinson disease where swallowing difficulties are present saliva can accumulate in the mouth and create problems and for some embarrassing situation when they start drooling (39).

For some patients that are weak, have a nerve disease or are paralyzed coughing is difficult or even impossible but, in these cases, careful attendance needs to be practiced by the caregivers and for example the sitting position in bed or chair adjusted.

As mentioned above, careful examination needs to be done and different textures tested to ensure proper nutrition, quality of life, and decrease risk of choking and aspiration but on whole the best texture is soft, slippery, and adhesive. If the texture is too thin, risk of aspiration sets in and if too thick, risk of aspiration post swallowing can occur (39).

Oral health

Bad oral health includes sore mouth due to gum periodontitis or other diseases (40). It is important to note that bad oral health does not have to be caused by bad caretaking in adult years. Some, for example, the older generation in Iceland that either lived in poverty in childhood or far from dental services are more likely to have bad oral health later in life. However, as reported in a study by Sigurdardottir et al., insufficient visits to the dentist due to high cost and anxiousness about the procedure that needs to be performed, along with insufficient dental service at elderly homes, are some causes of poor oral status (39). They also stated that “recent studies have shown that 72 – 78 % of nursing home residents need dental treatments, the most frequent oral health problems are associated with natural teeth, showing high caries prevalence, requiring dental fillings

and extractions” (39). Those wearing dentures are susceptible to oral candida and dry mouth with an associated risk of malnutrition (39).

One of the causes linked to bad oral health is dry mouth and insufficient saliva production. Dry mouth is caused mainly as a side effect of some medication and insufficient saliva production, but also in cases of untreated sleep apnoea and sleeping with the mouth open, dry mouth is one of the side effects (40)

Difficulty in chewing can be caused by bad oral health, relating to tooth decay of original teeth and bad status of dentures or non-fitting dentures. Changes in the oral structure can cause non-fitting dentures due to diminished muscles and fullness in the face. Less strength or even no action of muscles in the face is one of the primary causes for difficulty chewing meat for example. Still, accidents and complications after a stroke are other common causes (35, 39, 40).

Texture modification – for whom

The group of patients that need and benefit the most from the use of texture modification is aged people, specifically aged people with dementia and weaknesses. It is recommended that older people who suffer from or are at risk of malnutrition and show signs of oropharyngeal dysphagia and/or chewing problems should be offered food and meals with modified textures. This, along with enriched foods and meals, compensates for lower intake and supports adequate energy and macronutrient intake (3). Also that they are offered two hot meals and two to three snacks per day (11).

Other patients that are at risk for swallowing problems and dysphagia are patients with stroke, neurogenic and neuromuscular disorders, head and neck cancer, amyotrophic lateral sclerosis, Parkinson’s disease, hereditary ataxia, multiple sclerosis, or traumatic cervical spinal cord injury (3, 35, 39, 40). People of all ages who have bad teeth and mouth status will also benefit from a texture-modified diet for longer or shorter periods of time as they cannot or only partially chew food with normal consistency. The condition connected to loss of teeth is called edentulism and, according to Emami et al., affects 20 – 25 % of the US and Canadian population older than 60 years. In this condition soft food in small bites suits the best (41).

Systematic screening of dysphagia and swallowing problems needs to be performed of all patients at risk and proper diet ordering made along with recording notes of support during meals to ensure proper nutrition intake and decrease risk of choking and aspiration (36).

The International Dysphagia Diet Standardization Initiative (IDDSI)

IDDSI (www.iddsi.org), a new global initiative, was founded in 2013 by a group of experts worldwide with the main goal of developing a new standardized terminology and definitions to describe and manage texture modified foods and thickened liquids for people of all ages, in all care settings and all cultures, worldwide. Also to ensure that the same terms and descriptions on TMF and liquids are used among all stakeholders within

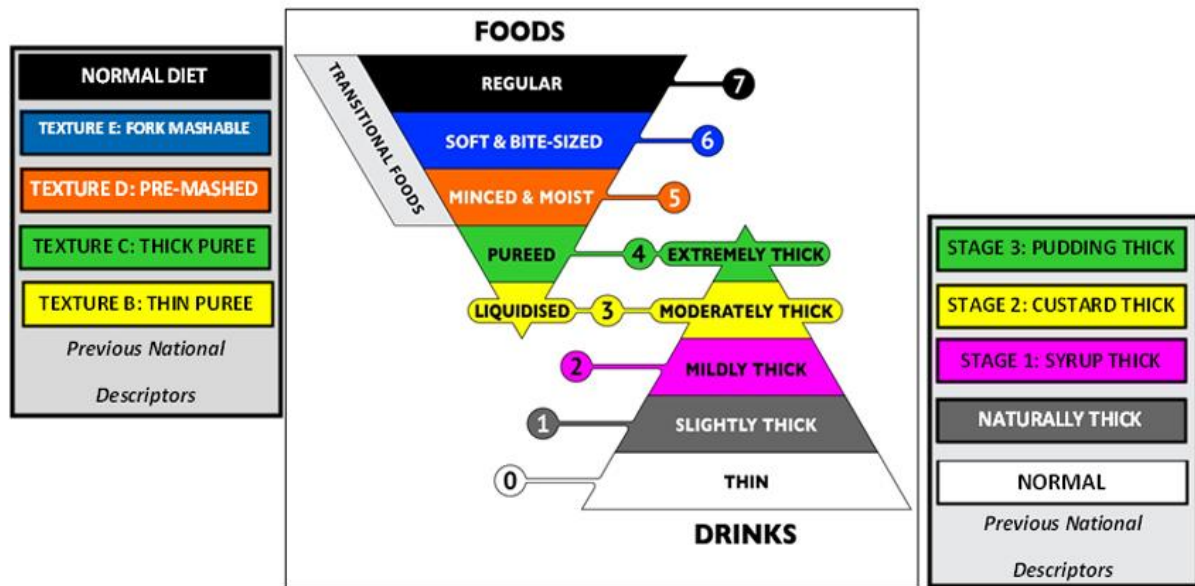
the health community and professional associations, manufactures, patients, families and the public for people with dysphagia (5). Worldwide standardized framework for dysphagia diets, as hypothesized by the inventors of IDDSI “could offer benefits, including but not limited to, improve patients’ safety; improve communication within and between health professionals, healthcare providers and patients; increased visibility of professional intervention; and greater opportunity to collect and evaluate treatment outcomes (5).

The need for such initiative was high, as in 2016 it was estimated that dysphagia affected around 8% of the world’s population or about 590 million people. According to the world’s population of today, that is growing at 0,87% per year, this number is about 654 million (35). In Iceland there are no statistics on the incidences of dysphagia but if the percent of the world is extrapolated to the Icelandic population of 383.726 (42), the number reaches 31.500. This fact alone gives a rise to concern and further developments in this field of study.

Texture modified diet and drinks should be prescribed and ordered for patients after a careful assessment, in the same standardized ways that drugs are, and it is of an equal importance. By using IDDSI in an appropriate way and following the suggested advice and protocols, adverse situations, inconsistencies, and errors in the labelling of texture-modified food can be decreased and even inhibited, an essential act to decrease the risk of choking, lung infections and deaths (5). According to systematic review by Steele et al., there is evidence that thickening is beneficial for those who aspire, thin liquids. There is also evidence that there is such a thing as “too thick” resulting in accumulation of food in mouth. According to the same review and not a surprise “solid food and thicker consistencies require greater effort in oral processing and swallowing”. This emphasises the fact that the correct consistency is important for the dysphagic person and the weak person that lacks the strength to chew food with regular consistency. At the same time the authors state that there is “no specific evidence to point to rheological values that that define the boundaries of effective thickening (either just thick enough or too thick), and that literature is lacking on TMF in the management of dysphagia (43).

The IDDSI framework consists of a continuum of eight levels (0 - 7) identified by numbers, text labels and colour codes (5) see Figure 6. It provides a common terminology to describe food textures and drink thickness. IDDSI tests are intended to confirm a particular product's flow or textural characteristics during testing. Testing should be done on foods and drinks under the *intended serving conditions* (especially temperature). The clinician is responsible for making recommendations for foods or drinks for a particular patient based on their comprehensive clinical assessment (5).

Figure 6 The IDDSI framework (5)



In Figure 6 the two triangles describe the different textures and thicknesses of foods and drinks within the IDDSI framework where each level has a number and colour code to distinguish between each one. On the left and right sides are previous descriptors used in the field.

Since the beginning, a high number of volunteers from around the world, including patients, caregivers, health professionals, industry, professionals, associations, and researchers, have contributed to the work. This voluntary work is an ongoing procedure where an increased number of volunteers are at work, including Icelanders, translating the standards to new and more languages to use for people with dysphagia. Now these countries count to more than fifty and Iceland will be one of these countries in 2025.

The primary purpose of texture modification of food and meals and the correct texture each time is to allow patients with dysphagia to nourish themselves effectively and safely on food by mouth instead of other means of intake, for example, tube feeding. If this is not undertaken, the situation might develop in a way that the patient won't feed safely or properly. The results can be aspiration, coughing and choking, which can risk the health and life of the person. Along with that, a fear of meals and drinks can set in and if the patient does not want to eat or drink, the consequences are malnutrition, weight loss and weakness, along with diminished quality of life as meals are a matter of breaking up the day and socialization.

Figure 7 A sample of a texture-modified meal, with items made by silicon forms



How the meal looks, as much as how it smells, is one of the key factors and sets the stage for the meal consumption from beginning to the end and how little or much is left when the mealtime is over with. For example, it is very important to mix or blend each meal component separately before serving it to the plate, and not mix for example potatoes and meat together. This is extremely important in cases where the TMD is going to be lasting for a long period of time (11). The issue on the smell can be a real challenge but one thing to do in cases where the patient is sensitive to smell and/or is nauseated, is to remove the lid of the plate away from the patient to let a possible strong and disturbing smell “air out”.

Texture modification is not a new way to manage swallowing difficulties but, in the past, this diet type has not been closely standardized, and each institute or country developed and used their own criteria, names and levels with various results and possibly increased risk to patients’ safety. ESPEN has concluded that “there are no harmonized descriptors” for texture modification in general” (3). The notion from the newest ESPEN guidelines from 2021 where it is emphasized that specialty diets should be eliminated wherever possible (3), becomes valid and clear in such cases. Also, this age group, is more often used to different type foods and meal combinations than younger generations and meeting the longings of the old men and women is extremely important to nourish them well. People on texture modification might have longings for vegetarian diet. However, for some types of vegetarian dishes it can be difficult to mix in a way that meets requirements of texture modification, for example beans and pulses, not to mention nuts. If these cannot be mixed properly and therefore skipped, the diet becomes low in protein unless milk, cheese and eggs can be mixed in, along with soy meal or pea protein, however the latter is lower in quality as most protein sources from the plant-based food compared to protein of animal origin.

Factors involved in patient food intake and the value of studies

It is evident that patient food consumption is highly dependent on their perception of the meal, and it is unlikely that this perception is reflected in the nutritional content. By this, the author is not implying that nutritional content is not important. However, if the meal is not appetizing, the patient is unlikely to eat it and then the proportions and calculations are of a little or no use. Also, if the meal is not appealing or the quality or temperature is obviously not good, the patient is less likely to eat and enjoy it, especially the patient that has little or no appetite due to factors such as nausea and / or vomiting, pain, tiredness, difficulty chewing or swallowing. Protected mealtimes are important (44) and proper planning at the ward in relation to patient program and mealtimes is essential – but can be a difficult task. Finally, if the patient – staff relationship and communication is poor and if needed assistance is not provided the patient has difficulties that become a big obstacle for him or her while eating and enjoying meals. Staff communication on nutrition is also important and essential. Therefore, it is important to listen to patients' and staff's voices and suggestions, periodically evaluate menus and menu cycles, check recipes and ingredients on a regular basis, and critically evaluate temperatures and the look of the meals upon serving points to the patients. Proper staffing at wards is also of significance and language barriers to be solved with proper job prescription and education of staff as possible (11, 44, 45, 46, 47, 48, 49).

Numerous studies have assessed the success of interventions to improve mealtimes of patients in the hospital setting as “hospital mealtimes represent an area of frequent frustration and tension for staff and older patients alike” “and when both groups can feel disempowered to influence change” (44). These interventions have focused on several aspects for example increased assistance during mealtimes but as the population of elderly patients grows in number and average age increases more general assistance will be needed. Assistance at mealtimes, includes sitting up in bed and getting ready to eat, assistance to get out of bed and into a chair or to a dining area to dine with others (43). Also, more specific assistance for example buttering the bread, layer it with cheese, cutting it into pieces and even for the most fragile ones, a complete and careful feeding assistance where the health professional needs to be trained to provide this with care and allowing the patient to eat with dignity (11).

However, as discussed by Roberts et al “Unfortunately, “for the most part, findings from these studies are disappointing, showing only modest improvements in nutritional intake and care processes for older inpatients”. (50), “This has led for a call to disinvest in some mealtime interventions due to lack of evidence that they are effective” (44).

The nutritional needs of hospital patients are mainly met at mealtimes, and therefore, an emphasis needs to be placed on meals and snacks to “work against the negative consequences of a poor intake” that have been demonstrated in large international studies (10, 11). Also, as stated by Beck et al., “mealtimes are an important

opportunity for compassionate person-centred care and a time of rare ‘sanctuary’ during the hospital stay” (51) also included in recommendations for Icelandic frail (11).

Important aspects of a better meal experience for hospital patients include protected mealtimes focusing on decreasing interruptions (44). To achieve this, improved procedures and scheduling of patient examinations and training appointments, to be avoided in the same time slots as meals are served. However, this can be a difficult task to accomplish as hospital equipment and manpower need to be well utilized and organized during working hours. Finally, by increasing instances where patients gather for meals, communal dining and togetherness can be initiated, and for some, meal experience is improved (11, 44). In relation to this and as mentioned above, in cases where patients need assistance with meals, the staff, becomes more time efficient if they can assist many in the same dining area instead of dividing themselves among several rooms within the ward. Watching and assisting patients at choking risk and those with great difficulties makes the meal safer for the patient and reduces strain and anxiety for all.

The Nutrition Day

The concept of nDay was founded in 2004 as an attempt to overcome malnutrition as its prevalence in the hospital sector had not diminished for many years.

The nDayQ is a worldwide initiative intended for use in hospitals and nursing homes. It was founded in 2006 by experts from ESPEN and the Medical University of Vienna with the aim is to raise awareness on nutritional care processes and malnutrition in relation to disease. The hospital questionnaires were updated in 2016 for inclusion of quality indicators of nutritional care and two years later the Hospital Express version was launched (52).

The nDayQ is intended to serve as a tool in assessing the prevalence of malnutrition and for extensive data collection on patients’ characteristics and malnutrition risk factors, in hospitals and nursing homes. It can serve as a quality indicator of nutritional care and allows benchmarking and annual monitoring of structures and processes related to nutritional care. It is not specific for texture modified diet or specialty diet but is useful for basic data collection and comparison. To date it is available in thirty different languages Icelandic became one of those in 2020 (5). An example on recent participation worldwide, are 71 countries and over 280.000 patients in hospitals and residents of care homes.

The nDay survey itself, is a standardized, one-day cross-sectional audit, submitted in November each year worldwide. Assessing one day of patient’s nutrition related factors. Also including questions on their experience on food and service at the hospital this proceeds with a one month follow up.

Each hospital and ward receive a comprehensive graphical report with local, regional, and universal comparison to similar units within a similar category. These

comparisons allow benchmarking and empower the units to define, distinguish and determine the current needs and bring attention to the fields, elements, and processes where a change is needed. Examples could be improved protocols for screening patients for malnutrition or suggestion for improving staffing issues to increase nutrition related service to the patients and improve their outcome. The results can be used as benchmarks from year to year, but it also allows praise for work well done (52).

How patients like hospital food have been “the million-dollar question“ for years. Numerous studies have been undertaken to evaluate patient’s perception in relation to hospital food, these studies are different in scope and depth but have the possibility to contribute extensively to the mealtime experience of hospitalized patients. Results have been interesting and informative to the field of science, along with providing valuable information to the food services and the wards on how to improve service to increase food intake and meet expectations of the patients.

Summary of studies on relevant and recent topics

In a Swiss study by Stanga et al. included about 300 patients (mean age 59.5 years, almost equal proportion men and women), 86 % were very satisfied or satisfied with the hospital food and 78 % were satisfied with the way the food was served. Twenty eight percent stated that they consumed all the food served, 48 % percent consumed most of it, but 22 % reported eating only a small proportion of their meal. There was a highly significant correlation between food satisfaction and perceived aroma and taste ($P=0.004$). Not surprisingly, the researchers found a negative correlation ($P=0.005$) between the length of admission and food satisfaction. In conclusion, the factors that the patients in the study valued the most were appearance, aroma, and temperature. According to the researchers, “problems related to hospital food may be addressed from three perspectives: the *nutritionist's* — Is the patient's nutrient intake adequate to meet requirements? the *economist's* — What are the costs and how much food is wasted? and the *patient's* — Choice, preference, timing, presentation and satisfaction” (45).

In a recent study by Furness et al (n=149) (median age 77 years, 52 % female, 38 % from the geriatric unit, 63 % of meals were regular diet, 11 % easy to chew / texture modified, median admission 19 days) several domains were of major focus, these were: Food quality, including food perception, variety, atmosphere; environment where functionality and intrapersonal factors were tested for; staff interactions and assistance, looking into factors such as manners and accuracy; food ordering system including ordering navigation and timing; and finally the aspect of overall satisfaction where the foodservice quality was underneath the spotlight. It was found that patients were most satisfied with interaction with staff. Patients described the staff as being courteous, friendly, nice, and “going out of their way to assist and expressing concern”. Patients were, however, most dissatisfied with the dimensions of food quality that was rated as the poorest aspect of patient satisfaction towards the food services, specifically flavour, presentation, and menu variety”. The issue of hospital food quality in this study was

similar to results of other studies “where both the expectation gap of food quality and food quality issues contributes to poor satisfaction” (53, 54, 55). Reported consumption barriers were clinical symptoms, nutritional impact symptoms and uncomfortable patient’s sitting position while dining. Not surprisingly, clinical factors and physical limitations were found to have substantial impact on food intake, the latter most prominently in the oldest age group. As far as physical factors are concerned; including odours, smell, noise, disruptions by other patients, visitors and hospital staff, room surroundings and ambience, these were not found to be a common factor affecting food intake. However, busy schedules resulting in fatigue were reported by the patients of the current study as in a study by Naithani et al. where rushed mealtimes were also an issue (47). Importantly, the focus should be on factors that are innovative and aim towards food quality improvement initiatives, particularly in long term stay. That includes improved menu variety, colour of meals, taste and flavour, more variety in fresh food, culturally diverse staple foods, variation in cooking methods, work on the presentation of meals, and food ordering systems and protocols (46).

In an Irish hospital study by Naughton et al, food consumption and mealtime factors were assessed by analysing 279 meals eaten at 23 mealtime periods. Based on visual inspection of patient’s plates, leftovers were evaluated by the nursing staff as fully completed (100 %), to three quarters, half, to one quarter or none (0 %). The study protocol also included observation of ward tasks and “what happened during the busiest periods, and when nursing staff were likely to experience more pressure from competing demands” (48). To summarize, in over 40 % of the meals, less than half was consumed, indicating sub-optimal nutritional intake. The main reasons for a low intake (consuming less than 50 % of the meal) were “not feeling hungry (27 %), felt too unwell (6 %), or did not like the food provided (5 %) the latter mainly related to a textured modified diet”. The majority (54 %) of meals were eaten at the side of bed or in a chair, 45 % with patients either fully propped up or semi-recumbent in bed but better positioning was strongly associated with meal completion. The authors found that less meal completion was associated with “requiring assistance, texture modified diet, laying down in bed, frailty, and use of a red tray”. The texture modified diet was the one least highly received by the patients, and posing the greatest challenge, as it was often not liked in terms of “appearance” or “consistency” and there was a lack in available alternatives to offer. Factors such as female gender, higher frailty and at nutritional risk, greater number of medications and longer length of hospital stay were also related to less meal completion. It was observed that there was a lack of communication among the staff on nutrition-related matters for those with a low intake or refused meals. Authors concluded that “mealtime predictors, with a weak association with less-meal completion were requiring assistance, special diets, lying in bed, and red tray (indicator of nutrition risk)”, however, these “were not statistically significant” according to the authors (48).

In a nDay study by Shindler et al, based on data from 56 countries collected in 2006 - 14 (n=91.245), the mean age was 64 years, an equal proportion of men and women, mean body mass index (BMI) 26 +/- 0,6 with a level of ≤ 18.5 in 6 % of subjects, and 7.5 % from geriatrics. The factor most strongly associated with reduced food intake on that specific day is a lower food intake on the previous days, "underpinning the importance of documenting patients' dietary histories when assessing the likelihood of decreased food intake", as concluded by the authors (56). Other noticeable factors were, patient confined to bed (immobility), being a female patient and young (<40 years) and old age (>70 years). The authors discussed the issue of standardized meal sizes and commented "that a full meal may have been too large for many women; more frequently, women indicated that they normally ate less than the quantity served". "The serving of a smaller portion of a complete meal may increase the likelihood of balanced intake than would eating patient-selected parts of a larger meal". As observed in other studies "food intake was also associated with the length of hospitalization whereby the longer the hospital stay was, the more the patients ate" (56). This could indicate that the patients were generally not bored by the food served and that by being offered regular meals the patients improved their appetite, energy and health status. The amount of food that was provided and the macronutrient composition of served or consumed food were not assessed probably affecting the quality of the data not to mention the influence on "satiety and outcome in at-risk patients". The authors pointed out that "female sex and immobility were the factors that were the second and third most-strongly associated factors with impaired food intake, which pointed toward structural and organizational factors in hospitals, namely food provision, portion size, choice of portion size, ward activities around mealtimes, and availability of support in association with eating" (56).

