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ESPEN Guideline

ESPEN guideline on hospital nutrition

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SUMMARY

In hospitals through Europe and worldwide, the practices regarding hospital diets are very heterogeneous. Hospital diets are rarely prescribed by physicians, and sometimes the choices of diets are based on arbitrary reasons. Often prescriptions are made independently from the evaluation of nutritional status, and without taking into account the nutritional status. Therapeutic diets (low salt, gluten-free, texture and consistency modified, …) are associated with decreased energy delivery (i.e. underfeeding) and increased risk of malnutrition. The European Society for Clinical Nutrition and Metabolism (ESPEN) proposes here evidence-based recommendations regarding the organization of food catering, the prescriptions and indications of diets, as well as monitoring of food intake at hospital, rehabilitation center, and nursing home, all of these by taking into account the patient perspectives. We propose a systematic approach to adapt the hospital food to the nutritional status and potential food allergy or intolerances. Particular conditions such as patients with dysphagia, older patients, gastrointestinal diseases, abdominal surgery, diabetes, and obesity, are discussed to guide the practitioner toward the best evidence based therapy. The terminology of the different useful diets is defined. The general objectives 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.

1. Introduction

1.1. Background

In hospitals throughout Europe and worldwide, the practices regarding hospital food are heterogeneous. The use, and if any, the prescriptions, of hospital diets are sometimes based on arbitrary non-scientific criteria or caregivers' personal beliefs. Hospital surveys on practices regarding hospital diets revealed that therapeutic diets such as low salt or gluten-free diet, or texture and consistency

Abbreviations: BMI, body mass index; BW, body weight; EN, enteral nutrition; FODMAP, fermentable oligo, di-, monosaccharides, and polyols; LCT, long-chain triglycerides; MCT, medium-chain triglycerides; NCGS, Non-Celiac Gluten Sensitivity; ONS, oral nutritional supplements; PN, parenteral nutrition; RCT, randomized controlled trial.

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modified diets, are associated with decreased energy delivery and thus associated with an increased risk of malnutrition [1,2]. In many clinics, prescriptions of hospital diets are made independently from the evaluation of nutritional status, and without taking into account the nutritional status.

1.2. Objectives

With the present guideline, ESPEN aims to provide as much as possible evidence-based recommendations regarding the diets needed in hospitals, rehabilitation centers, and nursing homes, their particular 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. Where evidence is not available yet, clear recommendations based on best knowledge and consensus among the experts are given. A thorough terminology of the needed diets is also provided. The recommendations are aimed at physicians, dietitians, nurses, and kitchen managers, in hospitals and nursing homes. The recommendations aim to cover all areas of the hospital, except the surgical intensive care unit and major burns units that are out of the scope of this guideline.

The present European guideline, which is to our knowledge the first on this topic on an European level, emphasizes the importance of proper nutritional assessment as a prerequisite for the prescription of a diet [3]. Furthermore, the prescription should be accompanied by nutritionist physicians and dietitians and be integrated into the hospital's nutrition care plan for appropriate evaluation [3].

2. Methodology

2.1. General methodology

The present guideline was developed according to the standard operating procedure for ESPEN guidelines [4]. The guideline was developed by an expert group of six physicians and five dietitians. Based on the standard operating procedures for ESPEN guidelines and consensus papers, the first development step of this guideline was the formulation of so-called PICO questions to address specific patient groups (or problems), interventions, **c**ompare different therapies and be outcome-related [5]. In total, 24 PICO questions were created; to answer these PICO questions, a literature search was performed to identify suitable meta-analyses, systematic reviews, and primary studies (for details see below, “search strategy”). Each PICO question was allocated to subgroups/experts for the different topics and 57 recommendations answering the PICO questions were formulated. The grading system of the Scottish Intercollegiate Guidelines Network (SIGN) was used to grade the literature [6]. The allocation of studies to the different levels of evidence is shown in Table 1. Supporting the recommendations, the working group added commentaries to the recommendations to explain the basis of the recommendations.

According to the levels of evidence assigned, the grades of recommendation were decided (Table 2). In some cases, a downgrading from the generated grades of recommendation was necessary based on the levels of evidence according to Tables 1 and 2, e. g. due to a lack of quality of primary studies included in a meta-analysis. Such cases are described in the commentaries accompanying the respective recommendations. The wording of the recommendations reflects the grades of recommendations since level A is indicated by the use of the word “shall”, level B by the word “should” and level 0 by the word “can” or “may”. The good practice points (GPP) are based on experts' opinions due to the lack of studies, for which the choice of wording was not restricted.

Table 1
Definition of levels of evidence.

1++	High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
1+	Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias
1-	Meta-analyses, systematic reviews, or RCTs with a high risk of bias
2++	High quality systematic reviews of case control or cohort or studies. High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
2+	Well-conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
2-	Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
3	Non-analytic studies, e.g. case reports, case series
4	Expert opinion

According to the Scottish Intercollegiate Guidelines Network (SIGN) grading system [6].

Between 13th February and 15th March 2020, online voting on the recommendations was performed using the guideline-services.com platform. All ESPEN members were invited to agree or disagree with the recommendations and to provide comments. A first draft of the guideline was also made available to the participants on that occasion. Twenty-nine recommendations reached an agreement >90%, 22 recommendations reached an agreement of >75–90%, and six recommendations an agreement ≤75%. Those recommendations with an agreement higher than 90% (indicating a strong consensus, Table 3) were directly passed, and all others were revised according to the comments and voted on again. Two recommendations were deleted based on the comments given in the voting. An originally planned physical consensus conference was canceled due to the Covid-19 pandemic. Instead, a second online voting took place between 7th July and 31st August 2020. Some recommendations which originally had received more than 90% agreement were also voted on during the second online voting due to major changes in wording. During the second voting, all recommendations except for eleven of them received an agreement higher than 90%. Of those below 90%, ten received an agreement >75%, one an agreement >50%. The final guideline comprises 56 recommendations. To support the recommendations and the assigned grades of recommendation, the ESPEN guideline office created evidence tables of relevant meta-analyses, systematic reviews, and (randomized) controlled trials. These evidence tables are available online as supplemental material to this guideline.

Table 2
Definition of grades of recommendation [5].

A	At least one meta-analysis, systematic review, or RCT rated as 1++, and directly applicable to the target population; or A body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results
B	A body of evidence including studies rated as 2++, directly applicable to the target population; or A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1++ or 1+
0	Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2++ or 2+
GPP	Good practice points/expert consensus: Recommended best practice based on the clinical experience of the guideline development group

Table 3
Classification of the strength of consensus.

Strong consensus	Agreement of >90% of the participants
Consensus	Agreement of >75–90% of the participants
Majority agreement	Agreement of >50–75% of the participants
No consensus	Agreement of <50% of the participants

According to the AWMF methodology [7].

2.2. Search strategy

The literature search was performed separately for each PICO question in May 2019 by using the Pubmed and Cochrane databases with the search terms presented in Table 4. Existing guidelines were also considered. The aim was to give clear recommendations regarding the indications of therapeutic diets at hospital, rehabilitation center, and nursing home in different settings: e. g. gastroenterology (low-fiber diet, realimentation after gastrointestinal bleeding, pancreatitis, gluten-free diet, FODMAPs, chyle leakage, intestinal lymphagectasia …), endocrinology and nutrition (low-calorie diet, low sugar diet, particularly in the setting of the risk of malnutrition in acute care obese patients, rare metabolic diseases), cardiology – nephrology-hepatology (low salt diet), geriatrics (diets with texture and consistency modified), hematology (neutropenic diet), as well as indications for high-protein diets. This guideline also proposes methods for semi-quantitative assessment of food intake as now recommended by the GLIM consensus [8].

3. Glossary

3.1. Diet(ary) counselling

Diet(ary) counselling, in accordance with the professional lanuage for dietitians, is « a supportive process, characterized by a collaborative counselor–client relationship, to establish food, nutrition and physical activity priorities, goals, and action plans that acknowledge and foster responsibility for self-care to treat an existing condition and promote health » [9].

3.2. Oral nutritional supplements (ONS)

Oral nutritional supplements (ONS) are developed to provide energy and nutrient-dense solutions that are provided as ready-to-drink liquids, cremes, or powder supplements that can be prepared as drinks or added to drinks and foods. Liquid ONS (either ready to drink or made up from powders) are sometimes referred to as sip feeds.

3.3. Standard diet

The standard diet should cover nutrient and energy requirements according to recommendations based on scientific evidence for the general population. Diet composition takes local food habits and food patterns into account (Table 5), as long as there are no specific therapeutic requirements, in which cases a therapeutic diet is required. This diet is aimed mainly at younger patients without disease-related metabolic stress.

3.4. Hospital diet

The hospital diet should cover individual patient's nutrient and energy requirements according to recommendations based on scientific evidence for 65 years and older patients, patients with an acute or chronic disease at risk for or with malnutrition or with disease-related metabolic stress. Diet composition takes local food habits and food patterns into account (Table 5).

3.5. Therapeutic diet

Therapeutic diets are prescribed according to the specific disease or needs of a patient.

3.6. Food product

A food product is any food that is suitable for human consumption which provides energy-containing macronutrients (e.g. carbohydrates, proteins, fats), and/or micronutrients (e.g. vitamins, minerals), and/or other substances which may contribute to fulfilling the nutritional requirements of the patient.

3.7. Food modification

Some conditions or disorders, e.g. diabetes, hyperlipidemia, hepatic encephalopathy, renal or celiac disease, may require food modifications that could include adjustments of carbohydrate, fat, protein, and micronutrient intake, or the avoidance of specific allergens.

3.8. Food fortification

Fortified food is a food product to which vitamins, minerals, energy, protein, or other nutrients, or a combination of them, have been added to increase energy or nutrient density.

3.9. Food supplement

A food supplement is a food product that supplements a normal diet. It is a concentrated source of nutrients (e.g. vitamins or minerals) or other substances with a nutritional or physiological effect, alone or in combination, marketed in various dose forms: capsules, tablets and similar forms, sachets of powder, ampoules of liquids, drop dispensing bottles, and other similar forms oral dosage forms, liquids, and powders designed to be taken in measured small unit quantities.

3.10. Texture modified food and thickened fluids

Texture modification of food and/or drink is an important intervention used so that people with dysphagia can swallow effectively and safely. However, the different names for and number of levels of modification and the characteristics used within and across countries all increase the risk to patient safety. One internationally recognized standardized system for evaluating and describing different levels of texture modified food and thickened fluids is the International Dysphagia Diet Standardisation Initiative (IDDSI), which provides a common terminology for food textures and drink thickness (https://iddsi.org). Although there are no harmonized descriptors, they could be described as follows:

- Liquidized/thin puree; homogenous consistency that does not hold its shape after serving.
- Thick puree/soft and smooth; thickened, homogenous consistency that holds its shape after serving and does not separate into a liquid and solid component during swallowing, i.e., cohesive.
- Timbal: homogenous smooth consistency that is omelette-like in texture and made from smooth purees mixed with egg and then baked. Timbal holds its shape after serving, is not sticky and does not separate into a liquid and solid component after

Table 4
Search terms.