Naithani et al (47), interviewed their group of hospital patients (n=48) (female 58 %, mean age 60 years, 23 were ≥ 65 years) based on experiences of access to food as they found information lacking from the patients' perspective. Mealtimes were also observed but in an informal way. The mealtimes assessed were 32 in total and served at 7:30 - 8 AM, at noon and 6 PM, both meals lasting for about 45 minutes. The categorization of the barriers the patients experienced were mapped as follows; Organization barriers including lack of information on the menu and suitability of the food it consisted of in terms of ingredients and nutrition, inhibiting patients in supporting their own healing and recovery. Inflexible ordering systems and unsuitable serving times were also mentioned the latter focusing on the timings of meals. Second were physical barriers; including food out of reach, difficulties assessing food due to packaging, inappropriate utensils offered or uncomfortable sitting position while dining. Finally, environmental factors including interruptions during mealtime from staff and other patients, noisy behaviour of other patients, other noise and unpleasant smells. Older age and disabilities were the marker for difficulties accessing food and some mentioned too little time to eat, whereas patients of a younger age expressed complaints about service matters - timing and delivery, along with food choices. The results indicated that majority of the patients

were satisfied with the food they received commonly expressed by the words “fine” or “alright”, they found the food met their expectations. Most patients felt they could access hospital drinks, meals and snacks however, about half of the patients experienced hunger during their stay. The missing access to food was mostly related to the missed meals due to treatment, between mealtimes and in the evening as dinner is served at 6PM. Not surprisingly, the health status, treatment and age reflected the scope of difficulties patients experienced such as swallowing difficulties, manipulating and moving food in the mouth and the portion sizes that were often regarded as too large. Patients’ perceptions on quality of meals were valued in terms of appearance, taste, temperature, and portion size. There were comments on the constraints and challenges of mass catering, processes of food production and delivery of meals. Few patients mentioned not being bothered about the food as they were more concerned about their health, or they expected only a short admission. As expected, a part of the patient group was rather dissatisfied and criticized the low wholesomeness of the food and the cooking method. This study indicates that the overall quality of food is acceptable to most patients and supports existing studies measuring inpatients’ satisfaction with hospital food from previous years. However, patients’ responses on food acceptability were often reflected by their low expectations towards hospital food and food provision and “their high regard of medical treatment over importance of food taste”. Patients find mass catering operations is constrained by their own systems, creating barriers such as environmental, physical and organizational factors. However, patients are generally able to seek out food that is more to their liking. Previous studies have shown that undernutrition increased with and longer length of stay (57, 58) however, in the study by Naithani et al, short stay patients (less than two weeks) reported more problems arising from the quality of food and food service during mealtimes compared with long stay patients (longer than a month). Reasons may be that long stay patients may have already learned coping strategies and therefore be better prepared to deal with potential difficulties compared with short stay patients or that family and friends provide food and assistance while eating (47).

In the context of this paper’s content addressing TMD, it is necessary to discuss subgroups of patients, those receiving TMD. In a study by Wright et al (59) they assessed oral intake of 55 patients, of which 30 were prescribed TMD. Compared to the other 25 patients, the ones eating TMD had significantly lower energy intake or 926 kcal compared to 1461 kcal ($P < 0.0001$) and for protein the value was 40 g vs. 60 g ($P < 0.003$). Both values are way too low for a person. “The energy and protein deficit from estimated requirements was significantly greater in the TMD group”, 609 kcal vs. 85 kcal ($P < 0.0001$), and 6 g vs. 22 g ($P = 0.013$) respectively (59). It was also concluded that if the intake of these two nutrients was low, it is likely that other nutrients will be low as well. The authors concluded that patients on TMD should be assessed by a dietitian for nutritional support and evidence-based strategies to improve overall intake should be identified (59).

Studies that have attempted to address problems of undernutrition have highlighted the importance of reducing organizational, physical and environmental barriers to accessing hospital food. For example, a trial among patients in elderly wards showed that eating at a dining table increased their energy intake (60) and protected them from interruption during mealtimes, leading to improved nutritional status (less weight loss and improved mid-arm circumference) (61). The study by Naithani et al supports the importance of organizational and environmental factors and indicates that these significantly influence access to food among all ages and not only elderly patients (47).

As stated by Naithani et al., from the results of English studies, one from 1997 and one from 2006, “currently nutritional care has a low priority in hospitals” (62, 63). The study by Naithani et al indicates that all age groups experienced organizational and environmental barriers during mealtimes on hospital wards and many elderly and post-surgical patients had physical difficulties in eating while a more general difficulties, was the unavailability of food between meals and the missing of meals. These problems made many patients feel hungry at some point during their hospital stay. However, these difficulties of accessing food often remain hidden because staff fail to notice, and patients are reluctant to request assistance. This indicates that patients’ eating experience and nutritional care requires adherence with the principles of Protected Mealtimes where other activities are not undertaken on the ward while meals are served or eaten and increased attention to identifying and addressing patients’ needs for assistance. However, in circumstances where this is not practical an alternative solution would be to positively suggest to patients that they might enjoy their food more if it was taken away and kept hot while the doctor spoke with them. This flexible approach requires the organization and availability of sufficient staff able to assist with ordering and feeding and increased importance assigned to this aspect of patient care, as well as good co-ordination of activities among catering assistants, nurses and domestic staff (47).

In a study by Young et al where the aim was to assess the mealtime experience of older patients the „physical and social complexity of mealtimes from the perspective of patients, caregivers, nurses and food service officers“ are highlighted. Also, novel targets for improvements were identified and targeted for improvements of three different touch points of hospital mealtimes., family (all female) and staff (all female) using a photo-voice method to assist with mealtime interventions. Three themes were identified: First, the preparation preceding the meal, second, the delivery and receiving the meal and third experiencing the meal. In greater depths the first theme included the “juggle and anticipation”, the second one „the rush, clutter and wait” and the third “the ideal, pulled away and acceptance”. Among the patients and caregivers, “the wait” experience was identified as more demanding in contrast with “the rush” experience among the staff. The results indicated that “despite a shared understanding of the importance of meals and shared vision of ‘the ideal’ mealtime, generally this was a time of tension, missed cares

and dissatisfaction for staff, patients and caregivers". "There was an overwhelming sense of acceptance and lack of control over change from all". "The researchers concluded that this study identified hospital mealtime themes which have gone unaddressed in design of mealtime interventions" and "may provide a framework" for further studies. Also, that "improvements could focus on reducing clutter, clarifying mealtime roles and workflows and supporting caregiver involvement" (44).

The NHS Patients Association (62, 63) implements on a regular basis a hospital food survey among its patients to assess the patient's views, report on valuable takeaways and strong trends, and ensure that the patient's voice is heard. Results showed that 65 % of the patients believed that the food directly impacted their overall experience during the admission, and 70 % found the food presentation affected their food consumption. The patients in this study enjoyed having choices of meals and mentioned that having options of hot drinks and snacks between meals, such as fresher fruit and salads, was a positive implementation in relation to the timing of daily meals and missed meals due to treatment. The patients mentioned fresher and healthier food of greater quality at the correct temperature, meals prepared on-site, and not frozen. An important issue learned from this study is that when patients are ordering themselves, it is important to check the order to prevent mistakes such as missing meal items.

In a study by Hartwell et al where the authors aimed to identify and prioritize the factors that contribute the most to hospital patients' meal experience empirically, food and service were the top contributors when social, personal and situational factors were evaluated in decreasing order of importance. Their results confirm that improving the quality of the food and the efficiency with which it reaches the patients remain the most important objectives of hospital food service (64).

In a study by Larsen et al, it was stated that "even though there is a lot of focus on nutrition in hospitals, patients often continue to lose weight during their stay". In their study they identified "the experiences of patients about eating situations, wishes and needs in connection with meals during their stay in the hospital". The results showed that these twenty Danish patients (age ≥ 18 years) who underwent interviews in a semi-structured way experienced helpfulness, friendliness, caring and indulgence on behalf of the health professionals, but the caring factor was regarded as an essential one. Despite these positive factors, some patients of the study experienced the health professionals being very busy and felt rejected by them. A way for some of the patients to cope was to accept the conditions, adapting their expectations to the system and even not ask for help. Concerning their experiences with fellow patients, these were mixed, and some patients reported that they would like to eat alone instead of feeling exposed and undignified, while others wanted to consume their meals with others, but have to say about "with whom they shared their meals". Patients, overall, found the food good and expressed

general satisfaction. However, the surroundings within the hospital and wards were disturbing for some, creating discomfort in bed, for example during mealtimes. IV drips and catheter bags were found affecting appetite and minimizing desire for food. The authors concluded that “it is important to ensure individual settings for the patients during meals and the focus should be on the relationship between patients and health professionals” and “that meals and mealtimes could be given further priority” (65).

How do patients like hospital food – to summarize

To summarize, the results of these studies have different indicators for food services and ward staff, and various interesting issues are discussed and raised. We can identify major highlights being “the physical and social complexity of mealtimes from the perspectives of patients, caregivers, nurses and food service officers” also “the physical and social complexity of the environment in which the multifaceted clinical task of hospital mealtime care is embedded” (44). Results of some of the studies indicated that “Availability of appropriate dishes and utensils may also contribute to increased meal consumption, as can eating in an attractive dining area with social interaction (45).

From these studies, lessons can be learned on how to identify the targets to be set to improve the major “touch points of the hospital mealtime” (44). It is also urgent that all staff is involved, know their responsibilities, can devote quality time and prioritize mealtime issues with the patient right before and during mealtimes (45). This includes the personalization of the meal and efficient room service as these may improve nutritional intake while decreasing food waste. Clinical nutritionist staff —especially dietitians — may increase food intake and reducing food waste through active monitoring of the patients’ nutritional needs (66).

The above-mentioned issues require, in some places, large mealtime improvement interventions to manage this complexity, solve issues and bring on changes for the good of the patient – and the hospital staff. The major variables addressed by patients, and to be focused on are comfort, autonomy and conviviality. Targeted are “reducing clutter, clarifying mealtime roles and workflows and supporting caregivers, underpinned by efforts to build trust and relationships between disciplines to enhance teamwork and address prevailing power hierarchies” (44).

As mentioned above, at the same time as some patients are unsure about the contribution of sufficient nutrition towards their health, they prioritise medication because they feel that it helps with their illness. Illness, accidents and being bedridden, leads to inactivity.

The aim of the study

The aim of this study was to assess the fluid, energy- and macronutrient intake of patients at Landspítali receiving TMD and if their intake fulfils their needs based on calculations and recommendations for their age, sex and weight.

Also, to assess by questionnaires how patients on TMD perceived the flavour, texture, variability and size of meals, snacks and drinks they received from the Landspítali Food Service. What were their likes and dislikes, and was the meal serving size suitable and the amount of sauce enough? Was the meal hot enough, did it look alright, and was it healthy?

Finally, to find where the patient consumed their meal most of the time, how they perceived the meal environment and staff at mealtimes, and whether they got the assistance needed. Did the cutlery suit their needs, and did they believe that a menu delivered with lunch and dinner would affect how they perceived the meal and thereby affect their food intake?

To accomplish this, the study methods were designed to answer the following research questions.

1. How common are TMD diet orders to Landspítali Food Services?
2. What characterizes the patient that receives TMD?
3. What is the energy, protein and fluid needs of patients on TMD?
4. Do patients receiving TMD meet their nutritional needs during admission
5. How much TMD is wasted.
6. How do patients on TMD like the food they receive from the food services.

Methods

Data collection

The patient data was collected from August 18th to December 30th, 2022. Each visit to a patient lasted for 30 - 45 minutes on average. Concerning data collection, a low number of participants was achieved, but only 20 % of the planned one-hundred-patient group was reached and included in the study. The one hundred subjects were considered as needed to reach statistical validity according to power calculations, based on similar studies.

There are a few reasons for this low number of participants. During the time of intended start and then closure of data collection there were strict limitations, and even total restrictions, on visits to the wards of LSH or individual patients. This was due to Covid 19 measures, other and more regular types of hospital and other communicable infections, with resulting isolation of potential subjects.

Other factors, relating to high age and physical and mental status of the potential participants, but according to a nurse at the ward, many were not in a condition to give their written consent and answer the questionnaires even though the researcher read aloud each question and filled out the responses for all participants.

Issues other than those mentioned above had effects on the data collection. The high workload and stress at the wards resulted in difficulties getting consent from the patient through the leading nurse for the researcher to come and submit the questionnaires. Also, was inhibiting the inability to access patients' information through the Icelandic electronic hospital registry SAGA/Heilsugatt (TM software 3.1.39.9). Instead, having to ask the leading nurse to write down the needed parameters but most of the time the form needed to be left at the ward and then picked up later. Sometimes more than one and even two extra visits were needed to receive it back or even to return and submit a new form because the other one got lost.

Subjects

Names of potential participants were found in the Food Services meal ordering system AIVO 2000 by viewing the list of patients that were receiving TMD at the selected wards. Then these names were followed within the AIVO 2000 meal ordering system for the following days and those that stayed for three days or longer were potential participants. Three days were considered enough time for the patient to receive fish and meat and various selections of sauces, potatoes, vegetables, desserts, and snacks.

The subjects were patients who received one of the four types of texture-modified diets offered at Landspítali. These are as follows: M1 (soft diet), M2 (minced diet), and M3 (mixed diet) where M stands for "Mauk" in Icelandic, meaning that the items within the diet type are by some means different in texture than the normal diet, for example soft, or modified in texture, for example by grinding or mixing. The fourth type is F4 (thick liquid diet) where F stands for "fljótandi" in Icelandic meaning liquidized diet and 4 standing for level four that has a "pudding like" consistency.

According to the study protocol, for the researcher to be able to approach each patient, the leading nurse of the potential patient had to confirm the willingness and ability of the patient to sign a consent and answer questions on the food they were receiving. If the nurse believed that the patient was a potential subject in terms of communication and ability to answer the questions, each potential patient was approached by the nurse and asked to participate in the study.

Each patient received a verbal and written explanation by the researcher, including the purpose of the study, what information and values were going to be collected and how the results were going to be used. It was also explained that they did not have to participate, could stop answering the questions at any time during the submission of the questionnaire, could skip questions and not discuss certain issues if not willing or able to. They gave their permission that information on age, sex, height, weight,

type of prescribed diet and the reason for it, results of nutritional screening and swallowing test, mouth, and teeth status, including dry mouth or not, were going to be registered from the hospital system by the leading nurse. Participants were informed that their data could possibly be used in further studies in this field. In appendix C the informed consent is shown.

The subjects of the study, named **Subjects5**, were patients admitted to the elderly units of Landspítali. The subjects of the study (Subjects5) were 65 years and older, age was in the range of 66 to 96 years, average 82.2 years, median 81 years. They were all prescribed a texture modified diet as a prerequisite for participation. 40% (n=8), five men and three women were on M1 diet, 20 % (n=4) were on M2 diet, two men and two women, 25 % (n=5) were on M3 diet, four men and one woman and 15 % (n=3) were on F4, thick liquid diet, one man and two women.

The wards were chosen in the beginning by the researcher based on current information from the Food Services meal ordering system AIVO 2000, on wards with the highest number of admitted patients on TMD and within the age limit of 65 and older. These selected wards were L1, L2, K1, K2 at Landakotsspítali, V1, V2, V3 at Vífilsstadaspítali and B2 and A4 at Landspítali Fossvogur. Despite the different names of the locations, these are all a part of Landspítali and within the Reykjavík area, and all served the same menu by the same kitchen and food services.

Forms and questionnaires

The patient information on **Subjects5** was collected from the Landspítali patient registry, Saga / Heilsugætt and included the patients' sex, age, height, and weight. The type and reason for the prescribed diet, mouth- and teeth status, if the patient was suffering from a dry mouth or not, and the results of a swallowing study if available. There were spare lines to write important and relevant nutritional and food intake related notes on the patient and their current admission if needed. Information about, oral health, teeth and swallowing status were collected through a leading nurse (Appendix D).

Screening for nutritional status

Screening for nutritional status was created by Thorsdóttir et al. at Landspítali by the nutrition department and first validated in 2005 (56). It evaluates adult patients for risk of nutritional deficiency and / or malnutrition by assessing several factors that all give a certain score in the range of 0 - 5. The higher the score the greater the risk. If the patient has five points or more, the likelihood of malnutrition is strong, for lung- and cancer patients, the criteria is four points.

Screening for Nutritional status (Mat á næringarástandi) (21) (Appendix E and F) (Icelandic original version, translated to English) was done by nursing staff of the ward. The information needed are obtained from the Icelandic electronic hospital registry

Saga/Heilsugatt (TM software 3.1.39.9). The following categories were used to group the patients into high < 23 kg/m², middle 23 - 30 kg / m², and low risk, ≥ 30 kg / m² but these values were chosen in relation to the age of the participants and according to The Icelandic Medical Directorate (10, 11). For two of the **Subjects5**, height measurements were missing, therefore their BMI could not be calculated.

However, if such screening was undertaken by the nursing staff and registered within the patient registry system the score was registered into the research documents.

NutritionDay questionnaire

Newly translated into Icelandic, the internationally known nutritionDay questionnaire (nDayQ) (67, 68, 69) with an aim to assess the service provided by the food services and at the wards (Appendix G). The questionnaire consists of eleven questions that are intended to assess how the patient perceives their meals at the hospital. If the food tastes good, alright, rather bad, or bad. Whether the meals are appetizing and healthy always, sometimes, or not, and if the amount of food on the food tray was of an appropriate portion size or not. It also includes questions asking if the patient receives the food they ask for, always, sometimes, or not, and if the patient has any special dietary needs, for example a vegetarian meal.

The intake of other food and drinks was not assessed in this study even though the researcher had permission to do so according to the study protocol. Therefore, no form was invented for registration purposes.

The quality assurance questionnaire

The researcher designed the QAQ (Appendix H). The questions are built around factors that are regarded as important in evaluating the texture modified diet produced and served at Landspítali Food services, but it also evaluates other factors that are important to all patients.

This questionnaire measures the level of satisfaction of patients on texture modified diet, experience on their meals and related services on behalf of kitchen and ward. At present, this questionnaire is invalidated. It is four pages long and contains thirteen questions, of which four have five sub-questions and one has two sub-questions.

Similar topics are of interest and comparable questions are asked in other studies of similar kind (44, 45, 46, 47, 48, 49) but despite that this new specific questionnaire was designed for this study.

Assessment of food and fluid intake

The patients in the study gave their permission in their written consent that their food intake was evaluated, by weighing leftovers from food trays upon return to the kitchen and recorded food and drink intake at the ward calculated as well. Before the weighing of leftover food from trays could start, work was undertaken reviewing serving utensils

at the serving line and the guide lists were up graded on terms of ladders and scoop spoons to ensure correct serving sizes.

Leftover food was weighed using a standard kitchen scale A&D Company Limited N92 (S/N Q94034891). This weighing was done upon returning off the food trays to the food services as the trays returned either from the last meal or from the day before. The ward had been asked to not remove any leftovers and store meal cards on the trays (as usually is done) and the dishwashing department was helpful pulling out and storing trays from the selected wards.

Each food item that was left on the tray was carefully weighed and the amount recorded on the paper meal card that was on the tray. This meal card includes information on patient name, ward number, date, and if the meal was breakfast, lunch, or dinner. These meal cards are printed out of the kitchen computer system and are placed on the tray at the serving line to indicate the meal to be served to the patient. In cases where items had been mixed on the plate, for example sauce and meat or sauce, meat, and potatoes estimation was done. However, sometimes this was impossible, and the sample was ruined.

After successful weighing, the amount left was subtracted from the amount served on the serving line and the caloric value and amount of protein calculated. This calculation was done in the AIVO2000 system.

Information on food and drink consumed at the ward was not collected due to difficulty accessing this information at the ward.

Estimation on energy, nutrients, fluid, and fibre needs

The energy needs of the subjects are calculated using the value of 27 - 30 kcal / kg / day (1, 2, 29, 30, 37, 38), the values are presented as mean and median, for lower and higher range of caloric need, along with standard deviation and sample variance.

The protein needs of the subjects are calculated using the value of 1.2 – 1.5 g / kg / day (1, 2, 29, 30, 37, 38). The values are presented as mean and median for lower and higher ranges of protein need, along with standard deviation and sample variance.

For estimating fluid needs the recommendation of 2 L / day for men and 1.6 L / day for women was used (10, 11). For estimation of fibre needs per day, the value of 12.5 g per 1000 kcal / day for both men and women were used, but the total amount should reach about 25 - 30 g per day (10).

Weighed leftovers

As this study was in part a quality one, intended to benefit the Landspitali Food Services, an additional study part was included whereas leftovers from TMD breakfast, lunch and dinner trays of other patients than only **Subjects5** were weighed and recorded. This explains the name of the main subject group of the study, as they were the main subjects

of interest, often with higher number of meals assessed, they had descriptive parameters recorded and answered the two questionnaires. However, and importantly, not all Subjects5 had four or more meals weighed but were their meals were in the range of one to four.

When all trays with weighed leftovers had been assessed, recorded and organized by name of patient, ward and type of meal (breakfast, lunch or dinner, some even included snacks) the subjects were organized into five subgroups based on if they had “one meal”, “two meals”, “three meals”, “four meals”, and more than four meals weighed and assessed. The aim of this was to gain information on the amount of wasted food and meals, and lost calories, protein and fibre.

Then the subjects who had three or more types of meals and snacks assessed were assembled into one group and “sample meal-days” for these subjects were set up. One “sample meal-day” had to include at least three meals of the following types of meals breakfast, lunch, dinner, midday and/or evening snack. An example could be a patient who had one breakfast, three lunches and four dinners weighed. Then intake of calories, protein and fibre for that one breakfast meal was calculated, so was the average intake of the three lunches and the average intake of four dinners. This would sum up to a certain number of calories, protein and fibre and be an example of a “sample meal-day”. These three meals add up to about 80% of calories provided by the food services as the proportions are breakfast 25%, lunch 30%, dinner 25% and the snack meals 10% each. A “sample meal-day” was not complete (100%) unless all meals and/or average meals were included in the calculations. For those who had a complete “sample meal-day” assessed their intake was compared to the estimated daily need based on average and sex dependent **Subject5** estimates. To clarify, **Subjects5** estimates were based on calculations using their registered BW. To assess how much of the estimated need was consumed by those who did not have a complete “sample meal-day” assessed, proportionate calculations were done. As in the example above with only breakfast, lunch and dinner assessed, and therefore only a knowledge on 80% of provided calories, the intake was compared to only 80% of the estimated need. Calculations were assembled for all subjects, women and men.

The amount of calories and protein that were wasted were calculated as total number for each subsample, the leftovers for women and men are compared.

Based on percentage of calories and protein that were consumed from each of the meals, the numbers were divided into ranges of $\leq 25\%$, 26-50%, 51-75% and $\geq 76-100\%$, the incidences of $\leq 25\%$ and $\geq 76-100\%$ were reported on specifically for all trays, women and men.

Finally, the amount of sauce that was left from M1, M2, and M3 trays was assessed and averages calculated for all, M1, M2, and M3 trays.

Permissions

The participating units were selected in relation to the composition of the patient group needed for the study. The wards were chosen in the beginning by the researcher based on current information from the Food Services meal ordering system AIVO 2000, on wards with the highest number of admitted patients on texture modified diet and within the age limit of 65 and older

The head nurse of the nine pre-selected elderly departments/wards, received a formal information letter (Appendix I) from the researcher, describing the study, the aims, and the protocol. They were asked to allow the study at their ward and introduce it to their employees. Also, to sign a confirmation document (Appendix J), verifying that they agreed to the study being undertaken at their ward. All head nurses agreed to take part and most encouraged that the study should be undertaken. Their signature was submitted to the Ethics Committee before the study received a final verification. When the study was about to start second information letter was sent to the head nurse to inform and remind about the responsibilities of the wards. (Appendix K)

A permission to use the Icelandic version of the nDayQ was achieved from the department of dietetics at Landspítali. Each patient gave their permission, with a written informed consent to participate in the study (Appendix C). If the patient agreed to take part, he/she was asked by the researcher to sign informed consent in two copies, one for him/her to keep, one for the researcher.

The protocol of the study was submitted to the Ethics Committee for Health Research of Landspítali (Sidanefnd Heilbrigðisrannsóknna á Landspítala) (26.11.21) and verified by number 43/2021 (07.02.22). Also, to the Scientific Research Committee of Landspítali (Vísindarannsóknarnefnd Landspítala) (26.11.21) for a permission to access personal information on the patients from their medical records. Data Protection Authority registry of Iceland (Persónuvernd) registered the study within their system (43/2021, 43/2022). Due to difficulties in data collection extension of the permission was applied for and accepted on behalf of the Ethical Committee. The study was performed in accordance with the Declaration of Helsinki (70).

Results

In Table 4 and 5 the descriptive parameters for the sample, **Subjects5**, are listed. Due to a small sample size the values are also presented as median. The listed parameters are age, ranging from 66 to 96 years, weight in the range of 66.5 to 102 kg, and height in the range of 1.45 to 1.89 m. BMI was in the range of 17.6 to 39 kg/m². For female Subjects5 the average weight was 76.4 kg (median 73.9 kg, range 50.8 - 108.7), or 27% higher than the criteria of 60 kg used for European elderly women when estimating energy needs (1). The average weight of the male subjects was 81.6 kg (median 80.1 kg, range of 66.5 to 102 kg) or quite close to the criteria of 80 kg used for European elderly men when estimating energy needs (1).

Table 4 Descriptive parameters for the sample, **Subjects5**.

	All	SD	Variance	Male	SD	Variance	Female	SD	Variance
Gender [%]	n = 20			n = 12 [60]			n = 8 [40]		
Age [years]									
Mean	82.2	8.17	66.77	82.9	8.52	72.63	81	8.04	64.57
Median	81			84			79		
Range	66-96			66-96			71-93		
Weight [kg]									
Mean	79.5	13.9	193.03	81.6	11.36	129.03	76.4	17.4	302.83
Median	77.3			80.1			73.9		
Range	50.8-108.7			66.5-102			50.8-108.7		
Height [cm]				n = 10					
Mean	172.9	10.16	103.16	179.4	5.36	28.71	164.8	8.8	77.36
Median	174			180.5			167		
Range	145-189			170-189			145-175		
BMI [kg/m ²]				n = 10					
Mean	26.9	5.06	25.6	25.8	4.09	16.72	28.2	6.09	37.08
Median	27.1			26.1			28.2		
Range	17.6-39			20.4-31.8			17.6-39		

Table 5 Descriptive nutritional needs for the sample, **Subjects5**

	All n= 20	SD	Variance	Male n= 12	SD	Variance	Female n= 8	SD	Variance
Fluid need [L]*									
Mean	2.38	0.41	0.17	2.45	0.34	0.12	2.28	0.51	0.26
Median	2.32			2.40			2.22		
Range	1.52-3.26			1.99-3.06			1.52-3.26		
Energy median need [kcal]									
Mean	2267	0.39	0.16	2325	0.32	0.11	2181	0.49	0.25
Median	2203			2282			2104		
Range	1447-3097			1895-2907			1447-3097		
Protein median need [g]									
Mean	107.4	18.81	353.67	110.1	15.33	235.15	103.4	23.65	559.15
Median	104.4			108.1			99.7		
Range	68.6-146.8			89.8-137.7			68.6-146.8		
Fibre median need [g]									
Mean	28.4	4.96	24.66	29.1	4.06	16.46	28.7	6.57	43.1
Median	27.6			28.6			27.7		
Range	18.2-38.8			23.7-36.4			19.1-40.8		

*Based on a recommendation of 30 ml/kg/day

Screening for nutritional risk

Twelve (60 %) of **Subjects5**, ten male and two female, were screened for nutritional status at the ward. The score ranged from two to five (average 3.3 (SD = 1.04, SV = 1.09)). Four had a score of three, three a score of four, three a score of two, one a score of five and one a score of two to seven (median 4.5). The average score of all subjects was 3.2 (SD = 0.94, SV = 0.88). For males, the average score was 3.3 (SD = 0.95, SV = 0.9) and for females the average score was 3.25 (SD = 1.77, SV = 3.13). Five points or more indicates strong likelihood of malnutrition and for these nutritional counselling is recommended.

In notes from the nurse, there were several comments on things relating to malnutrition, weight loss and food intake. Two patients had experienced considered weight loss and four were at risk of malnutrition.

Mouth- and teeth status

Another factor asked for was mouth- and teeth status as it is essential to food intake and nutrition. For two-thirds of the subjects there was a note on this in their hospital record. Five still had their original teeth, seven had both original and dentures or were waiting to get some or new ones. One had dentures but could not use it due to soreness in the mouth.

Concerning dry mouth, seven had dry mouth, five of them men. It is not possible to know what the cause was as it was not listed, nor speculate about possible causes for example the types of drugs taken, if any. It was impossible to connect dry mouth with some factors concerning own teeth, dentures, or both. Those who did not have dry mouth, they had both their own teeth and dentures.

Swallowing

Several notes were made on the question on swallowing tests. Due to the low number of subjects statistical calculations were not done. However, for the current sample, swallowing was normal for four patients, for most parts or reduced to a little extent for four patients, eight had a diagnosis of swallowing difficulties and five had not undergone swallowing test.

Reason for selection of dietary texture

The distribution of the different texture modifications was eight M1 40 % (male=5), four M2 20 % (male=5), five M3 25 % (male=4) and three F4 15 % (male=1).

In the questionnaire, the was asked for the reason for the selection of a modified diet. The most common causes were difficulty swallowing and choking risk (n=9), difficulty chewing and poor teeth status (n=2), stroke (n=4), Parkinson's (n=1), aspiration (n=2) and other (n=2).

Other information

One patient had difficulty eating because of bad sight but that patient received extensive help at mealtimes. For one a soft diet was ordered due to two previous choking incidences. However, in a conversation with the researcher the patient stated clearly that he believed that this previous incidence was not a reason for concern anymore. One patient had been on an F4 diet for eight weeks and was feeling extremely low because of that and her general health situation.

Additional information recorded by nurses included information on possible risk of diarrhoea, possible risk of malnutrition (n=3). Also, patients had a low appetite,

cognitive disfunction and dementia, all factors that relate strongly to less or dysfunctional food consumption.

Nutrition Day Questionnaire

For the first question, how did you like the food at the hospital, 90 % (n=18) find the food “very” or “rather good”, eleven found it rather good but seven very good. Only 10 % (n=2) “rather bad” or had no opinion. 50 % (n=11) find the food “always appetizing” and if taken together those that found “most food” and the meals “always”, and “sometimes appetizing”, the result was 80 % (n=15). 20 % (n=4) did not find the food appetizing.

Concerning if the food and meals were healthy or not, 20 % (n=4) found the food “always healthy”, 35 % (n=7) “sometimes”, 35 % (n=7) “don’t know”, but 10 % (n=2) “did not find the food healthy”. One subject replied by “I hope so”, one by “probably” and two were uncertain and replied in between “always and sometimes”.

For the question of the amount of food served on the plate, 35 % (n=6) found “too much food” or “at most” served but 65 % (n=13) found the amount “reasonable”. No one regarded the portion too small.

Seventy percent (n=14) always got the meal they asked for. Taken together 85 % (n=16) did get it “always” and “almost always”. 15 % (n=3) did not get the meals they asked for.

Less than 10 % (n=2) of the respondents reported having specific dietary needs other than TMFD, 86 % (n=18) did not and 5 % (n=1) was not sure. Concerning the question, “if the food met their needs”, 50 % (n=10) found the meals always meet their needs but only 10 % (n=2) responded by no. According to the results, about 90 % (n=18) of the patients were rather positive towards the food and regarded it meet their needs “always”, “sometimes” and between these.

Two-thirds (n=13) of the patients had never been unable to eat. Only eight patients responded in some way to the question “if they were offered another meal” if they were not able to eat. Three of them responded by “I don’t know”. Only one of these responded that he / she was “not offered another meal”.

Sixty percent (n=13) did not need any help to eat, and out of the eight (14 %) that needed help, five always got help when needed but three reported not getting the help they needed.

For the final question on the food service at the ward 95 % (n=19) regarded the manner on behalf of ward staff “very good” or “good” but one was unsure.

Table 6 Results for the nDayQ.

Question	Q#	Very good	Rather good	Rather bad	Very bad	No opinion	Don't know
How is the food	1	7	11	1		1	
Manner at ward	11	18	1				1
		Yes, always	Yes, sometimes	No	Did not want	No opinion	Don't Know
Is food appetizing	2	10	6	4			
Is food healthy	3	4	7	2			7
Food you ask for	5	14	3	3			
Meets your needs	7	10	8	2			
Offered another meal	9	1	2	1	1		3
Help if needed	10	5		3	12		
		Too much	Reasonable	Too little			
How much food	4	7	13				
		Yes	No				Don't know
Special needs	6	2	17				1
Unable to eat	8	7	13				

Q# = question number

To get a clearer picture of the responses to the nDayQ, Table 6 was created. In cases where the patient answered the question by an answer that was not a standard one, the response was merged into another answer that suited the best. The number in second column denotes the number of the question but the latter numbers, the number of patients responding to each possible answer to each question. From this representation it is clearly seen that the responses were on the positive side rather than negative.

Responses to the nDayQ were also transferred into a point scale. The most positive response to each question gave the highest score, for example in question one where there were five possible choices, very good was equal to five points and no comment one point. Where the responses were only three, the most positive answer was equal to three points. The highest possible score was 45 points and the highest average score possible was 4.09 points.

Quality Assurance Questionnaire

The results of the QAQ concluded that 45 % (n=9) consumed their meals always or most often in their bed. When asked further, 50 % (n=10) had the meals in their room “always” or “most often”, but almost 45 % (n=9) in the dining area with other patients. One patient

answered by “it varies”. But as mentioned above, for most of the wards included in this study, the patients are encouraged to dine outside their room with others when possible.

In 90 % (n=18) of cases the cutlery and cups suited the patients, only two (10%) were offered and used cutlery and cups that did not suit them. In a discussion with the subjects, the specific cup was helpful to drink from.

Eighty-five percent (n=15) of the respondents find the menu suits their needs well or at most. Less than 10 % (n=2) did not feel so and 5 % (n=1) were unsure, two were unsatisfied with their meal texture.

Concerning the question on the appearance of the meal. 40 % (n=8) find it very good and good and 30 % (n=6) alright. Total of 70 % (n=14), were rather positive. 20 % (n=4) were less positive and 10% (n=2) were not sure about their answer to this question. This question had the broadest range in answers.

When answering about the temperature of the meals, 50 % (n=10) regarded the meals hot enough, 20 % (n=4) responded by “most of the time” and other 20 % (n=4) “sometimes”. 10 % (n=2) find the meals not hot enough.

According to the answers of 70 % (n=14) the smell of the food is alright in general, but some were a little less positive and responded by “most of the time” these were 20 % (n=4). Two (10 %) were unsure.

For the questions on specific entries of the meals. The fish was regarded alright or appropriate in 70 % (n=11) of the responses. 30 % (n=9) were less positive and found it too thick, dry, not stable enough in consistency or had not received fish yet. For the meat 82 % (n=14) regarded it alright or appropriate showing a greater or 12 % more than the fish. 18 % (n=3) did not want ground meat, had not received it yet or find it too unstable (n=1).

For the side entries vegetables and potatoes. 81 % (n=13) were satisfied with the vegetables but those who were not stated that they preferred vegetables with regular consistency. Three were on M1 diet and one on M3. M1 receive vegetables that are identical to regular vegetables in consistency, but the types are different in the way that hard types, peas and beans are omitted. However, M3 need and receive mixed vegetables. Fresh vegetables are not served at these diet types, but one subject (M1) asked for fresh vegetables.

For the timbals, 25 % (n=5) find it “all right”, no one disliked it but 55 % (n=11) did not receive it, did not remember having it or were not sure. One found it a change to have it but three were not sure. The potatoes (M1 diet) and mashed potatoes (M2, and M3 diet) were in general well-liked by the patients but 90 % (n=14) find it all right, one patient found it too thick, and one did not like it.

The broth soups were regarded “alright” and “suitable” by 75 % (n=15) of the patients two find it too thick but these were on M1 diet. Other comments 25 % (n=3) were sometimes suitable, did not get and find particles in it (M3 diet). The milk soups were regarded “alright” and “suitable” by 75 % (n=15) of the patients only one find it too thick (M1). Other comments (n=4) were sometimes suitable, did not get and find particles in it

(M3 diet). For the fruit compote delivered with cream 75 % (n=15) find it “alright” and “suitable”. Five had not yet tried it and one had found particles in it (M3 diet).

The last part of the questions for specific food items regarded snack items, such as cakes, bread, cold cuts, and milk products.

For cakes, 56 % (n=10) find it all right, 10 % (n=2) not “alright”, and for 33 % it was regarded “not suitable. For bread almost 70 % (n=12) find it all right, 17 % (n=3) “not alright”, and 17 % (n=3) did not get bread. For the question on cold cuts, 72 % (n=13) find it “alright”, two did not and three did not receive it.

For the cold snacks, skyr, yogurt and puddings. For skyr, 35 % (n=7) find it “alright”, 10 % (n=2) did not find it “alright”, 30 % (n=6) did not get it and 25 % (n=5) either could not eat skyr during the admission or never eat it. According to the definition, all textures can have skyr, so the abstinence was more related to dislike rather than a texture issue.

For the yogurt, close to 55 % (n=10) find it “alright”, 26 % (n=5) did not get it and 21 % (n=4) cannot eat it. According to the definition, only F4 cannot have regular yogurt so the abstinence is either related to texture issue or dislike.

Puddings should be suitable for texture modified diets and 58 % (n=11) regarded it as “alright”. 26 % (n=5) and 16 % (n=3) either did not get pudding or did not think they could eat.

For drinks, questions were asked on various types. 80 % (n=16) did not have difficulties drinking water, coffee, or tea. Four did get their drinks mixed with thickening agents as a standard. 85 % (n=17) stated that fruit juices were alright, and three got these thickened. For this age group and study population, not all drink carbonated drinks and for this sample it was 50 % (n=10) but 50 % (n=10) did so with ease. 90 % (n=18) received nutrition drinks at the ward and regarded these as “alright”. 60 % (n=12) find thickened drinks “alright” but 40 % (n=8) did not receive that type of drink.

Fortunately, few reported experiencing the abnormal or strange flavour of food and drinks, but only 11 % (n=2) found this; another 10 % (n=2) found this sometimes, but 80 % (n=15) never. For those five that responded by “yes” three regard this affecting their appetite two did not.

For the question “Do you always know what you are eating”, yes responded 37 % (n=7), no 42 % (n=8) and 21 % (n=4) responded by “most of the time”.

For the final question concerning whether a menu on the tray would be helpful with meals, 50 % (n=9) responded with yes, 30 % (n=6) no and 20 % (n=4) doubted or were not sure.

Open questions

For the open questions in QAQ several personal comments came forth and were of interest. A positive notion, “not at all bad food” was received by one patient.

For question one, one patient on M1 mentioned his bad sight and that he also had no olfactory, but he always got proper assistance at ward and answers when he asked

what was on his plate and he was always able to consume large proportions of his meal. One patient on M3 diet, commented on the mashed potatoes that it was dry. Same patient would like to have more cream and butter and cheese higher in fat, however this patient was not supposed to get cheese in slices and the cheese at the ward is 26%. The same patient longed for more fish meals in general but particularly fried fish and onion, he/she had ice cream at home, and it suited well. To clarify, the three last mentioned food items are not served on M3-diet as it is not regarded as suitable. Four patients mentioned that their diet was very monotonous in variation and appearance, one of them was on F4 diet.

One on M1-diet mentioned that he/she needed to clear throat sometimes and food and drink disturbs swallowing, this patient did not have swallowing assessment at that time. One mentioned that despite the thermos system newly renovated, there was no change in meal temperature. In his/her opinion the sauce was most often warm enough and the vegetables alright, but soups and sauces sometimes too cold.

One mentioned that she did not need M2-diet despite some difficulties swallowing, but she mentioned that her sense of taste was altered. One was on M1 diet because of a previous incidence where he got choked on a tough piece of meat. That patient believed he no longer needed texture modification, mentioned vegetables and fruit specifically and wished for regular cooked vegetables not mixed. The temperature was also of stake and the food too cold.

One on M2 commented on the amount of food and that the serving was too large, but liked the soups and did always manage to finish it. Some cared for more vegetables and fruits, while others didn't care for it, one patient would also like to have less milk-based soups on the menu. M3 fish was not regarded appetizing by one subject.

One, receiving M1, commented on the vegetables, feels it tough for him to chew. He did not ask for food if his food was missing and was not offered a substitute meal at the ward. One commented on the meat, and it had been insufficiently mixed.

Two mentioned being nauseated and a few mentioned taste alterations and one missing olfactory these factors were not studied further in the current study. Only one commented specifically on the utensils (spoon and cup) and that it was not suitable.

Concerning the question if a menu on the meal tray would help to know what was served, only one responded specifically to it and believed it would help.

Comparison of results from nDayQ and QAQ

There were no identical questions between the nDayQ and QAQ as the second one was created to assess factors not questioned in the nDayQ for further quality assessment on the TMD of Landspítali. Therefore a comparison between answers to specific questions cannot be done comparing the similarities in answers and checking for the validity of QAQ. However, a comparison of the scores can be done on terms of the satisfaction rate calculated out of the responses to the questions by transferring responses into a point scale described above. As the total score possible in the QAQ was much higher than in nDayQ the comparison based on average scores of the total sample, male, and female.

One possible comparison between the two questionnaires can be made based on question three in QAQ, “Did the diet type suit your needs?” and question seven in nDayQ, “Do you think the food you get suits your needs?”

In QAQ, 85 % (n=15) of the respondents found that the menu suits their needs well or at least. Less than 10% (n=2) did not feel so, and 5% (n=1) were unsure, two were unsatisfied with their meal texture. For this question in the nDayQ, 50% (n=10) found “the food always met their needs”, and 20% (n=4) “sometimes”. Two responded by no, or 10%, four subjects had difficulty answering the question with yes or no or always and never. By adjusting these answers to “always” and “sometimes” and in between, 90% believed that the meals suited them. This shows a certain consistency in the answers.

Table 7 Numerical results and comparison of nDayQ and QAQ.

	NdayQ All	NdayQ male	NdayQ female	QAQ All	QAQ male	QAQ female
<u>Total score</u>						
Mean	30.5	29.04	32.85	56.5	57.1	55.6
Median	29.5	29.0	34.75	57.8	59.5	57.3
Range	20 - 41	23 - 34.5	20 - 41	31 - 71.5	34 - 68	31 - 71.5
SD	5.14	3.56	6.5	10.73	9.19	13.34
SV	25.38	12.66	42.99	115.1	84.58	177.91
<u>Average score</u>						
Mean	2.96	2.86	3.11	2.05	2.02	2.08
Median	3.03	2.8	3.17	2.1	2.14	2.03
Range	2 - 3.73	2.18 - 3.4	2 - 3.75	1.21 - 2.47	1.21 - 2.35	1.9 - 2.47
SD	0.42	0.36	0.5	0.25	0.29	0.19
SV	0.18	0.13	0.25	0.06	0.09	0.03

In Table 7, the total and average scores for nDayQ and QAQ are compared for the total sample, male and female. According to the nDayQ, the female subjects are slightly more satisfied than the male subjects or 11.6 % based on mean total score and 8 % based on mean average value. On the other hand, in the QAQ where more specific questions on content and quality of meals, the male subjects are slightly more satisfied based on mean total score or 2.6 % but slightly less or 2.9 % based on mean average score. As standard deviation is low, it indicates that the values are generally close to the mean or average values. The variance is rather low for all results, indicating that the values are generally similar and do not vary widely from the mean. For the female subjects however, the variance is greater as a result from a comparatively high score by one subject.

Weighed leftovers

The results of weighed leftovers from a total of 104 patients and 305 meals are presented below. Detailed results are only presented for those who had three and more meals weighed, see tables 8 - 17. F4 (thick liquid texture) meals are included in all assessments except on the amount of sauce as no sauce is served on F4.

One meal

Forty-two subjects (29 male, 13 female) had one meal tray weighed in the study, these were either, breakfast (6), lunch (28) or dinner (8), of all four textures. Only one left all the food (425 kcal and 9 g of protein) but four managed to finish all their food, all lunch meals, and three meals were almost finished (≥ 90 % of energy). Eight of the meals were F4 (thick liquid diet), and consumed energy was in the range of 8 – 100 %, with an average and median intake of 55 % and 61 % and 11 – 100 % for protein, with an average and mean intake of 47 % and 31 % of that provided in the meal.

On average, the women tended to consume larger proportion of both energy and protein provided by the meals compared to the men or about 5 % more.

Two meals

Sixteen subjects (7 male, 9 female) had two meals weighed in the study, the meals assessed were breakfast (6), lunch (11), mid-day snack (4), dinner (7) and evening snack (4), of all four texture. Four out of 32 meals were finished (three breakfasts and one mid-day snack) but three were left untouched, these were all a mid-day snack for M2, M3 and F4 that were not removed from the lunch tray to be served in the middle of the day. The untouched mid-day snacks were worth from 215 – 310 kcal and 17.5 – 30 g protein. Three evening snacks for M2, M3 and F4 were left on the tray and assessed the lost calories and protein for the patients were in the range of 60 - 220 kcal and 1 – 10 g protein. Six of the meals were F4 (thick liquid diet), consumed energy was in the range of 0 – 100 %, with average and median intake of 34 % and 25 % and 0 – 100 % for protein with average and mean intake of 33 % and 18 % of that provided in the meal.

On the average, the women tended to consume a slightly larger proportion of both energy and protein provided by the meals compared to the men or about 1.5 - 2% more.

Three meals

Seventeen subjects (7 male, 10 female) had three meals weighed in the study. These included all five types of meals, and all textures were included. Three out of 51 meals were finished (two breakfasts and one lunch), and two were left untouched.

Table 8 Proportion of energy and protein content of the breakfast, lunch and dinner meals consumed for three meals.

3 meals	Breakfast Energy %	Breakfast Protein %	Lunch Energy %	Lunch Protein %	Dinner Energy %	Dinner Protein %	All meals Energy % Average %	All meals Protein % Average %
All	36 – 100	0 – 100	19-100	3 – 100	14 - 75	6 - 73	54	50.1
Women	47 – 100	34 – 100	19-100	3 – 100	14 - 73	23 - 73	57.7	56.2
Men	36 – 49	0 - 78	24-92	15 – 79	17 - 75	6 - 64	48.5	41.2

In Table 8, the range of proportion of energy and protein consumed is recorded for the meals assessed divided into breakfast, lunch and dinner. Also, the average proportions for energy and protein of all meals (including the two snacks) for all meals, women and men. On average, the women tended to consume a larger proportion of both energy and protein provided by the meals compared to the men or 9 % and 15 % for energy and protein, respectively.

Men in this group were more likely to leave both energy and protein, 42 % more energy and 13 % more protein than the women.