PICO question No.	Search terms
1	hospital food (review <10yr), hospital nutrition, energy requirements hospital, protein requirements hospital, nutritional requirements hospital, hospital meal.
2	diet fractioning, fractionation, fractioned meals, meal frequency, meal timing, snacks, hospital
3	hospital distribution system, hospital food service, patient catering, hospital catering, hospital food delivery, logistics
4	hospital & vegan, vegetarian diet, religious diet, food preferences, malnutrition
5	gluten free diet, celiac gluten, malnutrition, lactose intolerance, review
6	(((Randomized controlled trial[Publication Type] OR Controlled clinical trial[Publication Type]) OR (Randomized[Title/Abstract] OR Placebo [Title/Abstract] OR Randomly[Title/Abstract] OR Trial[Title/Abstract] OR Groups[Title/Abstract])) OR Drug therapy[MeSH Subheading])) OR ((meta-analysis[MeSH Terms]) AND (systematic* review*[Title/Abstract] OR meta-anal*[Title/Abstract] OR metaanal*[Title/Abstract]))) AND Humans[Mesh])) NOT (((((((Randomized controlled trial[Publication Type] OR Controlled clinical trial[Publication Type])) OR (Randomized[Title/Abstract] OR Placebo[Title/Abstract] OR Randomly[Title/Abstract] OR Trial[Title/Abstract] OR Groups[Title/Abstract])) OR Drug therapy[MeSH Subheading])) OR ((meta-analysis[MeSH Terms]) AND (systematic* review*[Title/Abstract] OR meta-anal*[Title/ Abstract] OR metaanal*[Title/Abstract]))) AND Animals[Mesh:noexp]))) NOT ((((Adolescent OR middle aged OR young adult OR child OR infant[MeSH Terms]))) NOT Aged[MeSH Terms]))) AND ((malnutrition[mesh] OR malnutrition[tiab] OR “nutritional deficiencies”[tiab] OR “nutritional deficiency”[tiab] OR malnourishment [tiab] OR undernutrition[tiab]))) AND ((diet therapy[mh] OR diet[tiab] OR dietary[tiab] OR “hospital food”[tiab]))
7	Indication for high protein diet AND hospital
8	Indication for low calorie diet AND low Protein diet AND hospital
9	low protein diet AND liver disease, low protein diet AND hepatic encephalopathy, low protein diet AND chronic kidney disease, restricted protein diet AND liver disease, restricted protein diet AND hepatic encephalopathy, restricted protein diet AND chronic kidney disease, nutrition AND liver, nutrition AND kidney, diet AND kidney disease, diet AND liver.
10	Chyle leakage AND diet, chyle AND nutrition, chyle leakage pancreatectomy, chyle leakage esophagectomy, chylous ascites, low fat diet
11	FODMAP AND hospital diet, FODMAP AND hospital menu, FODMAP AND diet, FODMAP AND hospital food, Irritable bowel disease AND hospital diet, fermentable oligo-, di-, mono-saccharides AND polyols, FODMAP diet, irritable bowel syndrome diet, FODMAP OR (fermentable oligo-, di-, mono-saccharides and polyols) OR (fermentable, poorly absorbed, shot-chain carbohydrates) AND (Nutritional Status) OR (nutrition assessment) OR (nutritional requirements/or recommended dietary allowances), FODMAP OR (fermentable oligo-, di-, mono-saccharides and polyols) OR (fermentable, poorly absorbed, shot-chain carbohydrates) AND (parenteral nutrition, total) OR (parenteral nutrition) OR (Enteral nutrition) OR (exp Diet) OR (diet)
12	low fiber diet, low fibre diet, low fiber AND nutrition, low fibre AND nutrition, low fiber AND food
13	Neutropenic diet AND cancer, Neutropenic diet AND haematopoietic stem cell transplantation.
14	sodium restriction AND chronic cardiac failure; sodium restriction AND chronic heart failure; sodium restriction AND chronic renal failure; sodium restriction AND chronic kidney failure; sodium restriction AND chronic kidney disease; sodium restriction AND arterial hypertension; sodium restriction AND liver cirrhosis
15	corticosteroid therapy AND diet; corticosteroid therapy AND sodium restriction; prednisolone AND diet; prednisolone AND calorie restriction; corticosteroid therapy AND malnutrition
16	diabetes AND low carbohydrate diet; diabetes AND diet; diabetes AND malnutrition; insulinotherapy AND diet
17	(“texture diet”[tiab] OR “modified diet”[tiab] OR “texture modified”[tiab] OR “modified food”[tiab] OR “texture food”[tiab] OR “food consistency”[tiab] OR “diet consistency”[tiab] OR “diet texture”[tiab] OR “food texture”[tiab] OR “modified texture”[tiab]) AND ((((((((((((Randomized controlled trial[Publication Type] OR Controlled clinical trial[Publication Type])) OR (Randomized[Title/Abstract] OR Placebo[Title/Abstract] OR Randomly[Title/Abstract] OR Trial[Title/Abstract] OR Groups[Title/Abstract])) OR Drug therapy[MeSH Subheading])) OR ((meta-analysis[MeSH Terms]) AND (systematic* review*[Title/Abstract] OR meta-anal*[Title/Abstract] OR metaanal* [Title/Abstract]))) AND Humans[Mesh])) NOT (((((((Randomized controlled trial[Publication Type] OR Controlled clinical trial[Publication Type])) OR (Randomized[Title/Abstract] OR Placebo[Title/Abstract] OR Randomly[Title/Abstract] OR Trial[Title/Abstract] OR Groups[Title/ Abstract])) OR Drug therapy[MeSH Subheading])) OR ((meta-analysis[MeSH Terms]) AND (systematic* review*[Title/Abstract] OR meta-anal*[Title/Abstract] OR metaanal*[Title/Abstract]))) AND Animals[Mesh:noexp]))) NOT ((((Adolescent OR middle aged OR young adult OR child OR infant[MeSH Terms]))) NOT Aged[MeSH Terms])))
18	Dysphagia AND (Hospital food OR diet), dysphagia AND modification of food consistency, dysphagia AND modification of fluid consistency, dysphagia AND thickening agent, dysphagia AND spinal cord injuries, dysphagia AND als, dysphagia AND tetraplegia, swallowing disorders AND (hospital food OR diet)
19	acute pancreatitis AND hospital food, acute pancreatitis AND hospital nutrition, acute pancreatitis AND oral feeding, acute pancreatitis AND oral nutrition
20	gastrointestinal surgery AND diet, gastrointestinal surgery AND nutrition, gastrointestinal surgery AND hospital food, gastric surgery AND diet, gastric surgery AND nutrition, pancreatic surgery AND diet, pancreatic surgery AND nutrition, colorectal surgery AND diet, colorectal surgery AND nutrition, oesophageal surgery AND diet, oesophageal surgery AND nutrition
21	gastrointestinal bleeding AND hospital food, gastrointestinal bleeding AND hospital nutrition, gastrointestinal bleeding AND oral feeding, gastrointestinal bleeding AND oral nutrition, gastrointestinal haemorrhage AND hospital food, gastrointestinal haemorrhage AND hospital nutrition, gastrointestinal haemorrhage AND oral feeding, gastrointestinal haemorrhage AND oral nutrition
22	For studies and systematic reviews published between 2010 and 2020 using keywords realimentation AND endoscopy; realimentation AND gastrostomy; realimentation AND colonoscopy; diet AND endoscopy; diet AND gastrostomy; diet AND colonoscopy.
23	restrictive diet, modified diet, multiple diet, combination diet, malnutrition, hospital, elderly
24	Food intake assessment AND hospital, food energy AND evaluation, dietary intakes AND evaluation AND hospital

serving or during swallowing, i.e., cohesive. Can be eaten with a spoon or fork.
- Finely minced; soft diet of cohesive, consistent textures requiring some chewing (particle size most often described as 0.5 * 0.5 cm).
- Modified normal; normal foods of varied textures that require chewing, avoiding particulate foods that pose a choking hazard (particle size most often described as 1.5 * 1.5 cm).

3.11. *Care catering or hospital catering*

Care catering or hospital catering is the provision of menu services (in-house or outsourced) in health care facilities. 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. Special diets, food texture, allergies, and specific cultural aspects have to be

Table 5
Nutrient content in the standard and hospital diets. According to countries and hospitals, these nutritional objectives can be reached using different number and size of served portions (see Suppl Table 7).

Nutrient	Standard Diet	Hospital Diet
Energy (kcal/kg BW)	25	30
Protein (g/kg BW)	0.8–1.0	1.2–2.0*
Carbohydrate (E%)	50–60	45–50
Lipids (E%)	30–35	35–40
Protein (E%)	15–20	20–25
Added sugar (E%)	<10	–
Saturated fat (E%)	<10	–
Monounsaturated fat (E%)	10–20	–
Polyunsaturated fat (E%)	5–10	–
n-3 fatty acids (E%)	>1	–
EPA and DHA (mg/d)	500	–
Fibre (g/d)	30	0–30

BW, body weight; d, day; DHA, docosahexaenoic acid; EPA, eicopentaenoic acid; E%, percentage of daily total energy; n-3, omega3. *Oral nutritional supplements are likely to be used in case the objective of 2 g/kg/day of protein needs to be achieved.

considered at all times. For patients with, or at risk for, malnutrition, informed choices concerning food items and portion sizes have to be ensured. Daily (at least from 7 am to 7 pm) access to nutritionally relevant and well-prepared food should be mandatory, and served portions must appear appetizing for the individual. Energy-dense small-size portions should be available as an option for patients at nutritional risk.

3.12. Protein intake

Protein intake is indicated in g/kg body weight/day. In obese individuals, body weight (BW) can be replaced by adjusted BW according to the formula “Ideal BW plus (actual BW minus ideal BW) x 0,33”, whereas ideal BW can be calculated as the BW that corresponds to a body mass index (BMI) of 25 kg/m^2.

The following terms have been established:

- extra low protein intake: under 0.6 g/kg BW/day
- low protein intake: 0.6–0.79 g/kg BW/day
- normal protein intake: 0.8–1.0 g/kg BW/day
- high protein intake: 1.1–1.3 g/kg BW/day
- extra high protein intake: over 1.3 g/kg BW/day

Independent of protein intake, sodium chloride intake should be between 6 and 8 g/day.

4. Results

4.1. General statements

4.1.1. *Recommendation 1*

Each hospital, rehabilitation center, and nursing home should have a list of available diets visible for patients and personnel.

Grade of recommendation GPP – strong consensus (96.5% agreement).

Commentary.

At the hospital, and surely outside too, food is part of patient care. Meals should also be associated with pleasure, even at hospital, rehabilitation center, and nursing home. To ensure hospital food is adapted to patient disease and care, a diet list should be made available for both patients and personal. Ideally, patients should have the possibility to choose between several menus. An objective of the present guideline is to advise decision-makers which diets are mandatory for a hospital menu.

4.1.2. *Recommendation 2*

Each hospital shall have a structured hospital food facility consisting of a kitchen, a delivery system, and an ordering system.

Grade of recommendation GPP – consensus (89.5% agreement).

Commentary.

As all other recommendations within the first chapter of the guideline, this recommendation is obvious and based on “good practice point” (GPP) instead of evidence from the literature. The different facilities should have well-defined responsibilities and persons to contact in case of problems (see next recommendation). The wording ‘hospital‘ includes hospitals, rehabilitation centers, and nursing homes.

4.1.3. *Recommendation 3*

Clear responsibilities for hospital food production and delivery are necessary for all areas of food supply (ward, kitchen, delivery).

Grade of recommendation GPP – strong consensus (98.3% agreement).

Commentary.

For centers such as small hospitals, rehabilitation centers, or nursing homes that have not their own kitchen, a catering system is providing food, and sometimes hospital central kitchen could distribute the food to several hospitals, rehabilitation centers, or nursing homes. This could not be the case for large hospitals. In some European countries, it could be that catering companies are designing meals that are not adapted for patients with acute diseases who are at high risk of malnutrition or malnourishment. To ensure the best adaptations of hospital food to the patients, a structured hospital facility should be available at the hospital for ordering, cooking, and delivering the food. To optimize the organization, each actor of the chain should have clear roles and responsibilities that should be formally protocoled in each hospital. For example, a dietitian or a nurse or a doctor prescribe the diet at ward in collaboration with the patient. Hospital kitchen is responsible for food production. When the food arrives, nurse or nurse assitant serve the patient.

4.1.4. *Recommendation 4*

Hospitals, rehabilitation centers, and nursing homes should aim to use high-quality and sustainable food ingredients and to avoid food waste as much as possible.

Grade of recommendation GPP – strong consensus (100.0% agreement).

Commentary.

This recommendation is based on rapidly growing literature, of which one is cited here as a prominent example [10]. The EAT-Lancet Commission has published several papers on this topic besides other authors and organizations.

4.1.5. *Recommendation 5*

Patient and personnel surveys regarding hospital food and diets should be performed on a regular basis, at a minimum once a year.

Grade of recommendation GPP –consensus (90.0% agreement).

Commentary.

The evaluation of the hospital food organization is very important regularly to ensure that the organization is adapted to the overall hospital organization. Food delivery should be handled as easily as possible for the staff, and following patient needs regarding time schedule and food preferences. The food should be served at the right time according to patient availability, time (exams, medical tour, surgical procedures,..), and preferences. These evaluations should integrate surveys on patient's satisfaction towards hospital food organization: ordering, menu composition, and delivery. These surveys should be analyzed and reported to hospital administration to make sure that improvement measures are undertaken.

4.1.6. **Recommendation 6**

Hospital food ordering should be structured, documented, and protocoled.

Grade of recommendation GPP – strong consensus (95.0% agreement).

Commentary.

See commentary to recommendation 7.

4.1.7. **Recommendation 7**

The prescription of hospital food should be performed through the computerized patient medical record.

Grade of recommendation GPP – strong consensus (92.3% agreement).

Commentary.