Four and more meals

Twenty-nine subjects (16 male, 13 female) had four or more meals weighed in the study, the number of meals for each subject ranged from four to thirteen (four meals = twelve, five meals = five, six meals = two, seven meals = two, eight meals = one, nine meals = three, ten meals = two, thirteen meals = one). These included all five types of meals and all textures. Total of 167 meals were assessed. Twenty-seven meals were finished completely (eight breakfasts, nine lunches, one snack and nine dinners) and nine left untouched completely (two lunches and seven mid-day snacks).

Table 9 Proportion of energy and protein content of the meals consumed for breakfast, lunch and dinner for four meals and more.

4 meals & more	Breakfast Energy %	Breakfast Protein %	Lunch Energy %	Lunch Protein %	Dinner Energy %	Dinner Protein %	All meals Energy % Average %	All meals Protein % Average %
All	12 – 100	2 - 100	9-100	0 - 100	10-100	5 - 100	65.6	68.5
Women	12 – 100	2 - 100	0-100	0 - 100	16 - 95	5 - 100	56.5	58.6
Men	12 – 100	15 - 100	0-100	0 - 100	10-100	27-100	71.4	74.8

In Table 9, the range of proportion of energy and protein consumed is recorded for the meals assessed divided into breakfast, lunch and dinner. Also, the average proportions

for energy and protein of all five meals for all, women and men. Men were consuming about 71 % of energy and 75 % of protein provided in meals when the numbers for women were 56% and 59 % for energy and protein respectively or 21 % less for both.

Table 10 Proportion of sauce left on trays for four meals and more.

	Total trays (n=105)	M1 (n=35)	M2 (n=17)	M3 (n=53)
4 meals & more	%	%	%	%
Range	0 - 100	0 - 93	0 - 100	0 - 87
Average	22.7	14	43.5	21.7
Median	0	0	43	8

Upon assessment of the amount of sauce that was left on the trays, the result in Table 10 shows that out of the 105 lunch and dinner trays an average of 23 % of the served sauce of 1.2 dl was not consumed. For M1, twenty-four finished all their sauce (68 %), for M2 four did (24 %) and for M3, 25 did (47 %).

The subjects of the study, Subjects5

Twelve subjects (7 male, 5 female), hereafter named Subjects5, who participated in the study by answering the questionnaires and allowing their data to be collected from the SAGA system, also had their meal trays assessed and weighed. These were all also included in the separate assessments that were made dividing all patients with weighed meals into groups based on number of meals assessed.

All textures were included, but not all type of meals, missing out on mid-day snacks but seven breakfasts, 33 lunches, seven dinners and one evening snack were assessed. Each Subject5 had at least one lunch assessed but the number of assessed meals was in the range of one to nine, a total of 48 with an average of four meals (mean 3.5). Ten out of 48 meals were finished, nine almost finished ($\geq 90\%$), and no meal was left untouched. Only one snack meal was returned on the meal tray, showing that for most parts patients had the chance to enjoy their snacks later in the day.

Table 11 Proportion of energy and protein content of the breakfast, lunch and dinner meals consumed for **Subjects5**.

Subjects5	Break-fast Energy %	Break-fast Energy %	Lunch Energy %	Lunch Protein %	Dinner Energy %	Dinner Protein %	All meals Energy % Average %	All meals Protein % Average %
1 - 4 meals								
All	12-100	2 - 100	12-100	13-100	22-100	12-100	74.7	75.4
Women	12-100	2 - 100	12 - 90	13 - 89	22 - 84	12 - 96	47.8	45.2
Men	50-100	74-100	33-100	21-100	100	100	84.3	87.5

In Table 11, the range of proportion of energy and protein consumed is recorded for the meals assessed divided into breakfast, lunch and dinner. Also, the average proportions for energy and protein of the same meals and the one evening snack for all meals, women and men. The results show that the men consumed a substantially larger part of the energy and protein provided in the meals than the women or 36 % more calories and 42 % more of protein.

Table 12 Lost calories and protein for **Subjects5**.

	Lost calories	Lost protein
Subjects5 1-4 meals	Kcal	G
Total	6.545	255
Average per meal	170	6.8
Women	285	12.2
Men	120	4.3

In Table 12, calories and protein that were left from the meals are listed for all trays, women and men. Over 6.500 calories and over 250 g of protein were wasted in total. Women more likely to leave both energy and protein, over twofold more energy and three times more protein than the men.

Table 13 Instances of energy and protein intakes, at and above 76% and at and below 25% for **Subjects5**.

	Energy and protein $\geq 76\%$	Energy and protein $\leq 25\%$
Subjects5 1-4 meals	%	%
Total	63.5	11.5
Women	23.1	38.5
Men	78.6	1.4

In Table 13, it is shown that the men were almost three times more likely to have their energy and protein intake at and above 76 % of that provided in the meals, than the women. Concerning intake of energy and protein at and below 25 %, the women were almost 40 % more likely to have energy and protein below, compared to men.

Main results of the study

In the following tables and text, the main findings of the study are presented.

Table 14 Energy, protein and fibre need, assessed intake and proportion of need/day for **Subjects5**.

Sex	Needed Energy Kcal/day	Intake Energy Kcal/day	% of need	Needed Protein G/day	Intake Protein G/day	% of need	Needed Fibre G/day	Intake Fibre G/day	% of need
Woman	3.100	429	14	147	14	9.5	39	1.6	4
Woman	2.435	626	25.5	115	26	22.5	30.4	7.2	23.5
Woman	1.850	216	11.5	88	12	13.5	23.2	2.4	10.5
Woman	2.140	974	45.5	101	45	44.5	26.7	6.9	26
Woman	1.905	317	16.5	90	10	11.5	23.9	0	0
Man	2.910	1.002	34.5	138	55	39.5	36.4	2.6	7
Man	2.180	889	41	103	31	30	27.3	7.6	28
Man	2.510	565	22.5	119	29	24	31.4	2	6.5
Man	2.810	1.288	46	133	62	46.5	35.1	5.2	15
Man	2.100	979	46.5	100	56	56	26.4	10.7	40.5
Man	1.925	1.010	52.5	91	56	61.5	24.1	2.4	10
Man	2.550	710	28	125	36	29	31.9	4.9	15.5
W med	2.140	430	16.5	101	14	13.5	26.7	2.4	10.5
M med	2.510	980	41	119	55	39.5	31.4	4.9	15
Median	2.310	800	31	109	34	29.5	29	3.8	12.8

In Table 14, the calculated energy (27 - 30 kcal / kg body weight / day), protein (1.2 - 1.5 g / kg body weight/day) and fibre need (12.5 g / 1.000 kcal / day) of each subject are presented. Energy and protein need is based on body weight, and fibre needs based on estimated caloric needs. As the calculations are based on a range and a low number of subjects, values are based as median values rather than average. The range in daily caloric and protein need was 1.850 – 3.100 kcal and 1.925 – 2.910 kcal and 88 – 147 g and 91 – 138 g for women and men respectively. For fibre the need was in the range of 23 – 39 g and 24 – 36 g / day for women and men respectively.

Also presented, based on weighed leftover food, the total estimated intake of energy, protein and fibre, and the proportion of calculated need vs. intake. As all subjects did not have all types of meals weighed within a one-day period, daily meals are made of examples of meals from separate days. In cases where there were several, for example, breakfast meals that were weighed, an average number was used for calories, protein and fibre and the average number used for estimation of a one-day intake.

Table 15 Energy, protein and fibre need, assessed intake and proportion of need according to the meals that were used for the assessment for **Subjects5**.

Sex/%	Proportional Needed Energy Kcal/day	Intake Energy Kcal	% of need	Proportional Needed Protein G/day	Intake Protein G/day	% of need	Proportional Needed Fibre G/day	Intake Fibre G/day	% of need
F 80%	2.480	430	17	117	14	12	31	1.6	5
F 55%	1.340	625	46	63	26	41	17	7.2	43
F 30%	555	215	39	26	12	45	7	2.5	34
F 90%	1.925	975	50	91	45	49	24	7	29
F 30%	570	315	51	27	11	39	7	0	0
M 80%	2.330	1.000	43	110	55	49	29.5	2.6	9
M 55%	1.200	890	74	57	31	55	15	7.6	51
M 30%	755	565	75	36	29	80	9.5	2	21
M 55%	1.545	1.290	84	73	62	85	19.5	6.2	27
M 55%	1.060	1.010	95	50	56	112	13	2.5	18
M 30%	765	719	93	37	36	97	9.5	5	51
F med			46			41			29
M med			80			83			24
Median			51			49			27

In Table 15, for more precise presentation of proportional intake vs. need the estimated proportion of intake is calculated in relation to the number of meals that were assessed. The proportions of the daily energy per meal used are breakfast 25 %, lunch 30 %, dinner 25 % and snacks 10 % each. For example, if only breakfast, lunch and dinner are assessed, the calculations of proportional intake are based on 80 % of needed calories, protein and fibre and based on values in Table 15.

In cases where there were several, for example breakfast meals that were weighed, an average number for these breakfast meals was used for calories, protein and fibre. As the calculations are based on a range and the low number of subjects, values are based on median calculations.

Table 16 Estimated total and proportional intake of energy, protein and fibre, for four meals and more.

4 meals & more		Estimated of total intake Energy %	Estimated of total intake Protein %	Estimated of total intake Fibre %	Estimated Proportional intake Energy %	Estimated Proportional intake Protein %	Estimated Proportional intake Fibre %
W 4m+	Mean	46.7	17.5	51.9	66.2	22.4	36.1
W 4m+	Median	53.4	16.6	50.5	61.2	21	36.4
W S5	Median	16.5	13.5	10.5	46	41	29
M 4m+	Mean	39.3	12.8	46.9	53.1	17.6	34.6
M 4m+	Median	40.2	7.7	42.5	52	11.8	35.5
M S5	Median	41	39.5	15.0	80	83	24

In Table 16, for a more precise presentation of proportional intake vs. need the estimated proportion of intake is calculated in relation to the number of meals that were assessed. According to these results, the male **Subjects5** consumed 80 % of their estimated proportional need for energy and 83 % of protein while the numbers for female **Subjects5** were 46 % and 41 %, respectively. However, the female **Subject5** consumed a slightly higher proportion of the fibre needed than did the male subjects.

When comparing the numbers for male 4+ meals and **Subjects5**, there is a large difference in median proportional intake, 52 % vs. 80% for energy and 12 % vs. 83 % difference for protein. For the females the difference was less or 61 % vs. 46 % and 21 % vs. 41 % for protein.

Summary of all results

Table 17 Proportion of energy and protein content of the meals consumed for breakfast, lunch and dinner for all categories of assessed meals.

Number of assessed meals	Break-fast Energy %	Break-fast Protein %	Lunch Energy %	Lunch Protein %	Dinner Energy %	Dinner Protein %	All meals Energy % Average %	All meals Protein % Average %
1 meal								
All	0 - 63	0 - 67	6 - 100	6 - 100	22-100	2 - 100	57.2	56.8
Women	57 - 63	58 - 67	24-100	19-100	28 - 65	19 - 90	60.6	60.2
Men	0 - 56	0 - 54	6 - 100	6 - 100	22-100	2 - 100	55.5	55.1
2 meals								
All	65-100	70-100	11 - 88	10 - 83	22 - 80	17 - 76	48.6	48.7
Women	65-100	70-100	25 - 88	63 - 83	22 - 80	19 - 76	49.2	49.4
Men	100	100	11 - 68	10 - 79	46 - 69	66 - 70	47.8	47.7
3 meals								
All	36-100	0 - 100	19-100	3 - 100	14 - 75	6 - 73	54	50.1
Women	47-100	34-100	19-100	3 - 100	14 - 73	23 - 73	57.7	56.2
Men	36 - 49	0 - 78	24 - 92	15 - 79	17 - 75	6 - 64	48.5	41.2
4 meals +								
All	12-100	2 - 100	9 - 100	0 - 100	10-100	5 - 100	65.6	68.5
Women	12-100	2 - 100	0 - 100	0 - 100	16 - 95	5 - 100	56.5	58.6
Men	12-100	15-100	0 - 100	0 - 100	10-100	27-100	71.4	74.8
Summary								
All							56.4	56.0
Women							56.0	56.1
Men							55.8	54.7

In Table 17, the range of proportion of energy and protein consumed is recorded for the meals assessed divided into breakfast, lunch and dinner. Also, the average proportions for energy and protein of the same meals and the one evening snack for all meals, women and men. The results show that for the total sample, the women consumed a slightly larger part of the energy (1 %) and protein (2.5 %) provided in the meals than the men.

Over 62.100 calories and little over three kg of protein were wasted in total. Women were slightly more likely to leave both energy and protein than men, more so of protein.

Concerning energy and protein intake at and below 25%, women were about 25 % less likely to have energy and protein below, compared to men.

Table 18 Overview of intakes of all subjects that had leftovers weighed and grouped by type of food texture.

Meal type	Number of meals	% of calories consumed range	% of calories consumed mean	% of calories consumed median	% of protein consumed range	% of protein consumed mean	% of protein consumed median
M1	85	15 - 100	72.1	77.3	15.2 - 100	69.6	78
M2	62	5.8 - 100	50.7	47.5	1 - 100	50.8	51.4
M3	89	0 - 100	63.2	71.9	0 - 100	66.7	76.3
F4	69	0 - 100	46.9	48.8	0 - 100	49.6	44.7
All	305		58.2	61.4		59.2	62.6

Presented in Table 18, results of the assessment of percent of consumed calories and protein provided in all leftover trays for all types of meals, M1, M2, M3, and F4. Included are the meals that were left unfinished, a total of fifteen meals. Thirty-nine meals were finished. On average, the M1 meals were finished to a greater extent concerning both calories and protein. M3 meals were second, M2 meals third and F4 meals the least.

Table 19 Energy, protein and fibre, assessed intake and proportion of daily need

Sex	Energy Needed Kcal/day	Energy Intake Kcal/day	% E*need	Protein Need g/day	Intake Protein g/day	% P* need	Needed Fibre g/day	Intake Fibre g/day	% F*need
Female*	3.100	429	13.0	146.6	14	9.5	38.8	1.6	4.1
Female*	2.140	974	45.5	101.3	44.9	44.5	26.7	6.9	26
Female	2.140	935	43.7	101	57.2	56.6	26.7	9.2	34.5
Female	2.140	780	36.4	101	54	53.5	26.7	1.1	4.1
Female	2.140	727	34	101	23.4	23.2	26.7	6.1	22.8
Female	2.140	390	18.2	101	19.9	19.7	26.7	2.2	8.2
Female	2.140	1.224	57.2	101	63.6	64	26.7	10	37.5
Female	2.140	817	38.2	101	80.3	79.5	26.7	4.4	16.5
Female	2.140	579	27.1	101	33.7	33.4	26.7	2.9	10
Female	2.140	575	26.9	101	53.9	53.4	26.7	0.3	1.1
Female	2.140	1191	55.7	101	77.7	76.9	26.7	7.2	27
Male*	2.910	1002	34.4	138	54.6	39.6	36.4	2.6	7.1
Male	2.510	459	18.3	119	11.4	9.6	31.4	4.1	13
Male	2.510	1.093	43.5	119	55.1	46.3	31.4	1.4	4.5
Male	2.510	1.509	60.1	119	58.4	49.1	31.4	8.8	28
Male	2.510	320	12.7	119	11.2	9.4	31.4	2.5	8
Male	2.510	951	37.9	119	83.8	70.4	31.4	2	6.4
Male	2.510	455	18.1	119	26	21.8	31.4	2.3	7.3
Male	2.510	919	36.6	119	48.5	40.8	31.4	6	19.1
Male	2.510	760	30.0	119	44.2	37.1	31.4	1.3	4
Male	2.510	1.353	53.9	119	82.2	69.1	31.4	9.6	30.6
F med	2.140	780	36.4	101	53.9	53.4	26.7	4.4	16.5
M med	2.510	935	35.5	119	51.6	40.2	31.4	2.6	7.7
Median	2.510	817	36.4	119	53.9	44.5	31.4	2.9	10

*Subjects answering questionnaires and providing information on physical parameters.

In Table 19 the weighed intake and proportion of energy and protein intake for all subjects that have a registration for three or more meals are listed. A total of eighteen subjects, nine male and nine female, are included in this group, in addition to the three that were subjects of the main study and had their needed energy and protein based on their body weight; these are labelled with a *.

The meals that are included in the calculations are breakfast, lunch, dinner and/or snacks (including average meals, i.e. an average of, for example, two or more breakfast meals) and an example made from, for example, lunch and dinner from one day and a breakfast meal from the next day. For the subjects; twelve were regarded as having 65 % of total meals served (men=5, women=7), two were regarded as having 75 % of total meals served (men=1, women=1), four were regarded as having 80 % of total meals served (men=2, women=2), and three were regarded as having 90 % of total meals served (men=2, women=1). For subjects that are not included in the questionnaire part and therefore don't have registered body weight for more precise energy and protein need calculations, the average energy needed from the current study is used for each sex. For women, the median need for energy and protein are 2.140 kcal and 101 g, respectively, and for the men, the numbers are 2.510 kcal and 119 g protein per day.

As there are not a total of five meals per day for each patient same proportional calculations are undertaken, using the following percentage for each meal, where the percentage is the proportional size of each meal in the total day. Breakfast 25 %, lunch 30 %, dinner 25 %, two snacks, each 10 %.

For male **Subjects5** (n=12) the average body weight was 81.6 kg (median 80.1 kg, range 66.5 - 102 kg), a similar weight as the 80 kg criteria used for European elderly men, or only 2 % higher. For female **Subjects5** (n=8) the average weight was 76.4 kg (median 73.9 kg, range 50.8 - 108.7), or 27% higher than the criteria of 60 g used for European elderly women. The average weight of **Subjects5** (n=20) was 79.5 kg (median 77.3 kg, range 50.8 - 108.7).

The median energy need for females of the study was 2.140 kcal, that falls close to midway between NNR 2023 (1) energy recommendations for women of medium and high activity, i.e. PAL 1.6 and 1.8. The median of these values is 2.105 kcal / day and 2.080 kcal / day for 51 - 71 years and >70 years, respectively. For the men the median energy need was 2.510 kcal / day, just about 100 kcal less than the median of NNR 2023 (1) recommended need for men of medium and high activity, i.e. PAL 1.6 and 1.8. The median of these values is 2.620 kcal / day and 2.650 kcal / day for 51-71 years and >70 years, respectively.

Discussion

In this study selected elderly patients ($\leq 67+$) on TMD at Landspítali were surveyed on their meals and opinion on the meal service, using two different questionnaires. Necessary parameters for assessment of their energy, protein, fibre and fluid needs and factors concerning food intake from the food services were collected. Along with this weighing and assessment of leftover food from 305 meal trays from patients on TMF was undertaken.

Overall, the surveyed patients, **Subjects5**, were satisfied with their meals and service provided by the food services and pleased about the ward staff. According to the nDayQ the satisfaction was up to 11 % higher among the female subjects than male. However, according to the QAQ, assessing specifically content and quality of meals the male subjects were on average just a little more satisfied. Few of the **Subjects5** were unsatisfied about their diet order and believed that TMD was not correct in their situation.

Subjects5 of the study were elderly people that usually are grateful for what they are provided with and most often won't complain or talk negatively about the ward staff or that it did not attend to their needs. This is mentioned specifically as negative talk has been reported on in some studies and described that many patients won't ask for help or anything extra as the ward staff is always so busy (45). However, of a concern, as many wards at Landspítali are staffed with non-native speaking Icelanders, for the care to be at its best, including nutritional care, patients and all ward staff must be able to communicate efficiently, without misunderstanding and frustration. Also, nutritional knowledge must be at certain level for staff to be able to better support the patient in terms of proper nutrition. Therefore, should the kitchenets at the wards be run by the food services and staffed with nutritionally trained personnel also by the food services.

From verbal communication in the open questions with **Subjects5** several personal comments were made as stated in the results chapter. None of these comments were striking and all were respectful. The researcher in fact expected more negative feelings in this last part where the subjects could speak freely, and the conversation was almost at the end.

The positive notions were "not at all bad food" and that it was easy to get assistance at mealtimes and answers to question concerning the food on the tray for those that had bad or no eyesight. Sometimes patients were asking for food items and cooking methods that were not allowed on their menu due to their swallowing limitations.

A quarter of the patients mentioned that their diet was very monotonous in variation and appearance. In fact, this knowledge was one of the underlying reasons for this study to get more data on the issue to justify that changes would benefit the patient populations to come.

Temperature of meals is one of the key quality assurances the food services need to ensure for all hot meals on a daily basis. Temperature is also an important factor

especially when meals are texture modified, as some level of softness is dependent on it. Temperature of meals was mentioned, not specifically in relation to that texture of his meal was altered but more on means of comparison of before and after the new thermos system as he noticed no improvement especially in soups and sauces. As the improvement only reached the hot meal heating system and new isolation unit for each plate, not the soups, this comment was correct. Concerning the sauce, it is served in a small bowl made of rather thin glass and then placed on the plate with the other meal items and then closed with the helmet. The bowls are not heated before the sauce is poured in it like the meal plates are heated resulting in some drop in temperature. An improvement could be to warm the bowls for sauces and soups to preserve the heat better. In relation to temperature, upon assessment of the meal trays the researcher noticed that when trays returned to the dishwashing area there was still some warmth in the food even though up to two hours had passed – showing that the system is working quite well.

Overall, the reason for a low temperature could be due to the time it takes to process the texture-modified diet during grinding and mixing. Possibly the processing time needs to be speed up and the food immediately placed in a hot unit until serving takes place. Also, by improving working environment where heat lamps are used to the fullest during serving.

Few mentioned taste alterations, but these factors were not studied further in the current study but would be of interest, then in relation to intake of medication, dry mouth and overall oral health.

Concerning whether a menu on the meal tray would help to know what was served, only one responded specifically to it and believed it would help. This has been of an issue for years and regularly mentioned, especially by the nutritionist but now this won't be needed as each meal card has a description on what is on the tray.

Weighed leftovers

The trays with leftover food were assessed on several terms to find how much was left of each type of meal and sauce and, more specifically, energy, protein and fibre. Also, if male or female subjects consumed same or different amounts of meals and to what extent total or proportionally, they managed to meet their needs by the food they received. Lost calories and protein were also calculated to assess how much the subjects were missing out on, on terms of two key nutrients. When calories and protein are missing to this extent an assumption can be made that other nutrients are so too. For example, are fish and meat the main sources of the following vitamins and minerals; iron, zinc, copper, manganese, vitamin B2 and B12, omega 3 fatty acids, iodide and vitamin D. Therefore, when intake of protein is down to half the need, the assumption is that these nutrients are so too.

According to this study, male and female subjects consume almost the same proportion of calories and protein provided by their meals or in the 54.7 to 56 % range.

The total amount of calories and protein left on trays weighed in this study and left to become a biological waste amounted to 62.120 kcal and 3 kg of protein. This amount came from 305 meals, which only account for 0.026 % of the 1.169.681 meals served in 2023 on behalf of the Landspítali Food services, including 161.500 breakfast meals, 281.500 lunches, 251.300 midday snacks, 274.800 dinners and 200.500 evening snacks. Extrapolating to a one-year loss, it will amount to about 238.231.422 kcal and 11.505 kg protein.

A conclusion drawn, the reason for this low consumption of meals and snacks provided can be multiple. First, these subjects are patients of the hospital, suffering from various ailments and having some difficulties consuming their meals as the prescription of texture modification shows. They might not like the menu despite its content relating to the elderly population. The serving sizes might be too large or too large for the eye of this population, meaning that seeing the meal and regarding it large might decrease their appetite. They might have needed more assistance during mealtimes, and they might be resistant to eating as they don't agree with the diet type, they are served.

Disappointing, the amount of leftover timbals and no special interest on behalf of **Subjects 5** when inquired about their opinion on it, as timbals are unique and give the variance that can easily be implemented to the meal for different look and variability in the monotonous plate offered at TMD. Finally, timbals are in a way the direction IDDSI implementation would take us.

It was also noticed that some patients were also consuming snack meals with the main meals, most often the main meal was not finished. It is difficult to know, what comes first offering the snack leading to no room for finishing up the main meal or offering the snack because the main meal could not be finished. At least both situations lead to loss of energy, nutrients, satiety and food waste. But hopefully the patients were provided with another snack meal instead of the one that either got partly or fully wasted as it was also noted that snack meals were not removed from the tray and came back untouched just to end up in the trash.

Why patients leave their food is for many reasons, as stated above but it must become a joint teamwork of all staff at Landspítali to encourage patients to consume their meals. Ward staff need to dedicate more time on food and meal related issues, education to staff at the small kitchenets on nutrition related issues needs to be improved and preferably this ward position needs to be dedicated to only meal and nutrition related tasks.

The amount of leftover food was in accordance with what was expected by the author just from almost two-decade work at the food services.

Summarised are the answers to the research questions as follows. At Landspítali, the need for TMD is relatively low, with the number of produced TMD meals being 50 servings for each meal to meet the need. Divided up, for M1 the number is twenty, for M2 twenty, for M3 ten, and F4 four. In a comparison, for the other diet types around 700 lunch and dinner meals are produced each day. Excluded are specialty and allergy diets and liquid diets (40 servings), therefore TMD is less than 5% of all produced meals.

The main characteristics of the patients that receive this type of diet are elderly patients 67 years and older, many of them frail and with a relatively low appetite. They were admitted to the hospital at either, an acute or long-term elderly ward, a neurological ward or a medical ward for elderly.

The estimated energy, protein, fibre, and fluid needs of the subjects of the study (Subjects5) were based on scientifically recognized values stated elsewhere in this paper and their kg BW. Worth noticing, the subjects (Subjects5) of this study had higher average BW than the reference European male and female of similar age. For other subjects of the study, i.e. those that had their left-over meals and intake assessed, had their energy and protein need calculated based on average sex dependent BW values of Subjects5. By using the BW values of Subjects5 as a reference, rather than the European reference BW values, more precise estimate could be done, as Icelanders of this age group are on the average heavier than their European counterparts.

According to this study the patients (Subjects5) (n=20) that answered the two questionnaires and had leftovers weighed were leaving about half of the food served and therefore not meeting their nutritional and energy need by the meals from the food services. However, the results from the two questionnaires indicated that the patients were relatively satisfied with the meals they received, and the service provided at the ward. Temperature of the meals was an issue for some, as it was too low.

Undernutrition and poor food intake of hospitalized people is still a problem to be resolved but ways to increase intake at home and in elderly people care setting would decrease the number of patients that are admitted due to under- and malnutrition, falls and fractures. This requires increased emphasis on prevention through the whole healthcare system and continuing education of healthcare professionals.

Strength and limitations of the study

As the current study was in part a quality study, critics and discussion on the new questionnaire is valuable to increase its use for improvement. During writing and analytical work two ideas came up for improvement to the QAQ. First to include a subjective question assessing the patient appetite and if it was “better than at home”, “same or similar to that at home”, “less than at home”, “no appetite at all” or “do not know”. Second, to ask about interruption at mealtimes and if it was “frequent”, “daily”, or

“occasionally” during the hospital stay. Information on who it was that was interrupting and getting to know if it had effects on meal consumption or not are valuable. The purpose for including this in QAQ is that in the literature the concept of “protected mealtimes” is discussed and the importance of keeping the mealtimes in a way that the patient can consume his or her meals without interruption. If results from such a study at Landspítali show relatively high interruption rate and the patients regard this affecting their meal consumption a suggestion for improvement and reforms could be initiated at Landspítali aiming for improved eating experience for patients, from presentation of food to assistance at mealtimes.

Audits indicate that where this scheme has been implemented patients report greater satisfaction with their meals and fewer interruptions (71). Worth considering though is the fact that some studies have often shown that the protocol can lead to certain tension between nursing staff who try to ensure it works and medical colleagues who are not convinced of its value (72).

Finally, would be valuable to add a question assessing specifically, the experience of older patients, on how easy or difficult it is to open pre-packaged items placed on the tray or delivered at bedside between meals. At present only very few food items are bought pre-packaged and sent to the patients, it is only skyr, yogurt and butter, occasionally ice cream, therefore this is not of a big concern. However, when the wards will start providing a larger part of the snacks and possibly also in relation to cook-and-chill food delivery that is underway, there is a risk that this will become a potential barrier. As stated in the paper of Schindler et al, “ten percent of the sample could not open the water bottles and 39 % could not open cheese portions. The results were consistent with the previous research involving hospitalized older adults, adding emphasis to the conclusion that food and beverage packaging can be a potential barrier to adequate nutrition when certain types of packaged products are used in hospitals or the community” (56).

A major strength to the current study is the accurate weighing of leftovers to calculate lost calories, protein and fibre and assess of intake vs. need. Using the nDayQ to assess the experience of the patients is potential strength as the questionnaire is validated and used worldwide. Development of QAQ to assess specifically the quality of specific meal items is a strength, and the results that the average scores of both questionnaires were similar for all **Subjects5**, male and female.

Due to several limitations to the study, including not assessing all meals for total of three days and not recording and assessing additional intake at the ward, the total intake per day per patient was not evaluated. However, by weighing the leftovers, and making up the meal days described in the method section, it can be estimated how much energy and protein is not consumed by the patient and their intake calculated. Another limitation, as an assessment of extra food and drink provided at the ward was not made,

it is not possible to know if missed meals were replaced by smaller extra meals from the kitchen wards. Subjects⁵ answered this question and said that they had not been offered an additional meal. However, after going through the difficulties trying to reach more subjects and not having access to the Saga system, getting additional information for such thing as food and fluid intake was too optimistic to begin with.

Other limitations include a low number of subjects and missing data, including the height of two subjects, and that not all patients were screened for malnutrition or only half of the patients.

Another potential limitation of the study is the use of QAQ, as its internal validity and reliability have not yet been established. On the other hand, the use of nDayQ strengthens the study. Also strengthening the QAQ outcome is how close the average scores are when nDayQ and QAQ are compared, regarding the latter quite reliable and descriptive.

A possible weakness related to the submission of the questionnaires could be that the researcher herself met and asked the patients and introduced herself as working in the kitchen. In some cases, this might affect the responses to the questions as this patient group is most likely characterized by people who don't want to complain, talk negatively and "hurt" others.

Conclusion

In conclusion the elderly patients at Landspítali that receive texture modified meals from the Landspítali food services are in general satisfied with the meals they receive, except that some felt that the temperature should be higher. Most are satisfied with the service at ward and the amount of sauce is plenty for most of them. However, largest part of the sample consumed only about half of the food they were provided with, meaning that they only take in about half of the calories and protein they need. In addition to leftovers on the tray, individually served snack meals are too often not removed from the tray to be served later in the day and therefore get wasted. The male subjects were, however, consuming more on the average than the women. This low consumption of energy and protein can lead to compromised nutritional status, slower and worse recovery and less quality of life.

Future perspectives

In the most recent years, the important role the food services play has been given increased weight within the Landspítali setting but there is still a gap that needs to be

closed with more information and better communications and relations. In this context there are changes in the months to come on behalf of the food services that relate to structured protocols in asking the question “how do you as a patient like the food and the service” and more intense work on basis of kitchen and wards cooperation for the good of the patient. This is in accordance with the ESPEN guidelines where it is recommended that a survey among patients is undertaken at least once a year (3). The surveys then need to be analysed thoroughly and viewed in relation to the menu and service from time to time. What is being left on the trays when back to the dishwashing unit provides valuable information and what is highly or less received by the patients, these are issues of high interest and importance as the food left on the tray does not provide what it is intended to do.

For future perspective in the sector of clinical nutrition, as some studies have indicated, specialty diets are disliked more by the patients and ESPEN recommends as little specialty diet and deviation from regular diet as possible and as stated by Stanga et al., “satisfaction was high with the standard, vegetarian and diabetes menus, but low with the lipid-lowering and weight-reduction regimens. Possibly, this was related to the low-fat content of the latter, or to the fact that these diets differed more markedly from those to which the patients were accustomed (45)” However, specialty diets will continue to some extent, requiring further studies on each type of the core specialty diets including texture modified diet, fat reduced diet, low protein diets, sodium restricted diet and kidney diet to list the most common ones.

As the development and speed of initiation of IDDSI progresses world-wide, it will presumably be the leading future perspective in the field of texture modification. However, the correct individual diagnosis of swallowing problems and appropriate selection of textures will always be the most important factor along with correct serving and proper temperature on behalf of the food services. As IDDSI is concerned some testing work needs to be done at the wards and therefore teaching and guidance to the staff is essential. As the different levels of food texture are many, the perfect one might be difficult to find but most important constant guidance of patients by the ward staff is valuable. Also, a follow up on their nutritional status (by screening) and changing the diet prescription as needed as the patient progresses or declines in their feeding abilities. The IDDSI initiative is being translated to Icelandic and working group will be established to lead the IDDSI work in Iceland.

At Landspítali, there is yet no concept of “protected mealtimes” but possible need for this should be assessed among Landspítali patients to find if it needs to be implemented to improve patient food intake and satisfaction. Another concept could be “flexible” mealtimes, but as cook-and-chill meal service will be used at Landspítali, mealtimes will become more flexible as patients have greater access to variety of meals all day round.

To summarize, the food services of Landspítali should aim for more individualized service, submitting regular surveys to patients to assess their needs and preferences. Evaluate how improvements are perceived by the patients and report on the results for positive reinforcement within and outside the hospital. Providing appealing information on the menu encourages the patient to eat and enjoy. Restaurant like menu representation is used in some places as it can blunt the feeling of where the patient is really situated. Appealing pictorial presentation of food and meals is encouraging for most people and today the technology allows to present this and the menu together in an easy way for the patient to assess either on television screens, iPhones or in Tablets.

“Overall nutritional care” in the hospital and home should be the heading for future perspectives in the field of nutrition however the latter can be difficult for several reasons including lack of resources, knowledge and encouragement.

Despite the hospital environment is here of a major focus, the part that comes after discharge is what also matters – and matters a lot. How is the patient that continuous on TMD going to nourish when at home or in other care setting? Is someone to take care and ensure safe meals and drinks, it the knowledge, confidence and encouragement in place to continue to reduce the risk of aspiration, choking, undernutrition and related complications. For this to happen and be sustained for the time needed, proper and accessible education needs to be provided to the patient and the caretakers to be able to do their best for the patient but also to notice if the situation is getting worse.

This type of educational material is not available in Icelandic yet but translations from English text of recognized source is underway.

References

- 1 Blomhoff, R., Andersen, R., Arnesen, E.K., Christensen, J.J., Eneroth, H., Erkkola, M., Gudanaviciene, I., Halldorsson, T.I., Høyer-Lund, A., Lemming, E.W., Meltzer, H.M., Pitsi, T., Schwab, U., Siksna, I., Thorsdottir, I. and Trolle, E. Nordic Nutrition Recommendations 2023. Copenhagen: Nordic Council of Ministers, Nordic nutritional recommendations. 2023. Pg. 230-233.
- 2 Cederholm, T., Barazzoni, R., Austin, P., Ballmer, P., Biolo, G., Bischoff, S. C., Compher, C., Correia, I., Higashiguchi, T., Holst, M., Jensen, G. L., Malone, A., Muscaritoli, M., Nyulasi, I., Pirlich, M., Rothenberg, E., Schindler, K., Schneider, S. M., de van der Schueren, M. A. E., Sieber, C., Valentini, L., Yu, J. C., Gossam, A., Singer, P. (2017). ESPEN guidelines on definitions and terminology of clinical nutrition. *Clin Nutr.* 2017 Feb;36(1):49-65. doi: 10.1016/j.clnu.2016.09.004 .
- 3 Thibault, R., Abbasoglu, O., Loannou, E., Meija, L., Ottens-Oussoren, K., Pichard, C., Rothenberg, E., Rubin, D., Siljamäki-Ojansuu, U., Vaillant, M., Bischoff, S. ESPEN guidelines on hospital nutrition. *Clin Nutr.* 2021 Dec;40(12):5684-5709. doi: 10.1016/j.clnu.2021.09.039
- 4 NCP Coding References. A quality assurance document at Landspítali, nutrition department. Assessed [19.04.24]. Retrieved: [https://www.csun.edu/~lisagor/Fall%202012/NCP%20codes%20\(1%20page\).pdf](https://www.csun.edu/~lisagor/Fall%202012/NCP%20codes%20(1%20page).pdf)
- 5 Cichero, J., Lam P., Steele, C., Hanson, B., Chen, J., Dantas, R., Duivesteyn, J., Kayashita, J., Lecko, C., Murray, J., Pillay, M., Riquelme, L., Stanschus, S. (2017). The IDDSI Framework. *Dysphagia*, 32:293-314. <https://link.springer.com/article/10.1007/s00455-016-9758-y>
- 6 Hospital Food Service Market: Nourishing Patients with Quality and Care. Shivam Rajmane. July 27th, 2023. Retrieved from: <https://www.linkedin.com/pulse/hospital-food-service-market-nourishing-patients-quality-rajmane>
- 7 ASPEN. American Society for Parenteral and Enteral Nutrition. www.nutritioncare.org
- 8 Deutz, N., Bauer, J., Barazzoni, R., Biolo, G., Boirie, Y., Bosity-Westphal, A., Cederholm, T., Cruz-Jentoft, A., Krznarić, Z., Sreekumaran Nair, K., Singer, P., Teta, D., Tipton, K., Calder, P. Protein intake and exercise for optimal muscle function with aging: recommendations from the ESPEN Expert Group. *Clin Nutr.* 2014 Dec;33(6):929-36. DOI: 10.1016/j.clnu.2014.04.007
- 9 Bauer, J., Biolo, G., Cederholm, T., Cesari, M., Cruz-Jentoft, A., Morley, J., Phillips, S., Sieber, C., Stehle, P., Teta, D., Visvanathan, R., Volpi, E., Boirie, Y. Evidence-Based Recommendations for Optimal Dietary Protein Intake in Older People: A Position Paper From the PROT-AGE Study Group. *Journal of the American Medical Directors Association.* Vol 14, issue 8, august 2013, pg. 542-559.

- 10 The Icelandic Medical Directorate. Recommendations on nutrition for healthy elderly people. Retrieved from: <https://island.is/naering-radleggingar-landlaeknis/naering-eldra-folk> Assessed [14.04.24].
- 11 The Icelandic Medical Directorate. Recommendations on nutrition for frail or sick elderly people. Retrieved from: <https://island.is/frett/Nyjar-radleggingar-um-mataraedi-fyrir-hrumt-eda-veikt-eldra-folk>. Assessed [14.04.24].
- 12 Richter, M., Baerlocher, K., Bauer, J., Elmadfa, I., Heseker, H., Leschik-Bonnet, E., et al. Revised reference values for the intake of protein. *Ann Nutr Metab.* (2019) 74:242–50. doi: 10.1159/000499374
- 13 Butterworth, C., The Skeleton in the Hospital Closet 1974. *Nutrition.* 1994 Sep-Oct;10(5):442.
- 14 Malnutrition. Cleveland Clinic. Retrieved: <https://my.clevelandclinic.org/health/diseases/22987-malnutrition>
- 15 Norman, K., Haß, U., Pirlich, M. Malnutrition in Older Adults – Recent Advances and Remaining Challenges. *Nutrients.* 2021 Aug; 13(8): 2764. doi: 10.3390/nu13082764
- 16 Medical Coding References. ICD-10-PCS Reference Manual. https://www.cms.gov/medicare/coding/icd10/downloads/pcs_refman.pdf
- 17 Visvanathan, R., Newbury, J., Chapman, I. Malnutrition in older people. Screening and management strategies. *Australian Family Physician.* November 2004. 33, 799-805. Retrieved: https://www.researchgate.net/publication/8188980_Malnutrition_in_older_people_Screening_and_management_strategies#pf3
- 18 Geirsdottir, O., and Thorsdottir, I. Nutritional status of cancer patients in chemotherapy; dietary intake, nitrogen balance and screening. *Food Nutr Res,* 2008. 52. 10.3402/fnr.v52i0.1856
- 19 Thorsdottir, I., Jonsson, P., Asgeirsdottir, A., Hjaltadottir, I, Bjornsson, S., Ramel, A. Fast and simple screening for nutritional status in hospitalized, elderly people. *J. Hum Nutr Diet,* 2005. 18(1): p. 53-60. DOI: 10.1111/j.1365-277X.2004.00580.x
- 20 Ingadottir, A., Beck, A., Baldwin, C., Weekes, C., Geirsdottir, O., Ramel, A., Gislason, T., Gunnarsdottir, I. Association of energy and protein intakes with length of stay, readmission and mortality in hospitalized patients with chronic obstructive pulmonary disease. *Br J Nutr,* 2018. 119(5) p. 543-551. DOI: 10.1017/S0007114517003919
- 21 Thorsdottir, I., Gunnarsdottir, I., Eriksen, B. Screening method evaluated by nutritional status measurements can be used to detect malnourishment in chronic obstructive pulmonary disease. *J Am Diet Assoc,* 2001. 101(6): p. 648-54. 10.1016/S0002-8223(01)00163-8

- 22 Westergren, A., Torfadottir, O, Hagell P. Malnutrition, and nutritional care in an Icelandic teaching hospital. *Research* 2014;1:1270. doi.org/10.13070/rs.en.1.1270
- 23 Agawal, E., Ferguson, M., Banks, M., Batterham, M., Bauer, J., Capra, S., Isenring, E. Malnutrition and poor food intake are associated with prolonged hospital stay, frequent readmissions, and greater in-hospital mortality: results from the Nutrition Care Day Survey 2010. *Clin Nutr*, 2013. 32(5). P. 737-45. DOI: 10.1016/j.clnu.2012.11.021
- 24 Hiesmay, M., Schindler, K., Pernicka, E., Schuh, C., Schoeniger-Hekele, A., Bauer, P., Laviano, A., Lovell, A., Mouhieddiene, M., Schuetz, T., Schneider, S., Singer, P., Pichard, C., Howard, P., Jonkers, C., Grecu, I., Ljungqvist, O. Decreased food intake is a risk factor for mortality in hospitalized patients; the NutritionDay survey 2006. *Clin Nutr*, 2009. 28(5): p. 484-91. DOI: 10.1016/j.clnu.2009.05.013
- 25 Baker, L., Gout, B., Crowe, T. Hospital malnutrition: prevalence, identification and impact on patients and the healthcare system. *Int J Environ Res Public Health*, 2011. 8(2): p. 514-27. DOI: 10.3390/ijerph8020514
- 26 Saunders, J., Smith, T. Malnutrition: causes and consequences. *Clin Med (Lond)*. 2010 Dec; 10(6): 624-627. doi: 10.7861/clinmedicine.10-6-624
- 27 Ni Lochlainn, M., Cox, N., Wilson, T., Hayhoe, R., Ramsay, S., Granic, A., Isanejad, M., Roberts, H., Wilson, D., Welch, C., Hurst, C., Atkins, J., Mendonça, N., Horner, K., Tuttiett, E., Morgan, Y., Heslop, P., Williams, E., Steves, C., Greig, C., Draper, J., Corish, C., Welch, A., Witham, M., Sayer, A., Robinson, S. Nutrition and Frailty: Opportunities for Prevention and Treatment. *Nutrients*. 2021 Jul 9;13(7):2349. doi: 10.3390/nu1307234
- 28 Cruz-Jentoft, A., Bahat, G., Bauer, J., Boirie, Y., Bruyère, O., Cederholm, T., Cooper, C., Landi, F., Rolland, Y., Aihie, A., Sayer, A., Schneider, S., Sieber, C., Topinkova, E., Vandewoude, M., Visser, M., Zamboni, M. Sarcopenia: Revised European consensus on definition and diagnosis. *Age Ageing*. 2019 Jan 1;48(1)16-31. Doi:10.1093/ageing/afy169.
- 29 Waltson, J. Frailty UpToDate www.uptodate.com. © 2024 UpToDate, Inc. and/or its affiliates. All Rights Reserved. Retrieved: 29.08.24.
- 30 Kyle, U., Schneider, S., Pirlich, M., Lochs, H., Hebuterne, P. Does nutritional risk, as assessed by Nutritional Risk Index, increase during hospital stay? A multinational population-based study. *Clin Nutr*. 2005 Aug;24(4):516-24. doi: 10.1016/j.clnu.2005.04.003.
- 31 Thorsdottir, I., Jonsson, P., Asgeirsdottir, A., Hjaltadottir, I., Bjornsson, S., Ramel, A. (2005). Fast and simple screening for nutritional status in hospitalized, elderly people. *Journal of Human Nutrition and Dietetics*, 18(1), 53-60. https://doi.org/10.1111/j.1365-277X.2004.00580.x

- 32 Kańtoch, A., Wielek, J., Gryglewska, B., Grodzicki, T. Nutritional and Functional Status in Newly Hospitalized Older Patients Who are Not Underweight. *Journal of Nutrition in Gerontology and Geriatrics* 36(2-3):1-10. DOI:10.1080/21551197.2017.1377138
- 33 Feher, J. *Swallowing in Quantitative Human Physiology (Second Edition)*, 2017. Retrieved: <https://www.sciencedirect.com/topics/immunology-and-microbiology/swallowing>
- 34 Davies, A., Moores, C. *The Respiratory System (Second Edition)*, 2010. Retrieved: <https://www.sciencedirect.com/topics/immunology-and-microbiology/swallowing>
- 35 What is dysphagia. A training guide for healthcare professionals. Nestlé Health Science. www.nhs.uk/conditions/dysphagia
- 36 Wirth, R., Dziewas, R., Beck, A., Clavé, P., Hamdy, S., Heppner, H., Langmore, S., Leischker, A., Martino, R., Pluschinski, P., Rösler, A., Shaker, R., Warnecke, T., Sieber, C., Volkert, D. Oropharyngeal dysphagia in older persons - from pathophysiology to adequate intervention: a review and summary of an international expert meeting. *Clin Interv Aging*. 2016 Feb 23;11:189-208. doi: 10.2147/CIA.S97481. PMID: 26966356; PMCID: PMC4770066.
- 37 <https://www.apdaparkinson.org/what-is-parkinsons/symptoms/swallowing-difficulties-and-drooling/>
- 38 National Institute on Deafness and Other Communication Disorders. What is dysphagia. <https://www.nidcd.nih.gov/health/dysphagia>
- 39 Sigurdardottir, A., Geirsdottir, O., Ramel, A., Arnadottir, I. Cross-sectional study of oral health care service, oral health beliefs and oral health care education of caregivers in nursing homes. *Geriatr Nurs*. 2022 Jan-Feb;43:138-145. DOI: 10.1016/j.gerinurse.2021.11.010
- 40 National Institute of Dental and Craniofacial Research. <https://www.nidcr.nih.gov/health-info/gum-disease>
- 41 Emami, E., Freitas de Souza, R., Kabawat, M., Feine, J. The impact of edentulism on oral and general health. *International Journal of Dentistry*, 2013 (2013), p. 7 <http://dx.doi.org/10.1155/2013/498305>
- 42 Statistics Iceland. Retrieved from: <https://www.hagstofa.is/>
- 43 Steele, C., Alsanei, W., Ayanikalath, S., Barbon, C., Chen, J., Cichero, J., Coutts, K., Dantas, R., Duivestein, J., Giosa, L., Hanson, B., Lam, P., Lecko, C., Leigh, C., Nagy, A., Namasivayam, A., Nascimento, W., Odendaal, I., Smith, C., Wang, H. The influence of food texture and liquid consistency modification on swallowing physiology and function: a systematic review. *Dysphagia*. 2015 Feb;30(1):2-26. doi: 10.1007/s00455-014-9578-x.
- 44 Young, A., Byrnes, A., Mahoney, D., Power, G., Cahill, M., Heaton, S., McRae, P., Mudge, A., Miller, E. Exploring hospital mealtime experiences of older