Hospital food should be considered as part of medical treatment. As for drug therapy, hospital food should be prescribed by doctors, physicians, dietitians, or nurses through the computerized patient medical record, according to the patient's needs, nutritional status, disease, and medical situation. This means that the list of available diets should be available for the prescribers (doctors, physicians dietitians, or nurses), and that the indications of each diet should be specified and protocoled. The computerized prescription would be a good mean to monitor and evaluate the suitability of the hospital food prescriptions with the patient's status.

4.1.8. **Recommendation 8**

Each hospital, rehabilitation center, or nursing home should propose a minimal number of two different regular diets (the standard and the hospital diets) and a minimal number of two different additional diets, adapted to the size and the focus of the hospital.

Grade of recommendation GPP – consensus (79.6% agreement).

Commentary.

Larger hospitals would need more diets than recommended here, depending also on the focus of the hospital. Each hospital should adapt its menu offer based on the indication for therapeutic diets provided in subsequent chapters of the guideline. Offering comprehensive menus and diets could be a competitive advantage among hospitals since food supply and food quality are well recognized by many patients.

4.1.9. **Recommendation 9**

Therapeutic diets should be only used if medically indicated. Otherwise, a regular diet should be used.

Grade of recommendation GPP – strong consensus (100.0% agreement).

Commentary.

The indication for therapeutic diets is provided in subsequent chapters of the guideline.

4.1.10. **Recommendation 10**

Diets based on food restriction without medical evidence (e.g. anticancer starvation) should be avoided in hospitals, because they increase the risk of malnutrition.

Grade of recommendation GPP – strong consensus (97.5% agreement).

Commentary.

Hospital diets should be always prescribed according to the patients' nutritional status, which is often altered. Two regular diets, i.e. the standard diet and the hospital diets, are proposed in this guideline. They should be available in each hospital or healthcare center that receives patients at nutritional risk, i.e. 65 years and older patients, patients with an acute or chronic disease at risk for or with malnutrition or with disease-related metabolic stress. The choice between the two regular diets is based on nutritional risk screening. These two diets should constitute the basis of the hospital food. The therapeutic diets, also named "specific diets", should be only ones that are prescribed only in selected patients, for whom there is a clear medical indication. These diets can increase the risk of being underfed [1] and finally the risk of malnutrition. Therefore, therapeutic diets should be limited at hospital, especially in small hospitals. The choice of the therapeutic diets will depend on the characteristics/profiles of the usually admitted patients. For example, a hospital in which there are no patients with renal, hepatic or cardiac disease would not need a salt-reduced diet. As the risk of malnutrition is high, food restrictions should be avoided at hospital.

4.1.11. **Recommendation 11**

Hospital food diets should be re-evaluated every three to five years according to novel data in nutritional sciences and medicine, but also according to the hospital's focus and needs.

Grade of recommendation GPP – consensus (89.3% agreement).

Commentary.

This recommendation is based on the best of knowledge. To do this periodic reevaulation of hospital diets and to ensure the well functioning of hospital nutrition organization, some hospitals have installed a nutrition committee consisting of dieticians, nutritionists, nurses, and physicians, but also the manager of the hospital kitchen and possibly the transport logistics.

4.1.12. **Recommendation 12**

Hospital nutrition should be checked, re-evaluated, and eventually adapted for each patient at regular intervals (every three to five days) according to the course of the disease, monitored oral intake, and the patient's acceptance. If dietary modifications are insufficient to cover energy and protein needs, medical nutrition should be provided according to the stage of the disease. For details, see other ESPEN guidelines and evidence herein.

Grade of recommendation GPP – strong consensus (94.9% agreement).

Commentary.

This recommendation is based on recent international or national organization reports making arise the concept of "food for care". Indeed, hospital food is part of daily care. Hospital food is a moving process to be adapted to the course of the disease. Regular diets, i.e. the standard and the hospital diets, should be prescribed according to nutritional risk and status. Their prescription should be re-evaluated: the longer the hospital stay, the higher the risk of malnutrition [11]. A switch from the standard to the hospital diet will be a frequent situation (Fig. 1). Similarly, therapeutic diets should only be used if medically indicated, since they increase the risk for malnutrition. If therapeutic diets are indicated, food intake must be carefully monitored; in case of underfeeding, the indications of these diets should be reevaluated. In accordance with the benefit-risk ratio balance, and if oral intake is expected to be sufficient to cover nutritional needs, a switch from a therapeutic diet to the hospital diet should happen if the patient becomes malnourished during the hospital stay. Otherwise, in every situation where hospital food would become insufficient to cover the protein and energy needs, nutrition support, i. e. ONS, enteral nutrition (EN), or parenteral nutrition (PN), would be indicated as recommended in the ESPEN guidelines.

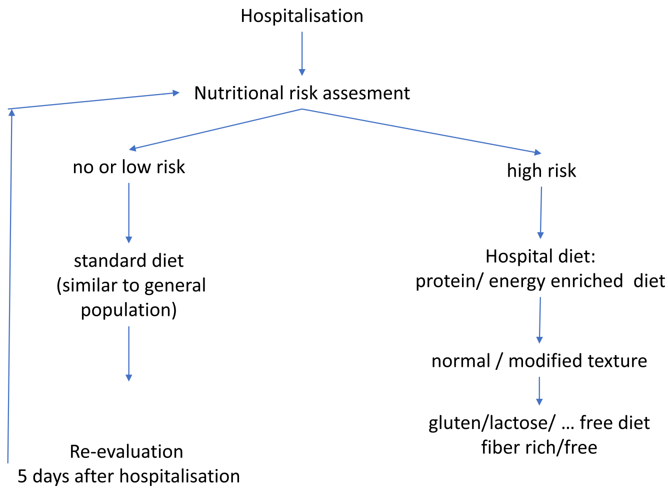

Fig. 1. Indications for the standard and the hospital diets at hospital admission based on the nutritional risk assessment, e.g. according to the GLIM criteria [8]. Indications of the standard diet should be re-evaluated five days after admission, according to the disease and patient's outcomes.

4.2. What is the composition of a standard diet in hospital (total energy, carbohydrates, lipids, proteins)?

4.2.1. ***Recommendation 13***

The hospitalized patients without or at low nutritional risk and who do not require special diets should be provided with the standard diet, as advised for the general population. The indication of this diet should be revaluated after three to five days.

Grade of recommendation GPP – strong consensus (90.9% agreement).

Commentary.

The choice of the hospital diet is depending on the nutritional risk assessment that is mandatory at hospital admission (Fig. 1) [12–20]. The indication of the standard diet should be reevaluated at least after five full days of hospital stay according to the assessment of nutritional risk or status. If the hospitalized patients become at high nutritional risk or malnourished, they should be provided with the hospital diet, a protein-energy enriched diet (see recommendation 14). The ESPEN guideline on nutrition in cancer patients states the first form of nutritional support should be nutrition counseling to manage symptoms and encourage the intake of energy-enriched foods and fluids; a diet enriched in energy and protein is the preferred way to maintain or improve nutritional status. ONS is prescribed in addition when an enriched diet is not effective in reaching nutritional goals [12]. This recommendation is in accordance with the principle of Food First by BAPEN [21]; e.g. eating little and often, choosing full fat and sugar products, and food enrichment. In the ESPEN guideline on clinical nutrition and hydration in geriatrics, it is stated that food fortification by natural foods or specific nutrient preparations can increase energy and protein density of meals and beverages and thus enable an increased intake by eating similar amounts of food [16], based on two systematic literature reviews considered relevant and rated of acceptable quality. Four systematic literature reviews [22–25] with rather acceptable quality that included studies offering additional snacks and/or finger foods were also identified in this guideline [16]. However, the effects of snacks were not analyzed separately and thus no specific conclusions were possible in this regard.

Eight studies investigate the effect of dietary enrichment [25–32]. The systematic literature review of Morilla-Herrera et al. concludes: “Despite the poor methodological quality of most studies analyzed, due to their simplicity, low cost, and absence of contraindications, simple dietary interventions based on the food-based fortification or densification with protein or energy of the standard diet could be considered in patients at risk of malnutrition because its effect on the total amount of energy and protein intakes.” [25]. The systematic literature review by Kiss et al. [26] on lung cancer patients during chemotherapy and/or radiotherapy suggest that dietary counseling improves energy and protein intake during chemotherapy, but has no benefit to other outcomes during chemotherapy. In the randomized controlled trial (RCT) by Munk et al. [27], the effect on overall protein intake and weight-adjusted energy was shown in hospitalized patients at nutritional risk. In the RCT by Stelten et al. [28] increased protein intake of acutely ill patients could be obtained. In the double-blind RCT by Ziylan et al. [29] on community-dwelling older adults, protein intake could be increased by acceptable and applicable protein-enriched products. In the clustered RCT by Leslie et al. [30] on frail older people living in residential care homes, energy enriched food was shown to increase energy intake and slow chronic weight loss. One means to improve protein and energy delivery and to reach the nutritional targets to hospitalized patients could be to promote six-meal services (three main meals + three snacks; or six small protein-rich meals per day) as the standard hospital food service.

4.2.2. ***Recommendation 14***

Hospitalized patients at moderate/high nutritional risk or malnourished shall be provided with the hospital diet, a protein-energy enriched diet.

Grade of recommendation A – strong consensus (94.2% agreement).

Commentary.

Studies that exclusively investigated the effect of diet interventions on malnourished patients are very limited and thus, for the present literature search, studies that combined both the effect of dietary interventions (counseling or more) and prescription of ONS were included. The choice of the hospital diet is depending on the nutritional risk assessment that is mandatory at hospital admission (Fig. 1) [12–14,17–20].

In cancer patients who are malnourished or at risk of malnutrition, nutritional therapy has been shown to improve body weight and energy intake but not survival. There is good evidence that nutritional support improves intake and weight, and some aspects of quality of life under radiotherapy [12]. Three systematic literature reviews conducted by Baldwin et al. were found, all included ONS [33–35]. In the one from 2011, it was concluded that dietary advice with or without ONS may improve weight, body composition, and grip strength [30]. There was no evidence of benefit of dietary advice or ONS given alone or in combination on survival. In the one from 2012, it was concluded that oral nutritional interventions are effective at increasing nutritional intake and improving some aspects of quality of life in patients with cancer who are malnourished or are at nutritional risk but do not appear to improve mortality [31]. In the Cochrane review from 2016, it was concluded that there is evidence of moderate to very low quality to suggest those supportive interventions to improve nutritional care result in minimal weight gain [32]. Most of the evidence for the lower risk of all-cause mortality for supportive interventions comes from hospital-based trials. In the study by Leedo et al. [31] on lung cancer, patients with nutritional risk score ≥3 (NRS-2002) got home-delivered meals. Increased energy and protein intakes were strongly associated with improved quality of life, functional score, hand-grip strength, symptom and performance scores. In the RCT by Canon-Torres et al., hospitalized patients with malnutrition enrolled in the intervention group received an individualized nutrition plan according to energy and protein (1.0–1.5 g/kg/day) intake requirements, as well as dietary advice. Results suggest dietary advice decreases hospital stay but not mortality. In the RCT by Bouillianne et al. [36], dietary protein was spread over four daily meals compared to a pulse diet with 72% of dietary protein consumed in one meal. Pulse feeding had a clinically relevant effect on lean mass in malnourished and at-risk hospitalized elderly patients.

In summary, population, intervention, control group, and outcome differ between studies explaining differences in results. The quality of studies also varies. However, all show good concordance in that the enrichment of the diet or counseling aiming to increase energy and protein intake positively affects energy intake and body weight, but effects on hard outcomes as reduced morbidity and mortality and increased functional capacity are rare. Baldwin et al. summarize "There is very low-quality evidence regarding adverse effects; therefore whilst some of these interventions are advocated at a national level, clinicians should recognize the lack of clear evidence to support their role." [35].

4.2.3. **Recommendation 15**

The standard diet should cover the minimal energy needs (25 kcal/kg actual BW/day) and the minimum of protein needs (0.8–1.0 g/kg actual BW/day). The hospital diet should cover 30 kcal/kg actual BW/day of energy needs, and at least 1.2 g/kg actual BW/day of protein needs.

Grade of recommendation GPP – consensus (86.8% agreement).

Commentary.