- inpatients, caregivers and staff using photovoice methods. First published: 29 January 2024. Journal of clinical nursing. DOI: 10.1111/jocn.17009
- 45 Stanga, Z., Zurflüh, Y., Roselli, M., Sterchi, A., Tanner, B., Knecht, G. Hospital food: a survey of patients' perceptions. Clin Nutr. 2003, volume 22, Issue 3, Pages 241-246, [https://doi.org/10.1016/S0261-5614\(02\)00205-4](https://doi.org/10.1016/S0261-5614(02)00205-4)
- 46 Furness, K., Harris, M., Lassemillante, A., Keenan, S., Smith, N., Desneves, K., King, S. Patient Mealtime Experience: Capturing Patient Perceptions Using a Novel Patient Mealtime Experience Tool Nutrients. 2023 Jun; 15(12): 2747. Published online 2023 Jun 14. doi: 10.3390/nu15122747
- 47 Naithani, S., Whelan, K., Thomas, J., Gulliford, M., Morgan, M. Hospital inpatients' experiences of access to food: a qualitative interview and observational study. Health Expert. 2008 Sep; 11(3): 294-303. Published online 2008 Aug 18. doi:10.1111/j.1369-7625.2008.00495.x
- 48 Naughton, C., Simon, R., White, T. Foubert, M., Cummins, H., Dahly, D. Mealtime and patient factors associated with meal completion in hospitalized older patients: An exploratory observation study. Journal of Clinical Nursing. First published: 04 May 2021 <https://doi.org/10.1111/jocn.15800>
- 49 National Health Services (NHS). Toolkit to help develop and maintain a hospital food and drink strategy. Published 29 August 2014. Last updated 26 January 2017. Retrieved: https://assets.publishing.service.gov.uk/media/5a81756fed915d74e623260c/Toolkit_Feb_16.pdf/preview
- 50 Roberts, H., Lim, S., Cox, N., Ibrahim, K. The Challenge of Managing Undernutrition in Older People with Frailty. Nutrients. 2019 Apr 10;11(4):808. doi: 10.3390/nu11040808. PMID: 30974825; PMCID: PMC6521101.
- 51 Beck, M., Birkelund, R., Poulsen, I., & Martinsen, B. (2019). Hospital meals are existential asylums to hospitalized people with a neurological disease: A phenomenological-hermeneutical explorative study of the meaningfulness of mealtimes. *Nursing Open*, 6(2), 626-634.
- 52 Nutrition day. <https://www.nutritionday.org/>
- 53 Dall'Oglio, I., Nicolò, R., Di Ciommo, V., Bianchi, N., Ciliento, G., Gawronski, O., Pomponi, M., Roberti, M., Tiozzo, E., Raponi, M. A Systematic Review of Hospital Foodservice Patient Satisfaction Studies. J. Acad. Nutr. Diet. 2015;115:567-584. doi: 10.1016/j.jand.2014.11.01
- 54 Jonsson, A., Nyberg, M., Jonsson, I., Öström, Å. Older patients' perspectives on mealtimes in hospitals: A scoping review of qualitative studies. Scand. J. Caring Sci. 2020;35:390-404. doi: 10.1111/scs.12866
- 55 Bauer, J., Bannister, M., Crowhurst, R., Denmeade, S., Horsley, P., McDonald, C., Martineau, J., Willer, F., Ash, S. Nutritionday: An Australian hospital's

- participation in international benchmarking on malnutrition. *Nutr. Diet.* 2011;68:134–139. doi: 10.1111/j.1747-0080.2011.01513.x
- 56 Schindler, K., Themessl-Huber, M., Hiesmayr, M., Kosak, S., Lainscak, M., Laviano, A., Ljungqvist, O., Mouhieddine, M., Schneider, S., Schueren, M., Schütz, T., Schuh, C., Singer, P., Bauer, P., Pichard, C. To eat or not to eat? Indicators for reduced food intake in 91,245 patients hospitalized on nutritionDays 2006–2014 in 56 countries worldwide: a descriptive analysis 12, *The American Journal of Clinical Nutrition*, Volume 104, Issue 5, 2016, Pages 1393-1402, <https://doi.org/10.3945/ajcn.116.137125>
- 57 Wade, D., Hewer, R. Motor loss and swallowing difficulty after stroke: frequency, recovery and prognosis. *Acta Neurologica Scandinavica*, 1987; 76: 50–54.
- 58 Anderson MD. Malnutrition and length of stay – a relationship? *Henry Ford Hospital Medical Journal*, 1985; 34: 190–193
- 59 Wright, L., Cotter, D., Hickson, M., Frost, G. Comparison of energy and protein intakes of older people consuming a texture modified diet with a normal hospital diet. *J Hum Nutr Diet.* 2005 Jun;18(3):213-9. DOI: 10.1111/j.1365-277X.2005.00605.x
- 60 Wright, L., Hickson, M., Frost, G. Eating together is important: using a dining room in an acute elderly medical ward increases energy intake. *Journal of Human Nutrition and Dietetics*, 2006; 19: 23–26.
- 61 Das, A., McDougall, T., Smithson, J., West, R. Benefits of family mealtimes for nursing home residents: protecting mealtimes may similarly benefit elderly inpatients. *BMJ*, 2006; 332: 1334–1335.
- 62 Association of Community Health Councils for England and Wales. *Hungry in Hospital?* London: CHC, 1997.
- 63 Age Concern. *Hungry to be Heard. The Scandal of Malnourished Older People in Hospital.* London: Age Concern, 200
- 64 Hartwell, H., Shepherd, P., Edwards, J., Johns, N. What do patients value in the hospital meal experience? *Appetite*, Volume 96, 2016, Pages 293-298, ISSN 0195-6663, doi.org/10.1016/j.appet.2015.09.023
- 65 Larsen, K., Schjøtler, B., Melgaard, D. Patients' experiences eating in a hospital – A qualitative study. *Clinical Nutrition ESPEN*, Volume 45, 2021, Pages 469-475, ISSN 2405-4577. <https://doi.org/10.1016/j.clnesp.2021.06.031>.
- 66 Rinninella, E., Raoul, P., Maccauro, V., Cintoni, M., Cambieri, A., Fiore, F., Zega, M., Gasbarrini, A. Mele, M. Hospital Services to Improve Nutritional Intake and Reduce Food Waste: A Systematic Review. *Nutrients*. 2023 Jan; 15(2): 310. Published online 2023 Jan 7. doi: 10.3390/nu15020310 <https://pubmed.ncbi.nlm.nih.gov/15882384/>
- 67 Nutrition day. <https://www.nutritionday.org/>

- 68 Asgeirsdottir, H. Preparation for future participation of Landspítali Hospital in the International nutritionDay Study. Thesis for the degree of Master of Science in Clinical Nutrition. 2020. <https://skemman.is/bitstream/1946/35630/1/Preparation%20for%20future%20participation%20in%20the%20international%20nday%20study%20-%20loka.pdf>
- 69 Asgeirsdottir, H. 2020. Preparation for Future Participation of Landspítali Hospital in the International nutritionDay Study. A master thesis. Nutrition day Questionnaire, Icelandic. Picker Institute Europe. Copyright 2012. Inpatient_question_bank_v2_30/8/12 [nutritionday.org https://www.nutritionday.org/en/-35-languages/languages.html](https://www.nutritionday.org/en/-35-languages/languages.html)
- 70 World Medical Association Declaration of Helsinki: Ethical principles for medical research involving human subjects. *J Int Biethique*. 2004; 15:124-9
- 71 Robinson, G., Goldstein, M., Levine, G. Impact of nutritional status on DRG length of stay. *JPEN. Journal of Parenteral and Enteral Nutrition*, 1987; 11: 49–51.
- 72 Savage, J., Scott, C. Patients' Nutritional Care in Hospital: An Ethnographic Study of Nurses' Role and Patients' Experiences. London: RCN, 2005. Available at: <http://www.rcn.org.uk/downloads/research/institute/PatientsNutritionalCareInHospital.doc>

Appendixes

Appendix A Information on diet and meal selection at Landspítali. A guide to patients and employees. 2024.

Næring sjúklinga

Veitingaþjónusta Landspítala sér sjúklingum fyrir heilstæðri næringu meðan á innlögn stendur en að nærast vel er nauðsynlegur hluti af meðferð sjúklinga. Því er afar mikilvægt að borða vel og fjölbreytt þegar veikindi steðja að vegna þess að líkaminn þarf næga orku, prótein og heildstæða næringu til að ná heilsu og byggja sig upp á nýjan leik. Markmið okkar hjá Veitingaþjónustu Landspítala er að framleiða hollan, góðan, girnilegan og fjölbreyttan mat, ásamt því að tryggja fæði sem fullnægir næringarþörf hvers og eins sem og sérþörfum, boðið er upp á morgunverð, hádegis- og kvöldverð ásamt síðdegis- og kvöldhressingu alla daga. Gott drykkjarvatn er aðgengilegt á deild og er mikilvægt að drekka nægan vökva jafnt og þétt yfir daginn, en karlar þurfa um 2 l meðan konur þurfa um 1.6 l.

Matseðill

Matseðillinn er 3 vikna rúllandi sem þýðir að hann endurtekur sig á þriggja vikna fresti. Matseðillinn yfir þessar þrjár vikur er mjög fjölbreytilegur með fáum endurteningum milli rétta, auk þess sem hann er breytilegur eftir árstíðum. Tillit er tekið til hátíða- og tyllidaga sem og íslenskra hefða t.d. bónda-, bollu- og sprengidags. Tekið er mið af mismunandi þörfum þar sem matreitt er fyrir fjölbreytan hóp fólks með ýmsar sérþarfir og á öllum aldri.

Í hverri máltíð samastendur matseðillinn af kjöt- eða fiskrétti og grænmetisrétti, stundum er jafnvel allt þrennt í boði. Þegar fiskréttur er réttur dagsins er einnig alltaf val um kjöt- og grænmetisrétt. Því er auðvelt að velja milli þessa til að auka fjölbreytileikann í máltíðunum meðan á innlögn stendur. Það er til dæmis hægt að velja fiskmáltíð í hádegi og grænmetisrétt að kvöldi og öfugt.

Ef sjúklingur óskar þess að velja af matseðli er rétt að tala við starfsfólk deildarinnar sem aðstoðar við valið. Ef að ekki er þörf á sérþæði er líka ekkert því til fyrirstöðu að hvetja aðstandendur til að færa sjúklingum mat, eitthvað sem sjúklingnum finnst gott að borða, sér í lagi ef að lysterleysi er að hrjá viðkomandi. Ekki er verra að maturinn sé næringarríkur. Nauðsynlegt er að gæta að öllu er snýr að hreinlæti, eldunartíma, eldunar hitastigi og geymslu í kæli sé sjúklingum færður matur að heiman, það er gert til að forðast matarsýkingar með tilheyrandi áhættu fyrir þann sem fyrir henni verður.

Ef að sjúklingur hefur einhverjar sérþarfir, til dæmis vegna sjúkdóms, ofnæmis eða ópols er mikilvægt að láta vita um það við komu á spítalann til að fá rétta þjónustu. Fæðutengdir ofnæmisvalar og lyfja ofnæmi er að jafnaði skráð í Sögukerfið en þó má ekki

treysta eingöngu á það heldur að upplýsa starfsfólk deildar við innlögn.

Viðmiðunargildi fyrir orku og næringarefni

Orkugefandi næringarefni eru þau sem líkaminn þarfnast í tiltölulega miklu magni til að fullnægja orkuþörf sinni og styðja við ýmsa líkamlega starfsemi og almenna heilsu. Orkugefandi næringarefni eru prótein, kolvetni og fita. Bæði of mikil og of lítil orkuinntaka, miðað við orkuþörf, getur haft neikvæð áhrif á heilsu. Því ætti orkuinntaka fullorðinna yfir langan tíma (að jafnaði) að vera í jafnvægi við þá orku sem líkaminn þarfnast, en mikilvægt er að muna að í tengslum við sjúkdóma og slys getur orku- og próteinþörf aukist.

Við gerð matseðla er tekið mið af mannelismarkmiðum fyrir Íslendinga og norrænum ráðleggingum um fæði fyrir sjúka. Matseðlar eru næringarútreiknaðir og ekkert hráefni er notað nema fyrir liggi upplýsingar um innihald og næringargildi þess.

Viðmiðunargildi fyrir orku og næringarefni eru gefin upp sem hlutfall af heildarorkuinntöku á dag. Þau eiga þó við um meðalneyslu yfir lengri tíma eða a.m.k fyrir eina viku, þar sem samsetning mataræðisins er mismunandi eftir máltíðum og frá degi til dags. Það er því eðlilegt að suma daga fáum við meira af tilteknu næringarefni og minna aðra daga.

Viðmið fyrir orkuefni, sem hlutfall af heildarorku (%), miðast eingöngu við mat frá eldhúsi og drykkir eru ekki innifaldir). Miðað er við að heildarinntaka sjúklings sé 2000 kcal á dag fyrir öll fæði nema OP, FSMS og Fljótandi fæði þar sem viðmiðið er 1700 kcal á dag. Ráðleggingar um orkudreifingu máltíða eru alla jafna eftirfarandi:

- Morgunverður: 25 %
- Hádegisverður: 30 %
- Síðdegishressing: 10 %
- Kvöldverður: 25 %
- Kvöldhressing: 10 %

Mótaðar hafa verið sérstakar vinnureglur við gerð matseðla hjá Veitingaþjónustu Landspítala þar sem hugað er að samspili næringar, bragðs, litasamsetningar, útlits, gæða og annars sem skiptir máli gagnvart upplifun og fæðuneyslu sjúklings. Jafnframt þarf að hafa í huga kostnað, framleiðslugetu og tækjakost eldhúss.

Fæðisúrval

A: Almennt fæði, samanstendur af kjöt- fisk- og grænmetisréttum.

A1: Almennt fæði sem hentar flestum sjúklingum.

A2: Hentar eldri kynslóðinni vel þar sem fæðisgerðin samanstendur af réttum sem er auðveldara að tyggja, kyngja og borða.

A3: Samanstendur af ýmsum grænmetisréttum og inniheldur egg og mjólkurvörur,

A4: Byggir á almenna matseðlinum en er aðlagður að þörfum barna í samvinnu við starfsfólk deildar og næringarfræðinga. Fæðisgerðin er einungis í boði fyrir ákveðnar deildir.

RDS: RDS fæði, samanstendur af kjöt-, fisk- og grænmetisréttum. Samræmist almennu fæðunum en samanstendur af stærri skömmtum af prótei- og grænmetishlutanum með álíka mikilli orku. Fæðið er byggt á ráðleggingum um mataræði og næringarefni fyrir fríska og sykursjúka en hentar einnig vel fyrir konur á meðgöngu og sængurlegudeildum og skjólstæðinga geðsviðs svo dæmi séu tekin

RDS kjöt/fiskur: Samanstendur af kjöt- eða fiskréttum.

RDS grænmetis: Samanstendur af ýmsum grænmetisréttum.

OP: Orku- og próteinbætt fæði, byggir á A2 matseðli. OP skammtastæðir eru smærri og maturinn almennt orku- og próteinþéttari sem næst með orku- og próteinbætingu á sósum og sumum eftirréttum. Miðað er við að sjúklingurinn fái, auk máltíða frá eldhúsi, **viðbótar millibita á deild** t.d. mjólkurvörur s.s. Næringu+ eða skyr með rjóma sem pantað er í Orra eða næringardrykki sem pantaðir eru úr apóteki.

M1, M2, M3: Fæði með breyttri áferð, samanstendur af almennu fæði með breyttri áferð, stundum kallað maukfæði. Fæði með breyttri áferð frá Veitingaþjónustu Landspítala fylgir 3 vikna rúllandi matseðli á hverjum tíma og er miðað við að matseðillinn fylgi að sem mestu leiti A2 fæðisgerð sem ætluð er eldri kynslóðinni. Rökin fyrir því að fæðin fylgist að eru að flestir á fæði með breyttri áferð eru af eldri kynslóðinni og því hentar matseðillinn vel sem slíkur en einnig verður það til þess að þessi sjúklingahópur er að fá sama mat sem er mikilvægt á þeim deildum þar sem sjúklingar eru hvattir til að borða saman í setustofum.

M1, mjúkt fæði:

Saman stendur af almennu fæði A2 með breyttri áferð á kjöti þar sem kjötið er hakkað. Gefið er meira magn af sósu 1,2 dl heit sósa eða 1 dl köld sósa eða tvö smjör, sé ekki sósa með fiskmáltíðinni. Úrval er af meðlæti, grænmeti og eftirréttum sem endurspeglast af A2 fæði. Morgunverður er samkvæmt A2 nema að aðeins mjúkir ávextir eru í boði. Síðdegis- og kvöldhressing er samkvæmt A2 fæði.

M2, hakkað fæði:

Saman stendur af almennu fæði A2 með breyttri áferð á kjöti þar sem kjötið er hakkað en fiskur er með hefðbundinni áferð. Bollur eru heilar en þess gætt að þær séu mjúkar og ekki með harðri skorpu. Gefið er meira magn af örðulausri heitri sósu, 1,2 dl eða tvö

smjör, sé ekki sósa með fiskmáltíðinni. Eingöngu er boðið upp á kartöflumús, sæt kartöflumús eða sæt kartöflumús toppa og maukað grænmeti (A2 eða A1) eða stundum svokallaða timbala (aðkeyptir) sem er maukað og mótað grænmeti. Brauð er skorpuskorið heilhvítbrauð og borið fram með smjöri. Úrval af eftirréttum fylgir A2 fæði, er kraftsúpa eða mjólkursúpa af fljótandi fæði eða annað sem hentar vel, en eftirréttir þurfa að vera örðulausir og ekki of þunnfljótandi. Frávik er að boðið er upp á hrísgrjónagraut. Rjómi sem meðlæti með eftirrétti er þeyttur rjómi ekki fljótandi til að forðast tvöfalda áferð sem truflað getur kyngingu. Morgunverður er samkvæmt A2 nema að brauð er skopuskorið og aðeins banani eða ávaxtamauk er í boði. Síðdegishressing er samkvæmt A2 fæði, nema með einstaka frávikum, til að mynda er ekki boðið upp á hjónabandssælu þar sem hún kornast auðveldlega og hentar því ekki. Kvöldhressing er breytileg eftir því hvað er á A2 matseðli. Því er stundum boðið upp á jógúrt, skyr, smámál, banana eða ávaxtagraut. Slík kvöldhressing er skömmtuð á bakkann, annars fer kvöldhressingin í kökukassa eins og almenn kvöldhressing.

M3, fínmaukað fæði:

Samantendur af almennu fæði A2 með mikið breyttri áferð þar sem kjöt, kjötbollur, fiskur og plockfiskur er allt mixað eða maukað. Gefið er meira magn af örðulausri heitri sósu, 1,2 dl eða tvö smjör, sé ekki sósa með fiskmáltíðinni. Eingöngu er boðið upp á kartöflumús, sæt kartöflumús eða sæt kartöflumús toppa og maukað grænmeti (A2 eða A1) eða stundum svokallaða timbala (aðkeyptir) sem er maukað og mótað grænmeti. Úrval af eftirréttum fylgir A2 fæði, er kraftsúpa eða mjólkursúpa af fljótandi fæði eða annað sem hentar vel, en eftirréttir þurfa að vera örðulausir og þykktir. M3 er frábrugðið M2 á þann hátt að að mixað þarf ávaxtagrauta og stundum er gefið ávaxtamauk. Rjómi sem meðlæti með eftirrétti er þeyttur rjómi ekki fljótandi til að forðast tvöfalda áferð sem truflað getur kyngingu. Í morgunverð er boðið upp á hafragraut, þeyttan rjóma, AB mjólk og ávaxtamauk eða banana. Síðdegishressing er samkvæmt A2 fæði, nema með einstaka frávikum til að mynda er ekki boðið upp á hjónabandssælu þar sem hún kornast auðveldlega. Kvöldhressing er breytileg eftir því hvað er á A2 matseðli þannig að stundum er boðið upp á jógúrt, skyr, smámál, banana eða ávaxtagraut. Slík kvöldhressing er skömmtuð á bakkann, annars fer kvöldhressingin í kökukassa eins og almenn kvöldhressing.

Fljótandi fæði:

Fæðið er ætlað sjúklingum sem eiga við mikla tyggingar- og/eða kyngingarerfiðleika að stríða og einnig fyrst eftir aðgerð. Fljótandi fæðið er orku og próteinbætt en uppfyllir þó ekki næringarlegar þarfir einstaklingsins til lengri tíma. Matseðilinn er þriggja vikna rúllandi matseðill sem byggir á eftirréttum á almennum matseðli.

F1 - Fljótandi fæði: Inniheldur ýmist hafraseyði og rjóma, ávaxta-, kraft- og mjólkursúpur, aðrar mjólkurvörur, næringardrykki og ávaxtasafa. Þeyttur rjómi og kanilsykur er gefið sem meðlæti með hádegis- og kvöldverði þar sem við á.

F1 - Fljótandi fæði - sykur: Er ætlað sykursjúkum og byggir á **F1 matseðli** eins og mögulegt er nema að viðbættur sykur er takmarkaður. Þeyttur rjómi er gefið sem meðlæti með hádegis- og kvöldverði þar sem við á.

F1 - Fljótandi fæði, mjólkurlaust:

Byggir á F1 matseðli eins og mögulegt er nema að sojamjólk, hafrajúgúrt og vegan rjómi er notað í stað mjólkur, jógúrtar og rjóma. Þeyttur vegan rjómi og/eða kanilsykur er gefið sem meðlæti með hádegis- og kvöldverði þar sem við á.