The indications for the standard diet and the hospital diet differ. The standard diet is aimed mainly at younger patients without disease-related metabolic stress, and who are admitted for a short stay (e.g. scheduled surgery or exams). The hospital diet is aimed at for 65 years and older patients, patients with an acute or chronic disease at risk for or with malnutrition or with disease-related metabolic stress. The energy density for the hospital diet should be higher to achieve smaller portion sizes. This is accomplished by the use of less fiber-rich sources for carbohydrates and by less focus on fat quality in favor of enrichment with food rich in fat where appropriate. In the hospital diet, protein intake should be at least 1.0 g/kg actual BW/day. In case of illness, protein requirements may even be further increased, e. g. due to inflammation, infections, and wounds [16]. Levels of 1.2–1.5 g/kg BW/day have been suggested for older persons with acute or chronic illness [37,38] and up to 2.0 g/kg BW/day in case of severe illness, injury, or malnutrition [37]. The recommended level for protein intake varies between studies but most studies referring to a recommendation are in the span between 1.0 and 1.5 g/kg BW/day [28,29,32,36]. In the study by Munk, the range is extended to 2.0 g/kg BW/day during illness [27]. The study of Leslie et al. [27] refers to the recommendations of COMA (UK committee on medical aspects of food policy): 53.3 and 46.5 g/day respectively in males and females. Examples of menus for standard or hospital diets are shown in the Supplementary Table 7.

4.2.4. **Recommendation 16**

The proportions of carbohydrates, lipids, and protein over the total daily energy intake should be 50–60%, 30–35%, and 15–20% for the standard diet, and 45–50%, 35–40%, and 20% for the hospital diet.

Grade of recommendation GPP – majority agreement (69.2% agreement).

Commentary.

Energy/kg actual BW, energy density, and macronutrient composition in terms of quantity and quality differ between standard and hospital diets. In the standard diet, the macronutrient composition is similar to the recommendations for the general population. This means that sources of carbohydrates should mainly be rich in fiber and that fat quality is following the recommendations for the general population. Strategies to reach energy and macronutrients goals must be adapted to patient capacities and habits (i. e. snacking if needed). Nutritional needs should be assessed individually for every patient including considering nutritional status, physical activity level, disease status and tolerance, length of hospitalization, and chronic disease.

4.2.5. **Recommendation 17**

Hospitalized patients should be offered at least two menu choices for each main meal, lunch, and dinner.

Grade of recommendation GPP – strong consensus (92.2% agreement).

Commentary.

A third choice could be a vegetarian meal choice. 40–70% of hospitalized patients are at nutritional risk. For the patients with low or no nutritional risk (i. e. young adults without inflammation or chronic diseases), the standard diet should be the one that is done for the healthy individual population; it is based on patient food preferences and menu choices to give them a chance to eat. We propose here an algorithm (Fig. 1) to state the indications of the two regular diets at the hospital: the "standard diet" and the "hospital diet". They should be prescribed at hospital admission according to patients' nutritional risk screening. The hospital diet is the protein-enriched diet to be given to high nutritional risk patients. The hospital diet should be prescribed taking into account the nutrition support if any. In case a therapeutic diet is indicated (e. g. lactose-free), it should be protein and energy-enriched if the patient is at high nutritional risk. Individual adaptation must be proposed according to food preferences and levels of food intake.

Malnutrition is associated with a prolonged length of stay and a higher complication risk, impaired wound healing, and an increased number of infections. Improving hospital diet is therefore desirable. There is not much evidence for the composition of a general hospital diet to prevent malnutrition. Hiesmayr performed a large one-day cross-sectional survey on food intake in hospitalized patients (N = 16,290), which showed that eating ¼ meal gave an adjusted hazard ratio of 2.10 of dying [39]. Eating nothing has a HR of 3.20. This is confirmed by Pullen et al. who showed that overall intake of energy is maximum 15% and overall protein intake is maximum 28% [40]. Bokhorst et al. showed that patients who experience the worst health ate the least [41]. There is some evidence that patients eat more when they are offered more meals a day. Dijxhoorn et al. showed that patients with the traditional meal service reach 0.7 g/kg/day protein, while patients in the frequent meal service reach 0.9 g/kg/day [42]. Eight percent of patients in traditional meal service reach 1.2 g/kg/day, while in the frequent meal service design 24% of the patients reach 1.2 g/kg/day. Rattray et al. performed an observational study in 110 patients, and showed that patients are provided 75% of estimated needs, and consume less than required (~50%) [43]. Munk et al. showed that protein enriched meals gave a significantly higher protein intake (not energy intake) (the relative risk was 2.20 [27]).

The guidelines for the general group of hospitalized patients advise 1.2–1.5 g/kg/day of protein and 25–35 kcal/kg/day of energy. The distribution of macronutrients should be as the guidelines prescribe. There is no evidence that every hospitalized patient should receive more micronutrients. This is the same for salt intake and fatty acid composition. In certain specific patient groups, there may be small evidence suggesting that polyunsaturated and monounsaturated fatty acids are necessary, but for the general hospital diet, a normal composition is appropriate.

We do not voluntarily give details regarding the amounts of fiber and saturated fatty acids to be integrated into the hospital diet

(Table 5), because hospital kitchens would have difficulty in fully complying with the recommendations.

4.3. Which could be the standard of logistics for hospital food delivery?

4.3.1. ***Recommendation 18***

Systematic "between-meals snacks" shall be offered and consumed to reach nutritional requirements as a standard hospital food service, and prevent night fasting.

Grade of recommendation A – strong consensus (96.2% agreement).

Commentary.

Hospitalized patients are frequently malnourished or at risk for malnutrition (e. g. older people, patients with acute or chronic diseases), and the risk increases with the length of hospital stay. The prevention of malnutrition or its worsening implies the coverage of at least 80% of estimated energy and protein needs. Hospital snacks are an additional optimal way to increase oral intake. In the study of Pullen et al., patients who consumed hospital snacks (34%) were more likely to meet the nutrient standards [40]. Snack consumption could enhance patient satisfaction and thus contribute to an overall increase in the consumption of food. Snacks can be provided in several types and flavors. They can have various forms, such as salted (sandwiches, cheese) or sweetened (cakes, dairies, dessert cream) and different texture presentations, that can avoid the weariness of the same snack proposals. The number of snacks must be adapted to the patient's needs and capacity to eat, ranging from one to three between-meal snacks per day [42,44]. But giving three snacks a day implies modifying the portion size or number of components of a meal tray to be eaten by the patient and limiting food waste while covering nutritional needs. Particular attention must be taken into account for the older people, because they consider that dietary interventions are less valuable than medical treatment, and therefore did not perceive eating poorly as a problem [45]. Snacking can prevent long overnight fasting at any patient age in hospitals, as well as in nursing homes. The shorter the delay between dinner and breakfast (time slot <10 h), the better it prevents malnutrition. The optimal snack composition must provide not only carbohydrates but also proteins, lipids, and fibers. Snack delivery and food preservation have to be adapted to local organizations and could be administered at every time if needed (night, patient awake, ...). Engelheart et al. showed that the length of fasting of the elderly was significantly shorter in the self-managing elderly than in a nursing home with frail, emphasizing the impact of staff organizations on overnight fasting [46]. Söderström et al. showed that overnight fasts exceeding 11 h and fewer than four eating episodes a day were associated with both malnutrition and risk of malnutrition [44]. Correa-Arruda et al. showed the impact of overnight fasting on muscular function. The muscular function was impaired after overnight fasting of adult patients hospitalized for medical treatment, especially for those with low ingestion, malnourished and elderly [47]. Therefore, unless the literature according to the topic is poor (no study having compared different meal service times), the group recommended that to prevent nocturnal starving in the people aged 70 or more, the time-space between dinner and breakfast should not be more than 10 h. A hospital food service organization based on systematic between-meals snacks (three meals and three snacks: 7:30 am, 10 am, noon, 3 pm, 7 pm, 10 pm) reaches this objective [48,49].

4.3.2. ***Recommendation 19***

At least one dietitian working in collaboration with the professionals involved in the field (e.g. nutrition support team, dietetic department, cooks, food engineers, food manager) should be dedicated to the hospital kitchen with the role of setting up patients' menus according to the different available diets.

Grade of Recommendation GPP – strong consensus (96.2% agreement).

Commentary.

There is a need to have a team of dietitians who in rotations could evaluate the menus so these are in accordance with needs of patients with different medical conditions and in accordance with patient preferences. It is expected that these dieticians have clinical experience of hospital malnutrition. Furthermore, these dietitians should communicate with the kitchen managers for development of the different menus. Continous education of kitchen staff regarding different menus to satisfy patient heterogeneity and specific needs is desired. In some countries, food managers are equal to administrative dietitians which is not the same as a clinical dietitian. The latter is registered in many countries and always regarded as health care staff. In some countries, some of them might also work in the kitchen but most of them are working solely with patients at the ward.

4.3.3. ***Recommendation 20***

Hospital food delivery must be adapted to patient's abilities and perspectives (acute care, rehabilitation unit, palliative care).

Grade of Recommendation GPP – strong consensus (92.3% agreement).

Commentary.

Patient's needs and capabilities depend on clinic situations and patient perspectives. Hospital food should be adapted accordingly. For palliative care, the organization of food provision is part of nutritional care as well as a comprehensive approach to nutritional care and individualization of nutrition [50].

4.3.4. ***Recommendation 21***

The mealtime should be protected with a time slot reserved for meals.

Grade of Recommendation B – strong consensus (94.6% agreement).

Commentary.

Food delivery at the hospital is based on local capacities and organizations. Defining standards for food delivery implies considering patients' capacities to eat and patients' preferences. In the UK (35), the concept of protected meals, with dedicated time slots has emerged.

Concerning patients' capacities, situations are different for:

- Patients with limited functionalities or disabilities in acute care (appetite loss due to fever, pain, or other medical side effects): meal tray should be adapted. Different eating aids might be beneficial in case of motoric disabilities. Some units experienced the trolley meal system as a strategy to adapt the meal with the patient's desires [51] and to minimize food waste. But units who adopt these meals on wheels distribution have to be aware of the nutritional risk due to possible smaller portions served [52,53]. It requires awareness raising and staff training for serving meals and other strategies to adopt by proposing enriched dishes.
- Patients in rehabilitation units (with nutritional needs linked to rehabilitation process): Patients would benefit from eating together with conviviality and caregivers could pay more attention to patients with assisted meals if needed (following recommendations of the French National Food Council [54] and of the National Nutrition Council and Finnish Institute for Health and Welfare [55], autonomous patients should stop keeping in their rooms for "single" meals.

- Open possibilities to patients to eat at every moment of the day is dedicated places (near catering units) should be thinking to improve organoleptic qualities, mealtimes and to focus on patient's choice. Increasing ambulatory hospitalization may accelerate the shift towards this new organization. Nutritional needs have to meet patients' preferences. Qualitative studies took account of patients' perception of meals [56,57] or motivation to eat [58]. The temperature of the meal, appearance, and aroma of food are important contributors as well as choice and service staff [57], or ambiance [59]. Improved meal presentation can increase food intake too [60].

In conclusion, hospital food delivery should be different 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).

4.4. Individal exceptions from the standard approach

4.4.1. Should food allergy or food intolerances be taken into account for the composition of the diet?

4.4.1.1. ***Recommendation 22***. In patients with proven food allergies, the food allergen shall be excluded from the patient's hospital food choice and delivery.

Grade of recommendation GPP – strong consensus (97.4% agreement).

Commentary.

Food allergy is defined as an immune system reaction that occurs soon after eating a certain food. Even a tiny amount of the allergy-causing food can trigger signs and symptoms such as digestive problems, hives, or swollen airways, going until the anaphylactic shock or death (general ref to be included). These severe clinical manifestations of food allergy justify by themselves to exclude the food allergen from the patient's hospital food choice and delivery.

4.4.2. Should vegan diet, religious beliefs, food preferences, presumed food intolerance, beliefs be taken into account for the composition of the standard diet?

4.4.2.1. ***Recommendation 23***. Religious beliefs and food preferences (taste) should be taken into account at best when proposing the menu choice to the patient.

Grade of recommendation GPP – strong consensus (92.1% agreement).

Commentary.

Catering services provide standard propositions that may suit most in-patients from medical perspectives (physiologic requirements, disease-related needs) as well as patient's perspectives. The heterogeneity of the hospitalized population (cultural and religious beliefs) generates a highly variable number of meal requests. The hospital staff is facing a complex situation to satisfy the patients' expectations. Dietary requirements related to religions are heterogeneous, and further variability is due to variations in a single religion depending upon the country of origin [61]. The respect of religious freedom has long been considered a basic civil right [62]. Therefore it seems logical that Kosher, Halal, vegetarian, or other diets should be provided by hospitals, even if these diets have nowadays no medical rationale [63]. Every patient should be able to follow the precepts of his religion (meditation, presence of a minister of his religion, food, freedom of action and expression, etc.) [64]. Far beyond the medical care background, patient food should be considered in all its components (i.e. nutritional, symbolic, and cultural). Health institutions strive "as much as possible" to find alternatives to food that rejected by a fraction of the patients [64]. Minimum precautions must be taken to make the meal edible: the content of a recipe should be easily identifiable by the patient. When Halal or Kosher meat cannot be provided, alternative protein propositions should be available on the menu and precautions must be taken with clear labeling of the served dishes and ingredients (e.g, the use of alcohol or wine vinegar in a recipe). In addition, when the standard plate is a three-component plate (meat, vegetables, and starches served all together), the possibility must be offered to avoid meat and vegetarian foods on the same serving platter. In all cases, reasons of non-eaten meal should be understood in order to prevent the risk of malnutrition.

Because of the practical difficulties for producing several propositions for the daily meals, patients or their families should be allowed to bring complementary foods - as long as they meet the hygiene and temperature rules and awareness of the patient's frailty with certain foods at risk or whose preservation is impossible. The health care personal should be informed about this option to promote its acceptability and to react appropriately in case of therapeutic diet prescription (e.g. medical gluten-free diet). If these adaptations are impossible or insufficient, patients should be encouraged to suspend their "home" diet to promote a favorable clinical evolution.

4.4.2.2. ***Recommendation 24***. Vegetarian diets shall be designed to cover the energy and protein requirements (see recommendations 14&15).

Grade of recommendation GPP –consensus (89.4% agreement).

Commentary.

A vegetarian diet is generally considered as a valid alternative to a specific meal for religious belief, as long as nutritional needs are covered (i. e 30 kcal/kg/day, protein 1–1.2 g/kg/day) [37]. Currently, the vegetarian diet is often a menu derived from the standard menu by the suppression of meat or fish, rather than a true vegetarian menu.

Flexitarian diet is becoming a piece of evidence both from an environmental perspective and health perspective (i. e. prevention in chronic kidney disease, the protective effect of a vegetarian diet versus the incidence and/or mortality from ischemic heart disease and incidence from total cancer) [65–67]. This approach requires a complete change in the menu's conception based on the quality of proposed alternative proteins. Animal proteins are, concerning human needs, better balanced in terms of amino acids, in particular essential amino acids. Eating eggs and dairy products make it easier to meet nutritional requirements, even during diseased conditions. But caution must be warned with a vegetarian diet. Protein Digestibility Corrected Amino Acid Score (PDCAAS), a composite index of digestibility and composition in essential amino acids, is lower in plant proteins due to deficiencies in certain essential amino acids. Solutions may come from complementarities between protein sources. Recipes could associate plant proteins such as cereal and legume proteins, or with the mix of vegetable and animal proteins, coming from cereal proteins (wheat, maize, rye, barley, etc.) or milk proteins with legume proteins helping to compensate for the latter's methionine deficiency. In most cases, meat-based products are richer in energy than vegetarian food items. Therefore, energy requirements can be reached by adding lipids (e.g. varied oils that will allow meeting qualitative nutritional goals too) in recipes.

4.4.2.3. ***Recommendation 25***. A vegan diet should not be offered at the hospital.

Grade of recommendation B –consensus (76.5% agreement).

Commentary.

Compared to a vegetarian diet, a vegan diet is not recommended in hospital food [68]. Vegans are at higher risk of iron, B12, and D vitamins and calcium deficiencies with higher rates of osteoporotic fracture and iron deficiency anemia [68,69]. Vegans should receive a mandatory vitamin B12 substitution because of an important risk of deficiency [70]. In conclusion, following the evolution of food choices and preferences, vegetarian diet demand has also increased at the hospital. Vegetarian design should meet nutritional requirements as much as variety, but patients should be aware that a vegan diet is not recommended due to the risk of malnutrition.

4.5. Indications for therapeutic diets

4.5.1. What are the indications of gluten, FODMAP and lactose evictions?

4.5.1.1. ***Recommendation 26***. A gluten-free diet shall be provided to patients with proven celiac disease.

Grade of recommendation A – strong consensus (100.0% agreement).

Commentary.

Celiac disease is a chronic immune-mediated enteropathy precipitated by exposure to dietary gluten in genetically susceptible individuals. Celiac disease-related enteropathy leads to multiple nutritional deficiencies involving macronutrients and micronutrients. Currently, medical nutrition therapy consisting of the gluten-free diet is the only accepted treatment for celiac disease [71].

Based on the WHO Codex Alimentarius standard, the European Commission issued regulations in 2012 and the US FDA in 2013 defining foods labeled 'gluten-free' as containing <20 parts per million (ppm) of gluten (equal to 20 mg kg^{-1} of food) when measured by an approved system for testing [72,73].

Industrially purified wheat-starch-based gluten-free products and uncontaminated oat products containing less than 20 ppm of gluten are allowed for celiac disease patients as a part of a gluten-free diet, and these products are particularly favored in northern Europe and the United Kingdom. Previous randomized and long-term follow-up studies also show that these products are safe and well-tolerated [74–78].

Gluten-free diets with and without medical reasons have gained popularity. The prevalence of gluten-related disorders is rising, and increasing numbers of individuals are empirically trying a gluten-free diet for a variety of signs and symptoms [79] or to loose weight. But in the National Health and Nutrition Examination Survey (NHANES) 2009–2014, data showed no significant difference in terms of prevalence of metabolic syndrome and cardiovascular risk score in gluten-free followers without celiac disease [80]. Patients may present gastrointestinal signs or symptoms, extra-gastrointestinal signs or symptoms, or both, suggesting that celiac disease is a systemic disease. Non-Celiac Gluten Sensitivity (NCGS) is a syndrome characterized by intestinal and extra-intestinal symptoms related to the ingestion of gluten-containing food, in subjects that are not affected by either celiac disease or wheat allergy [81]. The clinical variability and the lack of validated biomarkers for NCGS make establishing the prevalence, reaching a diagnosis, and further study of this condition difficult. Nevertheless, it is possible to differentiate specific gluten-related disorders from other conditions, based on currently available investigations and algorithms. Clinicians cannot distinguish between celiac disease and NCGS by symptoms, as they are similar in both. Therefore, screening for celiac disease must occur before a gluten-free diet is implemented since once a patient initiates a gluten-free diet, testing for celiac disease is no longer accurate. While the link between gluten and celiac disease is well established, the responsibility of gluten in NCGS remains to be demonstrated [82]. It is therefore not possible to affirm that a gluten-free diet is indicated in the NCGS [83].

Concerning conducting a gluten-free diet by conviction/belief, patients have to be informed of its potential detrimental effects, including insufficient dietary fiber intake, deficiencies in dietary minerals (iron) and vitamins (B vitamins), and potential heavy metal exposure [84,85]. Weight gain and obesity have been added to the list of nutritional consequences of the gluten-free diet and have been partially attributed to the hypercaloric content of commercially available gluten-free foods. Follow-up of patients diagnosed with celiac disease after starting the gluten-free diet has been reported to be irregular and, hence, less than ideal [71]. It is desirable that all celiac disease after starting the gluten-free diet should be followed by a clinical dietitian.

4.5.1.2. ***Recommendation 27***. For individuals with irritable bowel syndrome, a diet low in fermentable oligo-, di-, monosaccharides, and polyols (low FODMAP diet) should be recommended to improve symptoms including abdominal pain and bloating and to increase the quality of life.

Grade of recommendation B – strong consensus (91.8% agreement).

Commentary.

A number of studies clearly indicate that a low-FODMAP diet improves symptoms in patients with irritable bowel syndrome [86–90]. From these studies it can be deducted that hospitals should provide a low-FODMAP diet, considering the high prevalence of irritable bowel syndrome in the general population of >10%. All patients who need low-FODMAP-diet should get dietary counselling by a dietitan and should be followed by a physician and/or a dietitian.

4.5.1.3. ***Recommendation 28***. A diet low in lactose (<12 g per meal) shall be provided to patients with proven lactose intolerance (lactose breath test).

Grade of recommendation A – strong consensus (91.8% agreement).

Commentary.

Lactose is a disaccharide sugar found in mammalian milk; it makes up around 2–8% of milk (by weight), although the amount varies among species and individuals: 7.2 g/100 mL in mature human milk, 4.7 g/100 mL in cow's milk. Lactose digestion takes place in the small intestine by the work of lactase-phlorizin hydrolase, a protein expressed on the brush border of intestinal villi. If the lactase enzyme is absent (alactasia) or deficient (hypolactasia), unabsorbed lactose molecules osmotically attract fluid into the bowel lumen, leading to an increased volume and fluidity of the intestinal content. In addition, the unabsorbed lactose passes into the colon, where it is fermenting by bacteria producing short-chain fatty acids and gases (CO_2, CH_4, H_2) possibly leading to various gastrointestinal symptoms [91]. Lactose breath tests represent an indirect test for lactose malabsorption, and it is commonly considered the most reliable, non-invasive, and inexpensive technique. Based on several different studies, lactose breath tests show good sensitivity (mean value of 77.5%) and excellent specificity (mean value of 97.6%) [92,93].

There is currently a tendency towards a lactose-free diet, applied to dysimmune diseases, inflammatory rheumatism, autism, irritable bowel syndrome, or atopic eczema in children. However, there is absolutely no scientific rationale for a lactose-free diet in these indications. The only proven indication of the lactose-free diet is the proven lactose intolerance [94,95].

Lactase deficiency, which is common in adults, does not mean lactose intolerance. Intolerance symptoms represent only one-third of mal-absorbers [96].

Mal-absorbers can tolerate up to 12 g of lactose (corresponding to a glass of milk) when consumed alone and on an empty stomach, and up to 20 g when ingested with other foods [97,98]. Not all foods are equal in terms of tolerance due to their composition (lactose load, fat content, etc.), texture, and association or not with other foods. Anything that slows down gastric emptying can improve lactose tolerance. Drinking milk is the less tolerated form, especially skimmed milk and taken on an empty stomach. It is not necessary to remove lactose from the diet [99–101]. In any case, there is no justification for removing yogurts and cheeses, nor foods that are sources of low amounts of lactose [102].

4.5.2. What are the indications for a high-energy diet and/or high protein diet?

4.5.2.1. ***Recommendation 29****.* The hospital diet should be provided in the hospital setting to be served to malnourished patients, patients at risk for malnutrition, and other specific patient groups with a higher need for energy and/or protein.

Grade of recommendation B– strong consensus (92.6% agreement).

Commentary.

Several European or international guidelines were used to identify the indications for a high protein/high energy diet [12,14,16,18,19,103,104].

Malnutrition or risk for malnutrition is the main indication for a high energy diet, i.e. the hospital diet (see recommendation 14, Fig. 1) which usually should contain also a high protein content. To define patients as being malnourished or at risk for malnutrition, a standardized screening procedure must be applied at admission in the hospital. For screening purposes, e. g. the NRS-2002 could be used to identify patients with higher energy and/or protein need [105]. High energy diet is defined as containing a calorie content of >30 kcal/kg BW/day. A high protein diet is defined as containing >1.0 g/kg/day.

Other indications for a high protein diet are (also for patients without malnutrition):

- Polymorbid medical inpatients (at least 1.0 g/kg/day).
- Patients with chronic liver disease (normal weight: 1.2 g/kg BW/day, malnourished 1.5 g/kg BW/day, no reduction in hepatic encephalopathy) and with alcoholic steatohepatitis (1.2–1.5 g kg/BW/day).
- Patients with cancer (above 1 g/kg/day and, if possible up to 1.5 g/kg/day).
- Geriatric patients (at least 1 g protein/kg BW/day. The amount should be individually adjusted concerning nutritional status, physical activity level, disease status, and tolerance) [37].
- Patients with decubitus: protein intake should be above 1 g/kg/day and, if possible up to 1.5 g/kg/day, and 1.25–1.5 g/kg BW/day in adults at decubitus risk.
- Patients with chronic pancreatitis (amount not specifically defined).

Other indications for a high energy diet are patients with chronic liver cirrhosis with acute complications even if there are not malnourished (>30 kcal/kg actual BW (or adjusted BW if overweight or obese)/day (see recommendation 33)).

For most of the indications, the recommendation level in the guidelines is strong, but the level of evidence is low to moderate. Research questions are remaining about the effect on clinical outcome of increased supply (>1.2 g/kg BW/day) and composition of protein/amino acids.

4.5.2.2. ***Recommendation 30****.* The specifically designed hospital diet should be provided at the hospital because reaching the energy and/or protein target can hardly be realized with meals and snacking from the standard diet.

Grade of recommendation B– strong consensus (92.0% agreement).

Commentary.