F2 - Tært fljótandi fæði:

Inniheldur aðeins hafraseyði, kjötseyði (Knorr Bouillionbréf eða örðulausar og tærar kraftsúpur, ávaxtasúpur og ávaxtasafa. Fæðið er án allrar mjólkur og mjög næringarlega ófullkomið, því skal það aðeins notað í einn til tvo daga og þá samhliða annarskonar næringu á deild. Ekki er boðið upp á sykurlaust tært fljótandi fæði.

F3 - Fljótandi fæði eftir aðgerð - FSMS:

Byggir á F1 matseðli nema að súpur eru ekki síaðar nema þær innihaldi blaðlauk, lauk og/eða aspas. Fæðið er því ekki örðulaust heldur getur innihaldið bita af blómkál og spergilkáli svo dæmi séu tekin. Hugmyndafræði FSMS fæðisins er höfð að leiðarljósi þannig að loftmyndandi og tormelt grænmeti og fæðutegundir er sniðgengið. Þykktin er sú sama og á F1.

F4 - Þykkfljótandi fæði:

Byggir á Fljótandi fæðis matseðli (F1) eins og mögulegt er en áferðin er þykkari, eða frekar í átt að skyri og búðingi. Það er ætlað þeim sem svelgist á vökva og eru í hættu á að fá vökva ofan í lungun sem valdið getur lungnabólgu. Um er að ræða þriggja vikna rúllandi matseðil. Þykkingarefni sem notað er, er annað hvort kartöflu- eða maíssterkja eða viðurkennd þykkingarduft (Thick it eða Xanthan gum). Þykkfljótandi fæði er hægt að fá með minna af viðbættum sykri þegar þess gerist þörf.

F5 - Fljótandi fæði, kalt (TONES):

Byggir á F1 matseðli eins og mögulegt er nema að mjólkurafurðir eru lágmarkaðar og kraftsúpur eru ekki á matseðli þar sem þær henta ekki kaldar. Allir réttir eru eldaðir að

rétu hitastigi, hraðkældir og bornir fram kaldir. Matseðill inniheldur ýmist ávaxta- og mjólkursúpur, aðrar mjólkurvörur, næringardrykki og ávaxtasafa.

FSMS – fæði:

Fæði ætlað sjúklingum með meltingarfærasjúkdóma (FSMS) eða fyrstu þrjá til fimm dagana eftir aðgerð á meltingarvegi. FSMS fæðinu er ætlað að brúa bilið milli fljótandi eða maukfæðis og almenns fæðis. Um er að ræða auðmeltanlegt og trefjasnautt fæði þar sem forðast er að gefa tormelta og harða fæðu og fæðu sem getur verið loftmyndandi. Dæmi; nautakjöt, unnar kjötvörur, matur í raspi, reyktur og kryddaður matur, rúgbrauð, skyr, maískorn, hrátt grænmeti og bragðsterkt (rammt, tormelt) og loftmyndandi grænmeti s.s. laukur, baunir og rósakál. Hægt er að panta frávik eins og á almennu fæði. Síðdegis- og kvöldhressing er að jafnaði sú sama og á almennu fæði. Lamba- og svínakjöt er hakkað en kjúklingur og fiskur kemur með hefðbundinni áferð. Stundum er boðið upp á ommelettur.

Fitusnautt fæði 40g:

Fæðið er ætlað sjúklingum með lélega meltingu, skert fitufrásog, lifrarsjúkdóma og stuttan þarm sem og krabbameinssjúklingum sem hafa undirgengist geislameðferð á ristli/þörmum. Fæðið inniheldur 40 g af fitu á dag (+/-5%). Fæðutegundir sem eru útilokaðar eru unnar kjötvörur, feitar sósur og önnur fiturík fæða. Síðdegis- og kvöldhressing geta verið frábrugðnar því sem er á almennu fæði svo og getur magnið verið minna en venjulegur skammtur.

Fæðið er sér útreiknað af næringarfræðingi Veitingaþjónustu og miðað er við að sjúklingur fái aðeins það fæði sem berst frá eldhúsi nema næringarfræðingur deildar, hjúkrunarfræðingur eða lækni heimili annað.

Próteinskert fæði:

Fæðið er ætlað sjúklingum með skerta nýrnastarfsemi og lifrarsjúkdóma. Í boði er annars vegar 50 g af próteinum yfir daginn og hins vegar 60 g (+/-5%), magn af natríum er einnig skert og miðast við 2000m/dag eða undir. Magn kalíum og fosfata er einnig takmarkað. Magn próteina er ákvarðað af lækni eða næringarfræðingi. Á matseðlinum er magn kjöts, fisks, eggja og mjólkureftirréttta mjög takmarkað til að halda próteinmagni niðri. Meðlætið er að jafnaði það sama og í sömu skammtastærð og þekkist á almennu fæði fyrir utan sósuna sem oftast er í minna magni, smjör er oft gefið með fiski/fiskréttum. Eftirréttir eru helst ávaxtaeftirréttir, lítill ísskammtur eða búðingar með rjóma út á. Stundum er gefinn lítill skammtur af mjólkurgraut og kanilsykur. Síðdegis- og kvöldhressing geta verið frábrugðnar því sem er á almennu fæði og magnið getur einnig verið minna en venjulegur skammtur sér í lagi kjöt- og ostálegg.

Fæðið er sér útreiknað af næringarfræðingi Veitingaþjónustu og miðað er við að sjúklingur fái aðeins það fæði sem berst frá eldhúsi nema næringarfræðingur deildar, hjúkrunarfræðingur eða læknir heimili annað.

Í boði er:

Próteinskert fæði, 50g

Próteinskert fæði, 50g - sykur: Ætlað sykursjúkum.

Próteinskert fæði, 60g

Blóðskilunarfæði (dialysa):

Fæðið er ætlað sjúklingum með skerta nýrnastarfsemi og sumir þurfa að fara í blóðskilun reglubundið. Fæðið er snautt af natríum, kalíum og fosfötum en miðað er við um 2000mg af natríum, 2000mg af kalíum og 800mg fosfötum á dag (+/-5%). Ekki er boðið upp á ferskt grænmeti, banana, apríkósur, sveskjur, kíví, súkkulaði, kakó, brauðsúpu, reykt/saltað kjöt og reyktan/saltaðan fisk á matseðli. Mjólkurafurðir eru takmarkaða og miðast við smjör og rjóma sem útálát og rjóma/mjólk í sósum og pottréttum. Miðað er við 1 ostsneið eða sambærilegt magn af osti á dag (20 g). Eftirréttir eru oft ávaxtaeftirréttir eða sérlegaðir búðingar og þá gjarnan orkubættir með rjóma eða rjómi notaður út á. Miða skal við mest tvo skammta af ávöxtum á dag. Stöku sinnum er lítil ísskammtur á matseðli, gjarnan borinn fram með þeyttum rjóma. Síðdegis- og kvöldhressing geta verið frábrugðnar því sem er á almennu fæði og magnið getur einnig verið minna en venjulegur skammtur, súkkulaðikökur eru ekki gefnar. Magnið getur einnig verið minna en venjulegur skammtur og þá aðallega af sósu ef stýra þarf magni af natríum í máltíðinni en einnig af kjöti og fiski til að draga úr magni á kalíum. Blóðskilunarfæði er einnig hægt að panta með takmörkuðu magni af sykri.

Fæðið er sér útreiknað af næringarfræðingi Veitingaþjónustu og miðað er við að sjúklingur fái aðeins það fæði sem berst frá eldhúsi nema næringarfræðingur deildar, hjúkrunarfræðingur eða læknir heimili annað.

Í boði er:

Saltskert fæði:

Fæðið er ætlað sjúklingum sem þurfa að draga úr saltneyslu sinni, t.d. vegna hækkaðs blóðþrýstings, hjartasjúkdóma (hjartabilunar) og/eða bjúgsöfnunar. Nægjanleg salttakmörkun fyrir þennan sjúklingahóp gæti verið að takmarka unnar kjöt- og fiskvörur og kraftsúpur. Hægt er að hafa samband við veitingaþjónustu vegna slíkrar pöntunar eða að rita – KSP í frávíklugga og er þá skammtaður mjólkur- eða ávaxtaeftirrættur (súpa eða grautur).

Saltsnautt fæði, 2000mg:

Saltsnautt fæði er frábrugðið almenna fæðinu á þann hátt að unnar kjöt- og fiskvörur eru útilokaðar sem og kraftsúpur. Stundum þarf að minnka magn af sósu eða gefa smjör með fiski í stað sósunnar, takmarka eða velja annað brauð en það á almennu færði. Síðdegis- og kvöldhressing geta verið frábrugðnar því sem er á almennu fæði, t.d. annað brauðálegg og magnið getur einnig verið minna en á venjulegum skammti. Ef einstaklingur þarf meiri saltskerðingu ber að panta slíkt í gegnum klíniskan næringarfræðing eða hafa samband við sérfæðisritara Veitingaþjónustu.

Fæðið er sér útreiknað af næringarráðgjafa Veitingaþjónustu og miðað er við að sjúklingur fái aðeins það fæði sem berst frá eldhúsi nema næringarfræðingur deildar, hjúkrunarfræðingur eða læknir heimila annað. Saltsnautt fæði er einnig hægt að panta með takmörkuðu magni af sykri.

Mjólkurskurskert fæði:

Ætlað þeim sem eru með mjólkurskursóþol (laktósaóþol), sem kemur til vegna skorts á ensíminu laktasa sem meltingarkerfið notar til þess að kljúfa mjólkursukur í smápörmunum. Algengt er að einstaklingar með mjólkurskursóþol þoli á bilinu 2-5 g af mjólkursykri í máltíð og er það haft að leiðarljósi við skipulag máltíða og notkun á hráefni. Hægt er að nota ost og smjör þar sem það inniheldur ekki mjólkursukur en aðrar vörur sem notaðar eru, eru rjómi, jógúrt, skyr og AB mjólk sem er án mjólkurskurs. Morgunverður, síðdegis- og kvöldhressing inniheldur sérvaldar vörur sem eru án mjólkurskurs. **Glútensnautt fæði:** Ætlað þeim sem eru með glútenóþol (en: celiac disease) og einnig húðsjúkdóminn dermatitis herpetiformis. Til að útiloka glúten þarf að útiloka hveiti, heilhveiti, speldi/spelt, rúg, bygg og kamut og vörur þar sem þessar tegundir koma fyrir til dæmis í hefðbundnu brauði, kexi, morgunkorni, súpum og sósum. Í staðinn má nota maís, kartöflumjöl, hirsí, hrís (rís), kínóa og bókhveiti. Nota skal hafra sem eru ætlaðir fólki með glútenóþol en slíkir hafrar eru malaðir og pakkað í sérstökum rýmum þar sem hveiti, bygg og rúgur kemur ekki við sögu. Fæðið er í meginatriðum eins

og almennt fæði nema að það inniheldur engar fæðutegundir sem innihalda glúten, síðdegis- og kvöldhressing er sérvalin.

Joðskert fæði:

Ætlað sjúklingum á deild 11E sem undirgangast krabbameinsmeðferð sem byggir á geislajoðs meðferð. Flestir sjúklingar þurfa joðskert fæði aðeins í einn sólarhring, en þó gæti meðferð staðið lengur. Fæðið er án mjólkurafurða og sjávarfangs þar sem þau matvæli eru joðrík. Almenn fæði er lagt til grundvallar við skipulag matseðils nema að sneitt er hjá sjávarfangi, allri mjólk og mjólkurafurðum. Gæta þarf vel að geymslu og endurhitun á matarbakkanum sé sjúklingur ekki tiltækur þegar matarbakki berst. Mikilvægt er að geymabakkann í kæli og hita máltíðir vandlega fyrir neyslu.

Örveruskert fæði:

Fæðið er ætlað sjúklingum sem eru með bælt ónæmiskerfi vegna hvítblæðis, lyfjameðferðar og/eða geislameðferðar. Almenn fæði er lagt til grundvallar nema sneytt er hjá hráu grænmeti og skornum ávöxtum. Einungis er boðið upp á soðið grænmeti og ávexti með þykku hýði, t.d. banana. Gæta þarf að öllum áhöldum og borðbúnaði sem notaður er við framleiðslu og framreiðslu fæðisins. Starfsfólk eldhúss viðhefur sérstakar vinnureglur við meðhöndlun fæðisins og er mikilvægt að starfsfólk deilda viðhafi slíkt hið sama og gæti þess að bakkinn standi ekki opin eða sé opnaður fyrir en við rúm sjúklings.

Ofnæmisfæði:

Fæðið er ætlað sjúklingum sem hafa ofnæmi fyrir tiltekinni fæðutegund, einni eða fleiri. Ofnæmisvakar eru mismunandi, þeir algengustu eru mjólk og mjólkurafurðir, hveiti, glúten, egg, sojaafurðir, fiskur, skelfiskur, hnetur, möndlur, latex, nikkell og jafnvel laukur og hvítlaukur. Þeir sjúklingar sem eru með ofnæmi fá sér afgang frá mat skammtaðan frá sér fæðis eldhúsi Veitingaþjónustunnar.

Ungbarnafæði:

Ætlað 6-9 mánaða gömlum börnum sem eru ekki á sér fæði frá næringarráðgjafa eða öðru sér- og ofnæmisfæði. Morgunverður samanstendur af hafragraut og ávaxtamauki. Hádegis- og kvöldverður samanstendur af sérlagaðri kartöflumús úr kartöflum, lambakjöti, kjúklingi eða kalkún (mixað = M3) og grænmetismauki sem er það sama og gert er fyrir M3 eða barnamat úr krukku. Kartöflumús og grænmetismaukið er hvort um sig skammtað í litlar glerskálar og sett á heitan disk. Eftirréttur er ávaxtamauk í „skvísu“.

Appendix B NCPT codes for texture modified diets (4).

* Texture modified diet	ND-1.2.1	10829
* Easy to chew diet	ND-1.2.1.1	10914
* Mechanically altered diet	ND-1.2.1.2	10915
* Pureed diet	ND-1.2.1.3	10916
* Liquid consistency thin liquids	ND-1.2.1.4	10865
* Liquid consistency nectar thick liquids	ND-1.2.1.5	10866
* Liquid consistency honey thick liquids	ND-1.2.1.6	10867
* Liquid consistency spoon thick liquids	ND-1.2.1.7	10868
* Soft bite sized food Level six Blue	ND-1.2.1.8	12216
* Minced moist food Level five Orange	ND-1.2.1.9	12217
* Pureed food Level four Green	ND-1.2.1.10	12218
* Extremely thick liquid Level four Green	ND-1.2.1.11	12219
* Liquidized food Level three Yellow	ND-1.2.1.12	12220
* Moderately thick liquid Level three Yellow	ND-1.2.1.13	12221
* Mildly thick liquid Level two Pink	ND-1.2.1.14	12222
* Slightly thick liquid Level one Grey	ND-1.2.1.15	12223

Appendix C A sample of the written informed consent, signed by the patient and the researcher in two copies, verifying participation in the current study and allowing the use of the collected data for later studies.



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UPPLÝST SAMÞYKKI FYRIR ÞÁTTTÖKU Í VÍSINDARANNSÓKN

„Mat á fæði með breyttri áferð og næringarþörf sjúklinga sem fá fæði með breyttri áferð á Landspítala“.

Ágæti skjólstæðingur Landspítala

Undirrituð, fann nafn þitt í matarpöntunarkerfi eldhúss Landspítala en þú hefur fengið fæði með breyttri áferð (maukfæði = M1, M2, M3 eða F4) í þrjá daga á innlagnartíma þínum. Undirrituð hefur óskað eftir því við þinn hjúkrunarfræðing að kanna hvort að ég megji hitta þig og bjóða þér þátttöku í Meistaraprófs rannsókn minni “Mat á fæði með breyttri áferð (maukfæði) og næringarþörf sjúklinga sem fá fæði með breyttri áferð á Landspítala“.

Þátttaka er ekki skylda og þú getur hætt þátttöku hvenær sem er án eftirmála. Einnig getur þú neitað að svara einstökum spurningum eða ræða einstök efnisatriði.

Markmiðið með rannsókninni er að meta gæði fæðis með breyttri áferð frá eldhúsi Landspítala og hvort að það mætir næringarþörf þeirra sjúklinga sem þurfa á slíku fæði að halda. Stefnt er að því að niðurstöður verkefnisins munu verða sendar til birtingar í virtum erlendum vísindatímaritum og verða kynntar fagfólki sem og almenningi.

Ítarlegri kynning á rannsókninni er að finna í kynningarbréfi sem fylgir með þessu undirskriftarblaði.

===

Ég undirrituð/-aður þátttakandi í verkefninu “Mat á fæði með breyttri áferð og næringarþörf sjúklinga sem fá fæði með breyttri áferð á Landspítala“ samþykki að svara tveimur (2) spurningalistum um fæðið og matmálstíma á Landspítala, að matarbakkar mínir séu skoðaðir og afgangar vigtaðir að loknum máltíðum, þrjá (3) daga yfir innlagnartíma minn. Að upplýsingar um fæðu og drykk sem ég neyti á deild séu skráðar og notaðar í rannsókninni, sem og að upplýsingar um aldur, kyn, hæð, þyngd, niðurstöður skimunar á næringarástandi, kyngingarmati og ástandi á munnnum og tönnum. Engin áhætta er í því fólgin að taka þátt í rannsókninni.

Þátttakandi hefur lesið kynningarbréf fyrir “Mat á fæði með breyttri áferð og næringarþörf sjúklinga sem fá fæði með breyttri áferð á Landspítala”.

Undirskrift þátttakanda:

Ég _____

lýsi því hér með yfir að ég gef víðtækt samþykki mitt af fúsum og frjálsum vilja fyrir því að taka þátt sem sjálfboðaliði í rannsókninni “Mat á fæði með breyttri áferð og næringarþörf sjúklinga sem fá fæði með breyttri áferð á Landspítala”. Með orðinu víðtækt er átt við að nota megri gögnin í þeirri rannsókn sem skilgreind er hér að ofan og í kynningarbréfinu en jafnframt til notkunar síðar í nánar skilgreindum rannsóknum á heilbrigðissviði sem sótt verður um fullt leyfi fyrir.

Mér hefur verið kynnt eðli og umfang þessarar vísindarannsóknar og í hverju þátttaka mín er fólgin. Ég er samþykk(ur) þátttöku og skrifa því undir þessi tvö eintök:

Dagsetning og staður:

Undirskrift þátttakanda

Undirritun þess sem aflar samþykkis

Ef þú hefur spurningar um rannsóknina eða vilt hætta þátttöku í rannsókninni getur þú snúið þér til Fríðu Rúnar Þórðardóttur í síma 543 1618 / 824 5815 eða í tölvupósti frida@landspitali.is

Ef þú hefur spurningar um rétt þinn sem þátttakandi í þessari vísindarannsókn getur þú snúið þér til siðanefndar heilbrigðisrannsókna á Landspítala – Rauðarárstíg 10, 105 Reykjavík. Sími: 543 7465, tölvupóstur: sidanefnd@landspitali.is.

UPPLÝST SAMÞYKKI ÞETTA ER Í TVÍRITI, ÞÁTTTAKANDI HELDUR EFTIR EINU
EINTAKI, SÁ SEM AFLAR SAMÞYKKIS HELDUR EFTIR ÖÐRU EINTAKI

Appendix D A specifically designed form, intended to be used by a ward nurse to ease in registering patient information from the patient registration system.

Upplýsingar um sjúkling

Könnun á viðhorfi sjúklinga á mauk- og þykkfljótandi fæði á Landspítala

Rannsóknar númer: _____ Dagsetning: _____

Hver fyllir út: FRÞ Hjúkrunarfræðingur Sjúkraliði

Fæðisgerð skv. pöntun deildar:

M1 M2 M3 F4

Kyn: Karl Kona

Aldur: _____ Hæð: _____ m Þyngd: _____ kg

Ástæða breyttrar fæðisáferðar:

Munn- & tannstatus:

Munnþurrkur: Nei Já

Nánar: _____

Niðurstöður kyngingarmats:

Niðurstöður skimunar á næringarástandi:

Stig: _____


Athugasemdir: _____

Fyrir rannsakanda: Útreikningar

Heildarorkuþörf:

Próteinþörf:

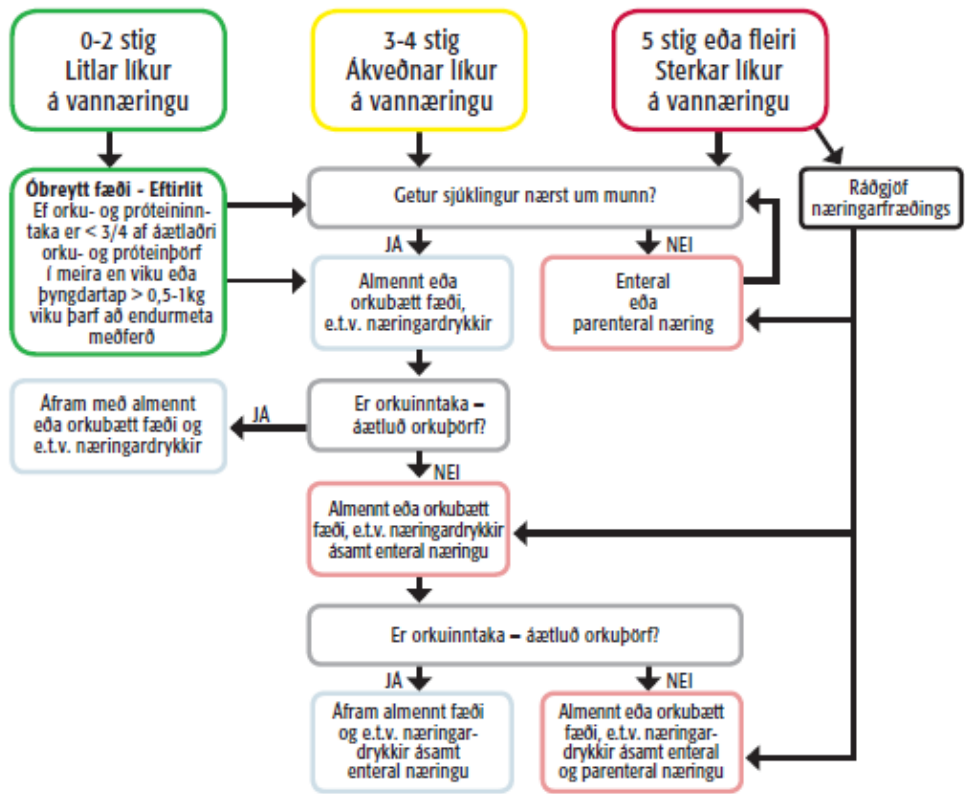
Appendix E A validated malnutrition screening form “Screening for nutritional Status” (21). The Icelandic version of the screening form.