Food delivery at the hospital is based on local capacities and organizations. Nutritional goals can be achieved by food strategies. This could be reached by [106] implementing protected mealtimes, a complex healthcare intervention that aims to stop all non-urgent clinical activity in the ward environment and provide a conducive eating environment, for improving the nutritional intake of hospitalized patients. Anyhow, this type of intervention has a very low grade of evidence and needs further clinical trials. Hospital snacks are an additional way to increase oral intake. In study conditions, patients who consumed hospital snacks were more likely to meet the nutrient standards [40]. Snacks are associated with better consumption, patient satisfaction and can be more cost-effective than ONS [49] or at least as feasible and effective as ONS [48]. They can have various forms, such as salted (sandwiches, cheese) or sweetened (cakes, dairies, dessert cream) presentations, that can avoid the weariness of the same snack proposals.

It was also shown in the multicenter EFFORT study in Switzerland that an intensive and individual in-hospital nutritional intervention in medical patients is capable to increase caloric and protein intake and reducing mortality [107]. However, not in all hospital settings around Europe, these intensive nutritional care processes will be possible, at least due to the lack of nutritional counseling by qualified staff. Furthermore, in chronic diseases and the geriatric population, there is usually a lack of appetite. Therefore, it is important to decrease food volume and increase the energy and protein content of the food. A specifically designed high energy and high protein diet was evaluated in the geriatric setting [108]. The main goal was to provide protein delivery to 75 g per day, an equal amount of protein for the three main meals, and a volume reduction to 2/3 of the usual volume. Those conditions were the basis for the therapeutic diet (Menu compact). Protein intake was increased by 34% and energy intake by 15%. An intervention study on providing a high protein diet to older people with a medium or high risk of malnutrition showed that this diet was able to increase the intake of protein from 0.9 g/kg/day to 1.2 g/kg/day [109]. Ideally, a combination of a specifically designed high energy high protein diet, snacking, ONS, and nutritional counseling should be available in the acute hospital setting to provide the most individualized nutrition therapy.

4.5.3. What are the indications of a low-calorie diet (weight reduction diet) at the hospital?

4.5.3.1. ***Recommendation 31****.* Hypocaloric diets are usually not indicated at the hospital and should be avoided because they increase the risk of malnutrition even in acute care obese patients.

Grade of recommendation B – strong consensus (94.6% agreement).

Commentary.

There is no need for a therapeutic diet for acute care obese patients. Obese patients shall receive one of the two regular diets according to nutritional risk as described above (see recommendation 4, Fig. 1). In-hospital patients are at high risk for malnutrition. It is known that 40–70% of in-hospital patients (depending on the underlying disease) are at risk for malnutrition or have manifest malnutrition [110]. Obese patients of 65 years and older patients, with an acute or chronic disease at risk for or with malnutrition or with disease-related metabolic stress, should receive the hospital diet. Inconveniently during the hospital stay, 30–80% of patients are losing additional weight [111]. This is the result of multiple reasons, e.g. fasting periods due to examinations, meal timing, unsavory meal conditions, etc. For that reason, it is usually necessary to provide to obese patients at least the isocaloric diet that are recommended to the general population during the hospital stay, the standard diet. However, for specific patient groups, a short-term low-calorie diet could be indicated (see next Recommendation).

4.5.3.2. ***Recommendation 32***. There are very few indications for low-calorie diets in the hospital setting but they temporally can be indicated in refeeding syndrome, obesity with severe insulin resistance, and in rehabilitation units for obesity.

Grade of recommendation 0 – strong consensus (91.9% agreement).

Commentary.

The refeeding syndrome can be a life-threatening metabolic condition after nutritional replenishment if not recognized early and treated adequately. There is a lack of evidence-based treatment and monitoring algorithms for daily clinical practice. An expert consensus guideline for the refeeding syndrome for the medical inpatient (not including anorexic patients) regarding risk factors, diagnostic criteria, and preventive and therapeutic measures based on a previous systematic literature search was published in 2018 [112]. Possible predictors for the refeeding syndrome are analyzed in many studies, for example, low energy intake for over 10 days or weight loss over 15%. However, their sensitivity (67%) and specificity (80%) are low [113]. Low serum magnesium (<0.7 mmol/L) was the only significant predictor in the study of Rio et al. [114]. Starvation itself is the most reliable predictor [114]. In addition to oncologic patients, patients with eating disorders, and patients with chronic vomiting or diarrhea have a higher risk of developing a refeeding syndrome [112,115–122]. Older age, high Nutritional Risk Screening (NRS-2002) scores (≥3), and comorbidities were found to be risk factors for the refeeding syndrome in many studies [118]. For patients with a high risk for refeeding syndrome, an initial phase of a hypocaloric diet is indicated [112]. Most studies as well as the NICE guidelines recommend starting nutritional therapy with low caloric input and increasing step by step over five to ten days, according to the individual's risk of the refeeding syndrome and clinical features [112]. Given the small number of extant randomized studies, this approach shows the best evidence level available [119]. It is recommended to start nutritional support with an amount of 5–15 kcal/kg BW per day (40–60% carbohydrate, 30–40% fat, and 15–20% protein), depending on the risk category.

Both the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD) support the short-term use of low-calorie diets for weight loss in diabetic patients [120,121]. In the acute hospital setting, it is not generally recommended to provide low-calorie diets in obese diabetic patients because acute illness can promote malnutrition. However, in the rare situation where there is no acute illness promoting high blood sugar, it could be discussed to reduce energy intake (especially from carbohydrates) to reduce the dose of insulin injection and breakthrough insulin resistance [120,122].

4.5.3.3. ***Recommendation 33***. In low-calorie diets, the protein content may not be reduced and may be at least 1 g/kg actual BW/day if BMI is below 30, and at least 1 g/kg adjusted BW/day if BMI is ≥30.

Grade of recommendation 0 – consensus (85.7% agreement).

Commentary.

During acute or chronic illness, obese patients should be considered to have the same risk of malnutrition as normal weighted patients. Obese patients may have increased muscle proteolysis [123]. Therefore reaching their protein target is important. As proposed by Singer et al. [17], the reference (adjusted) BW should then change from actual BW to ideal BW at a BMI is ≥ 30 kg/m^2. Probably using as ideal BW: 0.9 x height in cm −100 (male) (or −106 (female)) is sufficiently precise giving the overall uncertainties. Such an approach would completely ignore the metabolic demand of adipose tissue and muscle. Adipose tissue utilizes 4.5 kcal/kg/day and muscle 13 kcal/kg/day [124]. The proportion of muscle within the excess weight of an obese individual might be roughly 10%. A pragmatic approach is to add 20–25% of the excess weight (actual BW - ideal BW) to ideal BW for all calculations of energy requirements.

4.5.4. What are the indications of a low protein diet?

For recommendations on protein intake in cirrhotic patients with hepatic encephalopathy, and chronic kidney disease patients with acute illness, we refer to recommendation 54 of the ESPEN guideline on clinical nutrition in liver disease [18], and recommendation 21 of the ESPEN guideline on clinical nutrition in hospitalized patients with acute or chronic kidney disease [20].

4.5.4.1. ***Recommendation from the ESPEN guideline on Clinical Nutrition in Liver disease***. Protein intake should not be restricted in cirrhotic patients with hepatic encephalopathy as it increases protein catabolism.

Grade of recommendation B – strong consensus (100% agreement).

4.5.4.2. ***Recommendation from the ESPEN guideline on Clinical Nutrition in Kidney disease***. Chronic kidney disease patients previously maintained on controlled protein intake (the so-called “low protein diet”) should not be maintained on this regimen during hospitalization if acute illness is the reason for hospitalization.

Grade of recommendation GPP – strong consensus (100% agreement).

Commentary.

Cirrhosis is a state of accelerated starvation characterized by decreased protein synthesis and increased gluconeogenesis with proteolysis which promotes sarcopenia. Sarcopenia contributes to worse clinical outcomes, independent of the severity of the liver disease. Sufficient protein intake is necessary to prevent loss of muscle mass [18]. In the past, there has been controversy about whether patients suffering from hepatic encephalopathy should undergo a transient restriction in protein intake, to limit the synthesis of ammonium and the deamination of protein to aromatic amino acids. Further studies have shown that protein restriction has no advantage and may increase protein catabolism, furthermore normal to high protein intake does not precipitate hepatic encephalopathy and may even improve mental status [18,20].

Hospitalization due to critical or acute illness or major surgery is often characterized by a pro-inflammatory status and increased protein catabolism, thus continuing the dietary protein restriction is not appropriate in chronic kidney disease patients. The protein need in hospitalized patients must be oriented by the baseline illness that caused hospital admission more than by the underlying chronic kidney disease patients’ condition per se [20].

4.5.5. What are the indications of a low-fat diet?

4.5.5.1. ***Recommendation 34***. Patients with a proven chyle leakage should receive a diet low in long-chain triglycerides (LCT, <5% of total energy intake) and enriched in medium-chain triglycerides (MCT, >20% of total energy intake).

Grade of recommendation B – strong consensus (95.7% agreement).

Commentary.

There is still no strong evidence available in the management of chyle leaks, where a difference in terms of chyle leaks and diagnostic procedures, leads to the high heterogeneity of results among the studies [125]. Also, a chylothorax may need a different approach than chylous ascites. Chyle leakage is defined as a triglyceride-rich milk-like output from a drain, drain site, or wound, on or after postoperative day three, containing triglyceride >110 mg/dL or >1.2 mmol/L [126]. 1000 mL chyle leakage may contain up to 30 g of protein [127]. High volume chyle leakage may cause fluid problems, electrolyte disorders, and protein losses, and therefore induce a risk of malnutrition and a higher complication rate. The key initial step in management is to optimize the patient's nutritional status [128]. Many publications on the management of chyle leaks mention standard recommendations: surgical options, nil per os, fat-free diet, MCT-rich diet, EN, or PN, but do not explain clearly how one can “mix and match” various nutrition strategies [127]. The duration of nutritional interventions also remains unclear. Weijs developed a step-up treatment: leakage <500 mL/day = low fat diet, <1000 mL = low fat diet or total PN depending on increasing/decreasing after diagnosis, >1000 mL/day = total PN and this was successful for 90% of their patients [129]. With a low-fat diet, 40 of 61 patients were cured after a median of nine days of treatment. The exact composition of the low-fat diet remains unclear, however, a diet low in LCT is often recommended. In addition to a low-fat diet, enrichment with MCT could be considered to provide energy and maintain nutritional status. There is some evidence that a low-fat diet in chyle leakage may prevent surgical actions, mostly in patients with low-volume chyle leakage. Tabchouri concluded that chyle leakage is treated by most patients with nutritional intervention [130]. Steven et al. conducted a comparison of success rates between dietary methods in a systematic review and concluded that total PN should only be used when oral intake is contraindicated, while an MCT diet (LCT restricted) is more successful as a treatment (77% vs 68.5%) [131]. In patients with high volume chyle leakage (>1000 mL/day), medical nutrition could be considered, for supplementing electrolytes and for achieving nutritional goals. Unfortunately, there is no worldwide consensus in the treatment of chyle leakage, where evidence is lacking. Strong RCTs are needed to define the optimal treatment.

4.5.5.2. ***Recommendation 35***. Patients with rare fatty acid oxidation disorders, such as long-chain 3-Hydroxyacil-CoA Dehydrogenase Deficiency (LCHADD, MIM 609016) and Mitochondrial Trifunctional Protein Deficiency (MTPD, MIM 609015) and Very Long-Chain Acyl-CoA Dehydrogenase Deficiency (VLCADD, MIM 201475)* should receive a diet low in LCT (<5% of total energy intake) and enriched in MCT (>20% of total energy intake).

Grade of Recommendation 0 – strong consensus (92.3% agreement).

Commentary.

There are some rare metabolic disorders in the fatty acid oxidation known, such as long-chain 3-Hydroxyacil-CoA Dehydrogenase Deficiency (LCHADD) and Mitochondrial Trifunctional Protein Deficiency (MTPD). In these specific patient groups, a diet low in LCT is recommended. Enrichment with MCT (and a diet high in protein) is suggested [132,133].

4.5.5.3. ***Recommendation 36***. Some cases of intestinal lymphangiectasia with protein-losing enteropathy should receive a diet low in LCT (<5% of total energy intake) and enriched in medium-chain triglycerides (>20% of total energy intake). Energy and protein intakes should be at least 30 kcal/kg actual BW/day and 1.2 g/kg actual BW/day.

Grade of Recommendation 0 – consensus (89.1% agreement).

Commentary.

In patients with protein-losing enteropathy due to intestinal lymphangiectasia, a low-fat, high-protein, MCT diet may be successful [134,135]. This approach is associated with favorable effects on hypoalbuminemia, gastrointestinal symptoms, and growth. As these patients are frequently malnourished, the hospital diet (protein-energy enriched diet) should be provided (see recommendation 14).

4.5.6. What are the indications of a neutropenic diet, if any?

4.5.6.1. ***Recommendation 37***. Neutropenic diets (also called “germ-free”, “no microbial” or “sterilized” diets) shall not be used (e.g. in neutropenic patients with cancer including hematopoietic cell transplant patients).

Grade of recommendation A – strong consensus (93.6% agreement).

Commentary.

A recent updated systematic review and meta-analysis included six studies (five randomized) with 1116 patients, with 772 (69.1%) having undergone hematopoietic cell transplants [136]. There was found no statistically significant difference between neutropenic diet and usual diet in the rates of major infections or bacteremia/fungemia. In hematopoietic cell transplant patients, a neutropenic diet was associated with a slightly higher risk of infections. No difference in mortality was seen between a neutropenic diet and an usual diet.

However, a Cochrane review in 2012 concluded that based on the available evidence, it was not possible to give recommendations for clinical practice [137]. It was stated that more high-quality research is needed. At that moment there was no evidence from individual RCTs in children and adults with different malignancies that underscores the use of a low bacterial diet for the prevention of infection and related outcomes. All studies differed concerning co-interventions, outcome definitions, and intervention and control diets. Since pooling of results was not possible and all studies had serious methodological limitations, no definitive conclusions can be made. It should be noted that ‘no evidence of effect’, as identified in this review [134], is not the same as ‘evidence of no effect’.

Accordingly, there is currently no clear evidence to support the use of a neutropenic diet or other food restrictions in neutropenic patients with cancer. Patients and clinicians should continue to follow the safe food-handling guidelines as recommended by authorities.

4.5.7. What are the indications of a low-fiber diet?

4.5.7.1. ***Recommendation 38***. Solely on the day preceding a colonoscopy a low fiber diet should be eaten to achieve a better colon cleansing and to reduce patients’ discomfort.

Grade of recommendation B – strong consensus (94.3% agreement).

Commentary.

There is no clear definition for a low-fiber diet and the terms “low residue” and “low fiber” are used interchangeably. Usually a diet with a total daily fiber intake <10g is defined as a low-fiber diet [138–140]. A low-fiber diet has been used in colon preparation before a colonoscopy [141]. A low-fiber diet combined with cathartic agents does not impair the quality of bowel preparation and a better colon cleansing is achieved. Additionally, the low-fiber diet is better tolerated by patients and there is increased compliance [141–145].

A recent meta-analysis including 12 RCTs and 3674 participants compared a low residue diet (eight RCTs) or a regular diet (four RCTs) to patients receiving a clear liquid diet in bowel preparation. Compared with a clear liquid diet, the low residue/regular diet was associated with a higher willingness to repeat the procedure and better tolerability. No differences between groups were found in terms of adequate bowel preparation and adenoma detection rate [146]. It may be reasonable for patients without risk factors for poor preparation to undergo a low residue diet until lunch the day before colonoscopy.

The role of a low-fiber diet after elective colorectal surgery was studied in one RCT. This RCT showed that provision of a low residue diet rather than a clear liquid diet after colorectal surgery on day one postoperatively is associated with less nausea, faster return of bowel function, and a shorter hospital stay without increasing postoperative morbidity [147].

In patients with irritable bowel syndrome, a low fiber diet may be an effective treatment to relieve symptoms such as abdominal pain, cramps, and distension [139]. It is not clear whether the dietary fiber recommendations for individuals with irritable bowel syndrome should differ from those of the general population. There are no high-quality studies on the effect of a low fiber diet on the management of diverticulitis, acute colitis, Crohn's disease, and ulcerative colitis. In conclusion, no recommendation can be given regarding the role of a low-fiber diet in other clinical conditions than colonoscopy preparation.

4.6. Is salt reduction associated with clinical benefits in renal failure, heart failure, arterial hypertension, liver cirrhosis with edema/ascites, and with which threshold?

4.6.1. ***Recommendation 39***

In the case of chronic cardiac failure, chronic renal failure, or cirrhosis, sodium chloride reduction should not be decreased below 6 g/day, otherwise, the benefits-risk ratio is unfavorable towards a higher risk for malnutrition.

Grade of recommendation B – strong consensus (91.2% agreement).

Commentary.

Heart failure is often associated with high blood pressure. The European Society of Cardiology (ESC) 2012 Guidelines for the Diagnosis and Treatment of Acute and Chronic Heart Failure and the American College of Cardiology Foundation (ACCF)/American Heart Association (AHA) 2013 Guideline for the Management of Heart Failure, both provide comprehensive evidence-based recommendations in caring for patients with heart failure and they do recommend restricting sodium in heart failure patients [148,149]. However, they state that the intake of sodium should be individualized, since their potential benefits from sodium restriction such as dyspnea and blood pressure reduction, and edema improvement, vary between patients. On the other hand, that salt restriction might activate the renin-angiotensin-aldosterone-system and the sympathetic nervous system or increase the inflammatory cytokine levels. A review of these guidelines underlines the gaps in terms of the controversial effect of sodium and fluid restriction in patients with heart failure. More specifically, patients with heart failure who are assigned to a low-sodium diet and fluid restriction showed worse neurohormonal profiles, and for those with heart failure combined with reduced ejection fraction, an increase in heart failure admissions. This underlines the necessity for further research in sodium and fluid homeostasis [150]. A cohort study of 910 participants showed that sodium restriction <2500 mg/day had a significantly higher risk for the combined primary endpoint of death or heart failure hospitalization driven primarily by an increased risk of heart failure hospitalization. A Cochrane Review of eight RCTs (N = 3518) concluded that there is insufficient power to confirm clinically important effects of dietary advice and salt substitution on cardiovascular mortality in normotensive or hypertensive populations [151].

A review of eight studies studying the long-term effects of salt restriction in people with chronic kidney disease was unable to determine the direct effects of sodium restriction on primary endpoints such as mortality and progression to end-stage kidney disease [152]. A meta-analysis published three years later on the long-term effects of salt restriction in people with chronic kidney disease showed no direct effects of sodium restriction on primary endpoints such as mortality and progression to end-stage kidney disease. Salt reduction in people with chronic kidney disease, however, reduced blood pressure considerably and consistently reduced proteinuria. If such reductions could be maintained long-term, this effect may translate to clinically significant reductions in end-stage kidney disease incidence and cardiovascular events, but research into the long-term effects of sodium-restricted diet for people with chronic kidney disease is warranted, as is the investigation into adherence to a low salt diet [153]. In summary, salt reduction to a minimum of 3.8 g/day should be indicated in patients with chronic renal failure complicated with arterial hypertension. Cautious should be given to avoid cumulating restrictive diets (i.e low protein + salt-reduced diets) that are at high risk of malnutrition in chronic kidney disease patients.

Liver cirrhosis patients with arterial hypertension usually become normotensive and patients with normal blood pressure before disease develop low blood pressure. The guidelines for ascites control of the European Association for the Study of the Liver state that “a lower salt intake than recommended in the general population is not recommended in case of ascites complicating chronic liver disease (cirrhosis)” [154,155]. Moreover, the guidelines on the management of ascites and cirrhosis by Moore et al., dietary salt should be restricted to a no-added salt diet of 90 mmol salt/day (5.2 g salt/day) [154,155].

4.6.2. ***Recommendation 40***

In case of arterial hypertension or acute decompensated heart failure, sodium chloride (salt) intake shall be no more than 6 g per day.

Grade of recommendation B – strong consensus (91.8% agreement).

Commentary.

It has been well documented with a RCT of 412 participants with and without hypertension, that reduced dietary sodium and the dietary approaches to stop hypertension (DASH) diet are associated with a significantly lower systolic blood pressure with the dietary approaches having a greater effect on the reduction of blood pressure [156]. More recently, a Cochrane systematic review of 185 RCTs (N = 12,210) showed that sodium reduction from an average high usual sodium intake level (201 mmol/day, i.e. 11.5 g sodium chloride/day) to an average level of 66 mmol/day (3.8 g sodium chloride per day), which is below the recommended upper level of 100 mmol/day (5.8 g sodium chloride per day), resulted in a decrease in systolic/diastolic blood pressure in white, Asian and black participants with normotension and an even greater decrease in systolic/diastolic blood pressure in participants with hypertension [157]. However, these study settings were the primary care, and not the hospital. At hospital, the risk for malnutrition is worsening by a too strict salt diet restriction. Therefore, we propose that sodium chloride (salt) intake shall be no more than 6 g per day in case of arterial hypertension or acute decompensated heart failure. This is in line with the recommendations for other several diseases, such as chronic heart failure, liver cirrhosis with edema or ascites, and chronic renal failure (see recommendation 39).

4.6.3. ***Recommendation 41***

In patients admitted for acute decompensated heart failure, sodium should not be restricted to < 120 mmol/day (i.e. 2.8 g sodium chloride per day).

Grade of recommendation B – strong consensus (93.5% agreement).

Commentary.

In an RCT with 410 participants, researchers compared the effects of a normal-sodium (120 mmol sodium) diet with a low-sodium diet (80 mmol sodium) on readmissions for congestive heart failure during 180 days of follow-up in compensated patients with chronic heart failure. The group consuming the normal-sodium diet (120 mmol sodium) showed the best results, with a significant reduction ($p < 0.001$) in readmissions, brain natriuretic peptide, aldosterone, and plasma renin activity compared with the other groups consuming lower sodium dosages during follow-up ($p < 0.001$) [158]. The results of another RCT on salt reduction and fluid restriction with the use of furosemide showed that the combination of a normal-sodium diet with high diuretic doses and fluid intake restriction, compared with different combinations of sodium diets with more modest fluid intake restrictions and conventional diuretic doses, leads to reductions in readmissions, neurohormonal activation, and renal dysfunction [159]. Another RCT with an aggressive reduction in salt intake (maximum dietary intake, 800 mg/day) and a fluid-restricted (maximum fluid intake, 800 mL/day) showed that sodium and water restriction in patients admitted for ADHF are unnecessary [148].

4.7. Diets for special patient groups

4.7.1. Is a therapeutic diet indicated with a corticosteroid therapy?

4.7.1.1. ***Recommendation 42***. Patients treated with a short-term (≤6 weeks) systemic corticosteroid therapy may receive the hospital diet (see recommendation 14).

Grade of recommendation 0 – consensus (87.8% agreement).

Commentary.

Chronic or acute diseases where systemic corticosteroid therapy is indicated are frequently associated with inflammation and malnutrition. Therefore, prevention of malnutrition is highly warranted. In the case of systemic corticosteroid therapy, salt, sugar, fat, or calorie reduction should not be recommended, as the benefits-risk ratio is unfavorable towards a higher risk for malnutrition. At short-term (six weeks), sodium intake (<3 vs > 6 g/day) does not seem to influence blood pressure variations in patients starting systemic corticosteroid therapy [160]. A controlled trial in 23 women with BMI >25 kg/m^2, with mild, stable systemic lupus erythematosus receiving a low dose of prednisolone over six weeks indicated that significant weight loss (mean of 3 kg) and fatigue improvement could be similarly achieved with either a standard diet (2000 kcal/day, 50% carbohydrates, 15% proteins, 30% fat) or a low glycemic diet (carbohydrate limited to 45 g/day, 10–15% carbohydrates, 25% proteins and 60% saturated and unsaturated fat) [161]. Both diets were equally tolerable and did not cause flares in disease activity [161]. This study suggested that a restricted diet is not indicated for short-term corticosteroid therapy.

Calorie intake higher than 30 kcal/kg/day could favor corticosteroid-induced lipodystrophy during prolonged (>3 months) corticosteroid therapy [162]. As shown on an RCT of 60 participants, a salt reduction might have some positive effect on the metabolic side effects (blood glucose, lipid profile, blood pressure, and anthropometric measurements) in patients receiving corticosteroid medication for more than ten weeks [163]. The salt reduction is not indicated as the primary prevention of arterial hypertension in patients with corticosteroid therapy [164]. The only theoretical indication of diet modification could be a salt reduction (but >6 g chloride sodium/day) in case of occurrence of arterial hypertension during a long-term (>10 weeks) corticosteroid therapy (see recommendation 39). However, a small qualitative study of 16 adult patients under long-term corticosteroid (≥3 months, ≥ 5 mg/day) treatment from both general medicine and rheumatology practices highlighted the difficulties and the psychological distress encountered by patients in comprehending and implementing diet recommendations in the context of long-term corticosteroid use [165].