 LANDSPÍTALI		Mat á áhættu á vannæringu		<small>Persónuupplýsingar sjúklings:</small>	
<p><i>Eyðublaðið er notað til að greina líkur á vannæringu fullorðinna. Merkt er við eftirfarandi atriði og gefin stig eftir því sem við á.</i></p>					
Spurning	Svar	Mat	Stig		
1. Hæð: _____ m Þyngd: _____ kg	Líkamsþyngdar- stuðull kg/m ² eða skv. töflu á bakhlið: _____	> 20 kg/m ² 18-20 kg/m ² < 18 kg/m ²	0 stig 2 stig 4 stig	<input type="checkbox"/>	
2. Ósjálfrátt þyngdartap undanfarið? Ef já, hve mikið _____ kg, á hve löngum tíma _____ mán => þyngdartap er _____ %	Já <input type="checkbox"/> Veit ekki <input type="checkbox"/> Nei <input type="checkbox"/>	> 5% sl. mánuð eða > 10 % sl. 6 mánuði 5-10% sl. 1-6 mánuði Veit ekki Nei	4 stig 2 stig 2 stig 0 stig	<input type="checkbox"/>	
3. Eldri en 65 ára?	<input type="checkbox"/> Já <input type="checkbox"/> Nei	Spurningar 3 til 6:		<input type="checkbox"/>	
4. Vandamál sl. vikur eða mánuði?		Já: 1 stig Nei: 0 stig			
A. Dagleg uppköst í meira en þrjá daga?	<input type="checkbox"/> Já <input type="checkbox"/> Nei	<input type="checkbox"/>			
B. Daglegur niðurgangur? <small>(þunnar hægðir þrisvar á dag eða oftar)</small>	<input type="checkbox"/> Já <input type="checkbox"/> Nei	<input type="checkbox"/>			
C. Viðvarandi léleg matarlyst eða ógleði?	<input type="checkbox"/> Já <input type="checkbox"/> Nei	<input type="checkbox"/>			
D. Erfiðleikar við að kyngja eða tyggja?	<input type="checkbox"/> Já <input type="checkbox"/> Nei	<input type="checkbox"/>			
5. Hefur legið á sjúkrahúsi í 5 daga eða lengur sl. 2 mánuði?	<input type="checkbox"/> Já <input type="checkbox"/> Nei	<input type="checkbox"/>			
6. Hefur gengið undir aðgerð sem telst veruleg sl. mánuð? Ef já hvað var gert? _____	<input type="checkbox"/> Já <input type="checkbox"/> Nei	<input type="checkbox"/>			
7. Sjúkdómar				<input type="checkbox"/>	
<input type="checkbox"/> Bruni > 15%		5 stig	<input type="checkbox"/>		
<input type="checkbox"/> Innlögn vegna vannæringar		5 stig	<input type="checkbox"/>		
<input type="checkbox"/> Fjöláverkar (multiple trauma)		5 stig	<input type="checkbox"/>		
				Stig samtals: <input type="text"/>	
Útfyllt af _____		Dags. _____			
<small>Undirskrift</small>					
5 stig eða fleiri => Sterkar líkur eru á vannæringu. Fyrir lungna- og krabbameinssjúklinga er miðað við 4 stig eða fleiri.					

Við innlögn: Mat á áhættu á vannæringu er framkvæmt innan 24-48 klst. eftir innlögn sjúklings og endurmetið eftir þörfum.

		Þyngd kg																																																					
		30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92	94	96	98	100	102	104	106															
Hæð m	2.00	8	8	9	9	10	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29										
	1.98	8	8	9	9	10	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29										
	1.96	8	8	9	9	10	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29										
	1.94	8	9	9	10	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29											
	1.90	8	9	9	10	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29											
	1.88	8	9	9	10	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29											
	1.86	9	9	10	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30										
	1.84	9	9	10	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30										
	1.82	9	10	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30											
	1.80	9	10	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30											
	1.78	9	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30												
	1.76	10	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30												
	1.74	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30													
	1.72	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30													
	1.70	10	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30														
	1.68	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30														
	1.66	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30															
	1.64	11	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30																
	1.62	11	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30																
	1.60	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30																	
1.58	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30																		
1.56	12	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30																			
1.54	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30																			
1.52	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30																				
1.50	13	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30																					
1.48	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30																					
1.46	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30																						
1.44	14	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30																							
1.42	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30																							
1.40	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30																								

< 18 Alvarleg undirþyngd 18 - 20 Undir kjörþyngd >20 - 25 Kjörþyngd >25 Ofþyngd



Appendix F A validated malnutrition screening form “Screening for nutritional Status” (21). Translated from Icelandic to English.

Question	Answer		Evaluation	Score
1) Height: Weight: BMI:	Kg: M: Kg/m ² :		BMI: > 20 18-20 < 18	0 2 4
2) Involuntarily weight loss recently? If yes, how many _____ kg In how long time _____ month(s) => Weight loss is _____ %	Yes Don't know No		>5% past month <u>or</u> >10% past months 5-10% past months Don't know No	 4 2 2 0
3) Older than 65 years:	Yes / No			1 / 0
4) Problems past weeks/ months A) daily vomiting > 3 days B) daily diarrhoea* C) persistent low appetite or nausea D) difficulty swallowing / chewing	Yes / No Yes / No Yes / No Yes / No		Questions 3-6 Yes = 1 point No = 0 point	1 / 0 1 / 0 1 / 0 1 / 0
5) Hospitalized ≥ 5 days past 2 months	Yes / No			1 / 0
6) Substantial surgery past Months. If so, what type of a surgery: _____	Yes / No			1 / 0
7. Diseases Burn > 15% Hospitalized due to malnutrition Multiple trauma	Yes / No Yes / No Yes / No		Question 7 Yes = 5 point No = 0 point	5 / 0 5 / 0 5 / 0
			Total points:	
<u>Evaluation:</u>				
Low risk of malnutrition				0 – 2
Some risk for malnutrition				3 – 4
Strong likelihood for malnutrition				5 +

*a thin/liquid stools ≥ 3 x day

Könnun á viðhorfi sjúklinga á mauk- og þykkfljótandi fæði á Landspítala

~~~~~  
Merkið **x** við það svar sem þið teljið réttast. Í sumum spurningum er þér bent á að fara yfir í aðra spurningu. Þar af leiðandi getur verið að þú sleppir einhverjum spurningum, sem eiga ekki við hjá þér.

Vinsamlegast skrifið ekki nafn, kennitölu né heimilisfang á spurningalistann

~~~~~  
1. Þegar á heildina er litið, hvernig finnst þér maturinn á spítalanum?

- 1 Mjög góður
- 2 Frekar góður
- 3 Frekar slæmur
- 4 Mjög slæmur
- 5 Ég fæ engan mat á spítalanum (*þeir sem merkja við hér hafa lokið þátttöku*)

2. Er maturinn lystugur?

- 1 Já, alltaf
- 2 Já, stundum
- 3 Nei

3. Er maturinn hollur að þínu mati?

- 1 Já, alltaf
- 2 Já, stundum
- 3 Nei
- 4 Veit ekki

4. Hversu mikinn mat færð þú?

- 1 Of mikinn
- 2 Hæfilegt magn
- 3 Of lítinn

5. Færð þú þann mat/máltíðir sem þú biður um?

- 1 Já, alltaf
- 2 Já, stundum
- 3 Nei
- 4 Ég fæ engan mat

6. Hefur þú einhverjar sérstakar þarfir eða langanir er tengjast mataræði (t.d. ofnæmi, sykursýki, grænmetisfæði)?

- 1 Já
- 2 Nei
- 3 Veit ekki

7. Telur þú matinn sem þú færð á spítalanum henta þörfum þínum?

- 1 Já, alltaf
- 2 Já, stundum
- 3 Nei
- 4 Veit ekki / get ekki svarað

8. Hefur þú einhvern tíma verið ófær um að borða á matmálstíma (t.d. vegna þess að þú varst ekki á deildinni eða varst að jafna þig eftir skurðaðgerð o.sfrv.)

- 1 Já
- 2 Nei (*svara næst spurningu 10*)
- 3 Veit ekki (*svara næst spurningu 10*)

9. Var þér boðið að fá aðra máltíð á öðrum tíma í staðinn?

- 1 Já, alltaf
- 2 Já, stundum
- 3 Nei
- 4 Ég vildi ekki fá mat
- 5 Ég mátti ekki fá mat (t.d. vegna þess að ég gat ekki borðað með munninum)
- 6 Veit ekki / get ekki svarað

10. Færð þú næga hjálp við að borða frá starfsfólki á deildinni?

- 1 Já, alltaf
- 2 Já, stundum
- 3 Nei
- 4 Ég þarf ekki hjálp við að borða

13. Hvernig er viðmót þeirra sem koma að máltíðarþjónustunni (afhending máltíða, upplýsingar um mat o.s.frv.)?

- 1 Mjög gott
- 2 Gott
- 3 Lélegt
- 4 Mjög lélegt
- 5 Veit ekki / get ekki svarað

Appendix H A newly designed quality assurance questionnaire (QAQ) for texture modified diets at Landspítali, specifically for this study.

Könnun á viðhorfi sjúklinga á mauk- og þykkfljótandi fæði á Landspítala

~~~~~

Merkið **x** við það svar sem þið teljið réttast. Í sumum spurningum er þér bent á að fara yfir í aðra spurningu. Þar af leiðandi getur verið að þú sleppir einhverjum spurningum, sem eiga ekki við hjá þér. Vinsamlegast skrifið ekki nafn, kennitölu né heimilisfang á spurningalistann

~~~~~

1. Hvar borðar þú?

- Oftast eða alltaf í rúminu
- Í stól eða hjólastól, inni á herbergi
- Í stól eða hjólastól, frammi í setustofu
- Veit ekki / get ekki svarað

Hvernig hentaði það þér?

2. Fannst þér hnífapörin og glösin henta þínum þörfum?

- Já
- Nei
- Veit ekki / get ekki svarað

3. Hentaði fæðisgerðin (maukfæðið, þykkfljótandi) þínum þörfum ?

- Já
- Að mestu
- Nei
- Veit ekki / ekki viss

4. Hvernig finnst þér útlit máltíða?

- Mjög gott
- Gott
- Allt í lagi
- Sæmilegt
- Mjög slæmt
- Veit ekki / ekki viss

5. Var maturinn nægjanlega heitur að þínu mati?

- Já
- Oftast
- Stundum
- Nei
- Veit ekki / ekki viss

6. Var lyktin af matnum í lagi að þínu mati?

- Já
- Oftast
- Stundum
- Nei
- Veit ekki / ekki viss

7. Vinsamlegast svaraðu lið A til F ef þú fékkst maukfæði

A) **Fiskurinn**

- Í lagi / hæfilegur
- Of þykkur
- Kekkjóttur (ef á M3 fæð)
- Of þurr
- Of þunnur / blautur
- Á ekki við

B) **Kjötið**

- Í lagi / hæfilegt
- Of þykkt
- Illa hakkað / mixað
- Of þurrt
- Of þunnt / blautt
- Á ekki við

C) **Grænmetið**

- Í lagi
- Of miklar örður / of gróft
- Of þunnt
- Á ekki við

D) **Grænmetis klattar**

- Í lagi
- Ekki gott
- Fékk ekki / veit ekki
- Var tilbreyting að fá klattana
 - Já
 - Nei, skipti ekki máli
 - Veit ekki / ekki viss

E) **Kartöflurnar / kartöflumúsinn**

- Í lagi
- Of þykk (kartöflumúsinn)
- Of þunn (kartöflumúsinn)
- Á ekki við

F) **Sósan / smjörrið**

- Hæfilegt magn
- Of lítið magn
- Of mikið magn
- Á ekki við

8. Voru eftirréttir í hæfilegri þykkt

A) **Súpur**

- Í lagi / hæfilegar
- Of þykkar
- Of þunnar
- Á ekki við

B) **Gautar / vellingar**

- Í lagi / hæfilegir
- Of þykkir
- Of þunnir
- Á ekki við

C) **Ávaxta- / berjagrautar / ávaxtamauk**

- Í lagi / hæfilegt
- Of þykkt
- Of þunnt
- Of miklar örður / of gróft
- Á ekki við

9. Voru millimáltíðir við hæfi?

A) **Kökur**

- Í lagi
- Ekki í lagi
- Á ekki við

B) **Brauð**

- Í lagi
- Ekki í lagi
- Á ekki við

C) **Álegg**

- Í lagi
- Ekki í lagi
- Á ekki við

D) **Skyr**

- Í lagi
- Ekki í lagi
- Á ekki við

E) **Jógúrt**

- Í lagi
- Ekki í lagi
- Á ekki við

F) **Búðingar**

- Í lagi
- Ekki í lagi
- Á ekki við

10. Hvernig gengur að drekka vökva?

A) **Vatn/ kaffi / te**

- Í lagi
- Ekki í lagi/svelgist á / hóstar/ þarf að ræskja sig
- Á ekki við

B) **Safa, gosdrykki**

- Í lagi
- Ekki í lagi/svelgist á / hóstar/ þarf að ræskja sig
- Á ekki við

C) **Næringardrykki**

- Í lagi
- Ekki í lagi/svelgist á / hóstar/ þarf að ræskja sig
- Á ekki við

D) **Þykktir drykkir**

- Í lagi
- Ekki í lagi/svelgist á / hóstar/ þarf að ræskja sig
- Á ekki við

Ef ekki í lagi, vinsamlegast skýrið nánar:

11. Upplifir þú óeðlilegt eða skrítið bragð af mat og drykkjum? Já Nei

Ef já, hafði það áhrif á matarlyst? Já Nei

Annað sem þú vilt koma á framfæri:

Kærar þakkir fyrir þátttökuna

Fríða Rún Þórðardóttir

Næringarfræðingur, MS næringarfræðinemi

Appendix I Information letter to the head nurse of all selected wards, including the research questions and a detailed description on the purpose and importance of the study. The inclusion criteria, what is asked for on behalf of the ward staff and information on used forms. Finally, asking for participation and co-work on behalf of her staff.

Ágæti deildarstjóri

Fríða Rún Þórðardóttir heiti ég og er næringarráðgjafi í Eldhúsi Landspítala og MS nemi við Háskóla Íslands. MS rannsókn mín, sem er í umsagnarferil hjá Siðanefnd og Vísindarannsóknarnefndar heilbrigðisrannsókna Landspítala, fjallar um gæði fæðis með breyttri áferð (M1, M2, M3, F4) á Landspítala og hvernig fæðið mætir næringarþörf sjúklinga. Ber hún heitið „Mat á fæði með breyttri áferð og næringarþörf sjúklinga sem fá fæði með breyttri áferð á Landspítala”.

Ingibjörg Gunnarsdóttir deildarstjóri Næringarstofu er ábyrgðarmaður rannsóknarinnar innan Landspítala og þau Ólöf Guðný Geirsdóttir og Alfons Ramel eru leiðbeinendur mínir af hálfu Háskóla Íslands.

Markmið með rannsókninni

Markmið rannsóknarinnar er að meta inntöku á vökva, orku- og orkuefnum (kolvetnum, próteinum og fitu) hjá sjúklingum á Landspítala sem fá fæði með breyttri áferð og hvort þörf þeirra sé fullnægt. Einnig að meta með spurningalista ánægju þeirra með það fæði sem þau fá frá eldhúsi Landspítala, hvernig þau upplifðu máltíðirnar og drykki, áhöldin sem þau notuðu og umhverfið sem þau mötuðust í. Einnig verður spurt um bragð og áferð af þeim mat og drykk sem sjúklingarnir fengu og hvort það að fá matseðil á hádegis- og kvöldverðarbakkanna myndi hafa áhrif á upplifun og fæðuneyslu.

Rannsóknaspurningar:

Hversu algengt er að pantað sér fæði með breyttri áferð á Landspítala?

Hvað einkennir þá sjúklinga sem fá fæði með breyttri áferð?

Hver er vökva, orku- og próteinþörf sjúklinga sem fá fæði með breyttri áferð?

Mætir vökvainntaka og orku- og próteinmagn fæðis með breyttri áferð þörfum sjúklinga?

Hversu hátt hlutfall af fæðu með breyttri áferð er ekki borðað og veldur matarsóun?

Hvernig líkar sjúklingum sem fá fæði með breyttri áferð maturinn sem þeir fá?

Mikilvægi rannsóknarinnar:

Fyrst, að vinna að úttekt á fæði með breyttri áferð frá eldhúsi Landspítala sem er fyrirmynd margra annarra íslenskra sjúkrastofnana og námsstaður tilvonandi matartækna sem starfa víðsvegar um landið. Rétt val á fæðisgerð og fullnægjandi framleiðsla fæðis með breyttri áferð er mikilvægur þáttur er snýr að öryggi sjúklinga og næringarinntöku þeirra en fyrir sjúkling með kyngingarörðugleika getur verið skaðlegt að fá fæðu sem hann ræður ekki við.

Nægjanleg vökvainntaka kemur inn á marga lífeðlisfræðilega þætti en einnig hefur vökvainntaka áhrif á viðbrögð og virkni kyngingar-kerfisins með sérstök áhrif á munnkok.

Úrtak:

Úrtakið er sjúklingar á deildum Landspítala sem fá fæði með breyttri áferð frá eldhúsi. Reikna má með að megin þorri sjúklinganna verði af öldrunardeildum á Landakoti og Vífilstöðum, B4 í Fossvogi en einnig frá öðrum legudeildum Landspítala fyrir utan barnadeildir.

Inntökuskilyrði:

Sjúklingur þarf að hafa verið á fæði með breyttri áferð / maukfæði frá eldhúsi í þrjú daga áður en að spurninglistinn er lagður fyrir hann. Þrjú dagar var talinn hæfilegur tími til að sjúklingurinn hefði fengið fisk og kjötrétt, fjölbreytilegt úrval meðlætis, eftirrétta og millimáltíða og gæti því betur myndað sér skoðun á þeirri fæðu sem hann fékk og hvernig hún hentaði honum. Einnig, að innan þess tímaramma hafi sjúklingur mögulega öðlast betri líðan og treystir sér frekar til að svara spurningunum.

Tilgangur þessa bréfs er að leita eftir samþykki þínu fyrir því að rannsóknin verði framkvæmd á þinni deild. Meðfylgjandi eru spurningalistarnir tveir og eyðublaðið sem rannsakandi notar til að skrá upplýsingar um sjúklinginn, alls 3 viðhengi. Rétt er að taka fram að rannsakandi hyggst sjálf leggja spurningalistana fyrir og því ætti álag á starfsmenn deildar ekki að aukast á neinn hátt. Upplýsingar um viðbótar næringar- og vökvainntöku myndu verða teknar af skráningarblaði við rúm sjúklings.

Með von um að þér lítist vel á rannsóknina og gefir þitt leyfi til að undirrituð muni hitta sjúklinga á þinni deild til að leggja fyrir þá spurningalistana ef ábyrgur hjúkrunarfræðingur deildarinnar gefur til þess leyfi í hverju tilfalli. Einnig að undirrituð fái að taka niður upplýsingar af vövaskráningarblaði við rúm sjúklings. Að lokum, og óska eftir því að þakkar með afgangum af mat séu settir inn í matarvagn að máltíð lokinni með matarkortinu á og án þess að hreyft sé við afgangum með það að markmiði að afgangar séu skoðaðir og inntaka sjúklingsins mæld.

Í fjórða viðhenginu er eyðublað sem undirrituð biður þig að undirrita, skanna inn og senda til baka samþykki þínu til staðfestingar.

Með kveðju

Fríða Rún Þórðardóttir, Næringarráðgjafi, MS nemi við Háskóla Íslands

Appendix J Confirmation document signed by each head nurse verifying understanding and participation of her ward in the study. A letter to the head nurse informing that the study is starting.

Reykjavík 13. desember 2021

Með undirritun minni staðfesti ég undirrituð/undirritaður

_____ deildarstjóri á _____ að

Fríðu Rún Þórðardóttur, næringarfræðingi og MS nema er heimilt að framkvæma rannsóknina „Mat á fæði með breyttri áferð og næringarpörf sjúklinga sem fá fæði með breyttri áferð á Landspítala“ á deild minni.

Ég hef kynnt mér markmið rannsóknarinnar, spurningalistana (2) og eyðublaðið sem nota á og hvaða gögnum öðrum verður safnað en það eru upplýsingar um viðbótar neyslu á fæðu og drykk af skráningarblaði við rúm sjúklings og afgangum af mat sem sjúklingur skilur eftir að aflokinni máltíð.

Nafn:

Netfang:

Sími:

Appendix K A text from an informational letter to each head nurse informing that the study was to start and reminding about the tasks of each ward.

Kæru deildarstjórar

Með þessu bréfi langar mig að tilkynna ykkur að rannsóknin mín á fæði með breyttri áferð er að hefjast.

Mig langar einnig að biðja ykkur um að kynna rannsóknina meðal ykkar starfsfólks og hlutverk deildar í henni er snýr að undirbúningi og framkvæmd. Það hlutverk er að meta getu sjúklings til þátttöku í rannsókninni, ræða við sjúkling um mögulega þátttöku, upplýsa rannsakanda og fylla út eyðublað með tilteknum persónulegum upplýsingum um sjúkling. Einnig að halda vel utan um og skrá alla fæðuinntöku á deild sem er utan þess sem kemur frá eldhúsi.

Fylgst er með inn- og útskriftum dagalega gegnum matarpöntunarkerfi og haft samband við hjúkrunarfræðing á degi eitt af innlögn sjúklings á fæði með breyttri áferð til að kanna hvort að hann/hún telji að sjúklingur sé fær um að taka þátt í rannsókninni og gefa upplýst samþykki fyrir að gögn um hann séu lögð fram og að fæðuinntaka sé vigtuð og metin. Ef að hjúkrunarfræðingur metur það svo að sjúklingur sé fær um þetta er hann beðinn um að kanna hug sjúklings gagnvart þátttöku í rannsókninni.

Á degi þrjú af innlögn er haft samband við deild til að kanna mat hjúkrunarfræðings og svar sjúklings og leggja inn beiðni um að næsta dag sé sjúklingur spurður hvort að hann/hún sé tilbúin að hitta rannsakanda og svara spurningalistum.

Þegar rannsakandi kemur og hittir sjúkling er hjúkrunarfræðingur beðinn um að fylla út eyðublað með upplýsingum um sjúkling. Rannsakandi kynnir rannsóknina fyrir sjúklingi, kynnir honum rétt hans, fær undirskrift á upplýst samþykki eyðublað og leggur spurningalistann að lokum fyrir sjúkling.

Þess skal gætt að undirritað upplýst samþykki, spurningalistar og eyðublaðið fylgi rannsakanda af deild að viðtali loknu.

Bakki er skammtaður á færibandni skv. matarkorti og sendur með matarbíl á deild þar sem bakkinn er færður skjólstæðingi. Þegar sjúklingur hefur borðað nægju sína er bakkinn með matarkorti sett inn í matarvagn sem síðan er fluttur til baka til eldhúss á Hringbraut.

Nauðsynlegt er að matarkort fylgi matarbakkanum til sjúklings og frá honum að máltíð lokinni.

Næstu daga eru matarfgangar af bakka sjúklings vigtaðir og reiknað út hversu mikið var borðað af því sem skammtað var á diskinn og bakkann. Einnig er upplýsingum safnað um fæðuinntöku á deild sem er utan þess sem eldhús skammtar.