In patients with corticosteroid therapy, a standard diet could be proposed to cover increased energy expenditure and protein catabolism related to inflammatory diseases: carbohydrates 55–60% of the total energy intake, proteins 15–20%, and fat 25–30% (saturated, monounsaturated, polyunsaturated fatty acids in the ratio 1:1:1) [166]. Unfortunately in real-life practice in France, unnecessary measures in most patients (potassium supplementation, prevention of peptic ulcer, low-sodium diet) were frequently associated with prescription of long-term (≥3 months) systemic glucocorticoid therapy, while other consensual measures (prevention of osteoporosis, vaccinations) were prescribed to less than half of patients [167]. The calcium and vitamin D supply must be ensured.

Our literature review revealed the lack of substantial evidence about the effect of altered diet composition on the nutritional status of hospitalized patients receiving high doses of corticosteroids. Therefore, we suggest that diet restriction which might increase the risk of malnutrition should not be recommended. Assessment and close monitoring of systemic corticosteroid-induced side effects such as hyperglycemia is highly recommended [168]. The diet should be adapted accordingly.

4.7.2. Is there a recommended diet for diabetic patients?

4.7.2.1. ***Recommendation 43***. Type 1 and 2 diabetic patients should be offered the standard or the hospital diet according to their nutritional risk/status (see recommendations 12,13,14).

Grade of recommendation GPP –consensus (84.0% agreement).

Commentary.

Malnutrition prevention in diabetics patients is as important as for any other patient. Glycemic control should not be a pretext to reduce food intake in diabetic patients. Optimization of insulin therapy is indicated, but not the reduction of food intake and increasing the risk of malnutrition. When hospitalized, diabetic patients could be more at risk of malnutrition especially in case of diabetes disequilibrium.

4.7.2.2. ***Recommendation 44***. Patients with insulin therapy shall receive support to identify and quantify their dietary carbohydrate intake for glycemic control.

Grade of recommendation A – strong consensus (97.1% agreement).

Commentary.

On a meal-by-meal basis, matching insulin to the amount of carbohydrate consumed (carbohydrate counting and insulin dose adjustment) is an effective strategy for improving glycemic control. Randomized controlled trials in adults with type 1 diabetes have shown carbohydrate counting can improve glycemic control, quality of life, and general well-being without increases in severe hypoglycemic events, BW, or blood lipids [169–172].

4.7.2.3. ***Recommendation 45***. Snacks containing mixed carbohydrates and protein should be offered between meals according to individual care (e.g. usually with mealtime short- and median-acting insulin) and glycemic control.

Grade of recommendation GPP –consensus (89.4% agreement).

Commentary.

Snacks containing mixed carbohydrate, protein, and fat intakes induce better glycemic control than carbohydrate only.

4.7.2.4. ***Recommendation 46***. In hospitalized diabetic patients, the low carbohydrate diet (<40% of energy intake) should be avoided as it is associated with lower energy intake and the risk of malnutrition.

Grade of recommendation GPP – strong consensus (91.8% agreement).

Commentary.

In the case of diabetes disequilibrium, optimization of insulin or antidiabetic drug is warranted, whereas calorie restriction is not. Diabetes is an important factor associated with low dietary intake, e.g. in hemodialysis patients [173], lower limb ulcers, and amputations [174]. The risk of frailty and sarcopenia is higher in people with diabetes [175]. This risk is increased in case of acute or chronic illnesses associated with diabetes. Restrictive regimens should be avoided to prevent malnutrition and support nutrition when needed.

4.7.2.5. ***Recommendation 47***. With diabetic complications (e.g. diabetic nephropathy, diabetic gastroparesis, lower limb ulcers, and amputations), diet and nutrition support should be individual and diagnosis-based.

Grade of recommendation GPP – strong consensus (97.3% agreement).

Commentary.

Individuals with type 1 and type 2 diabetes have about a twofold increased risk of developing a range of cardiovascular diseases compared to those without diabetes [176]. Dietary patterns, specifically the Mediterranean and dietary approaches to stop hypertension (DASH)-style diets, are recommended to reduce cardiovascular disease risk factors and cardiovascular disease events in people with diabetes [174]. Key features of these and Nordic diets include:

1) decrease salt intake (<6 g/day);
2) eat two portions of oily fish each week;
3) choose whole grains instead of refined grain;
4) eat everyday vegetables at least 300 g and fruit and berries at least 200 g;
5) eat nuts and legumes (pulses) three times per week;
6) consume less red and processed meat, refined carbohydrates, and sugar-sweetened beverages;
7) replace saturated fats with unsaturated fats;
8) limit alcohol intake to ≤14 units/week (in hospitals: zero alcohol).

In Diabetes UK Position Statements [174] they concluded “There is no convincing evidence for recommended ideal amount of carbohydrate for maintaining long-term glycemic control for people with type 1 diabetes”. As well the exact proportion of energy that should be derived from total fat intake does not appear to be critical. In people with diabetes, studies recommending up to 40% of energy from fat - mostly unsaturated fat. From the evidence, there is no reason to recommend any specific ideal portion of macronutrients specifically for optimal glycemic control for type 2 diabetes. However total energy intake, overall diet composition and controlled total energy intake for weight management are vital. The overall diet quality also has a significant impact on diabetes complications e. g., cardiovascular disease [174].

In case of hyperglycemia, insulin and antidiabetic therapy should be adapted, and the strategy consisting of reducing food/carbohydrate intake to decrease glycemia should be avoided. Insulin should be adjusted to carbohydrate intake in patients using multiple daily injections and continuous subcutaneous insulin (insulin pump).

For persons with gastroparesis, the choice of nutritional support depends on the severity of the disease. In mild diabetic gastroparesis, maintaining oral nutrition is the goal of therapy and dietary recommendations rely on measures that optimize gastric emptying. These are low-fat, low-fiber meals, small frequent meals, complex carbohydrates, and energy-dense liquids in small volumes [177]. For the person with severe gastroparesis who is unable to maintain nutrition with oral intake, a feeding jejunostomy tube, which bypasses the affected stomach, can improve symptoms and reduce hospitalization [178].

For persons with diabetic nephropathy, national and international guidelines recommend that appropriate dietary advice tailored to the stage of kidney disease should be given concerning potassium, phosphate, salt, and energy intake, ensuring malnutrition prevented [179].

4.8. Indications for modified texture diets

4.8.1. What are the indications of modified texture diets in geriatrics?

For the indications of modified texture diets in geriatric patients, we refer to recommendation 22 of the ESPEN guideline on clinical nutrition and hydration in geriatrics [16].

4.8.1.1. ***Recommendation from the ESPEN guideline on clinical nutrition and hydration in geriatrics***. Older persons with malnutrition or at risk of malnutrition and signs of oropharyngeal dysphagia and/or chewing problems shall be offered texture-modified, enriched foods as a compensatory strategy to support adequate dietary intake.

Grade of recommendation GPP – strong consensus (100% agreement).

Commentary.

The evidence for prescription of texture-modified diets for dysphagia is limited, but good clinical practice pointing for the use of texture modified foods in patients with oral dysphagia [180], in agreement with the ESPEN Guideline on clinical nutrition and hydration in geriatrics [16] and neurology [15] which grade of recommendation is good practice strong consensus (100% agreement) for the use of texture-modified, enriched foods as a compensatory strategy to support adequate dietary intake according to signs of oropharyngeal dysphagia and/or chewing problems.

Texture modified food means a challenge for the hospital kitchen in terms of nutritional as well as sensory aspects since pureed diets usually have a low energy density, indicating that a greater quantity of food needs to be consumed to meet nutrient needs which may impose a physiological burden on older adults [181]. Furthermore, texture-modified food might look unappealing [181]. Oral dysphagia becomes prevalent in high ages according to several age-related changes in the oral cavity, pharynx, and esophagus [182]. Histologically, the swallowing muscles are different from somatic muscles as they receive continuous stimulation from the respiratory center, but are inevitably affected by malnutrition and disuse; accumulating evidence is available regarding the negative influence on swallowing [183].

4.8.2. What are the indications of modified texture diets in other situations than geriatrics?

4.8.2.1. ***Recommendation 48***. In clinical situations at risk of dysphagia (stroke, neurogenic and neuromuscular disorders, head and neck cancer, amyotrophic lateral sclerosis, hereditary ataxia, multiple sclerosis, or traumatic cervical spinal cord injury), systematic screening of dysphagia should be performed, and the need and type of modified texture diet should be identified.

Grade of recommendation GPP – strong consensus (91.7% agreement).

Commentary.

Oral-pharyngeal dysphagia is associated with many medical conditions, including stroke, neurogenic and neuromuscular disorders, head and neck cancer, amyotrophic lateral sclerosis, hereditary ataxia, inflammatory bowel disease, and traumatic cervical spinal cord injury.

Dysphagia is associated with many negative clinical short- and long-term outcomes, such as pneumonia, malnutrition, dehydration, and reduced quality of life [184–187]. According to the published literature, the overall incidence of dysphagia in traumatic and non-traumatic cervical spinal cord injury patients varies from 16% to 80% [186].

The evidence for the prescription of texture-modified diets for dysphagia is limited [180]. Many guidelines [15,188] and studies [188] recommend: In initial stages of dysphagia, adequate nutrition intake may be achieved through dietary modification to include soft, semisolid, or semi-liquid consistencies, partnered with appropriate swallowing techniques. There is a lack of evidence on the positives well as on the adverse effects of texture-modified diets in stroke patients with dysphagia [15]. In IBD patients with intestinal strictures or stenosis in combination with obstructive symptoms, a diet with adapted texture, or distal (post-stenosis) EN can be recommended. There is no robust data, this is just a logical practical approach [189].

The term dysphagia refers to difficulties in swallowing. In general, evaluation of swallowing usually begins with a screening and/or bedside examination and, if indicated, swallowing assessment by a speech therapist. This may be often followed by an instrumental evaluation with a videofluoroscopic swallowing study (VFSS) and/or fiberoptic endoscopic evaluation of swallowing (FEES). The goals of the swallowing assessment are to determine the optimal nutrition method (oral vs. nonoral) to support adequate nutrition and hydration and to maximize safe swallowing since proper swallowing safety aims to reduce the pulmonary complications associated with penetration-aspiration. Videofluoroscopic swallowing study is conducted by a speech therapist and a radiologist [186]. Multi-professional work is important and adds the patient safety. One internationally recognized system for different textures is the International Dysphagia Diet Standardisation Initiative (IDDSI) (https://iddsi.org/Translations/Available-Translations).

4.8.2.2. ***Recommendation 49***. In the initial stages of dysphagia, adequate nutrition intake may be achieved through dietary modification to include soft, semisolid, or semi-liquid consistencies, in combination with appropriate swallowing techniques.

Grade of recommendation GPP – strong consensus (97.3% agreement).

Commentary.

Historically, in 2002 the American Dietetic Association proposed standardized terminology and definitions of diet modification for patients with dysphagia. And the National Dysphagia Diet proposed definitions of solid food textures and viscosity ranges for thin, nectar-like, honey-like, and spoon-thick liquids. But now, from October 2021, it is imperative that all healthcare providers globally implement IDDSI, both to ensure patient safety and to maintain current standards of practice. The Academy of Nutrition and Dietetics has announced hat beginning October 2021, IDDSI will be the only texture-modified diet recognized by Full Nutrition Care Manual (NCM)®. The National Dysphagia Diet (NDD) and associated resources will no longer be included in the NCM® past October 2021. Some studies have made of the use of thickening agents (and xanthan gum seems to be better than starch) [79,190]. Newman et al. (2016) wrote as background for their study “Fluid thickening is a well-established management strategy for oropharyngeal dysphagia [191]. However, the effects of thickening agents on the physiology of impaired swallow responses are not fully understood, and there is no agreement on the degree of bolus thickening. European Society for Swallowing Disorders (ESSD) concludes that there is evidence for increasing viscosity to reduce the risk of airway invasion and that it is a valid management strategy for oropharyngeal dysphagia [191]. However, new thickening agents should be developed to avoid the negative effects of increased viscosity on residue, palatability, and treatment compliance. New RCTs should establish the optimal viscosity level for each phenotype of dysphagic patients and descriptors, terminology, and viscosity measurements must be standardized. This white paper is the first step towards the development of a clinical guideline on bolus modification for patients with oropharyngeal dysphagia [191].

4.9. Procedures of realimentation

4.9.1. What is the recommended procedure of realimentation after acute pancreatitis?

We refer to recommendations 2, 3, 21, 22, 23 and statements 4 and 5 of the ESPEN guideline on clinical nutrition in acute and chronic pancreatitis [19].

4.9.1.1. ***Recommendation from the ESPEN guideline on clinical nutrition in acute and chronic pancreatitis***. Oral feeding shall be offered as soon as clinically tolerated and independent of serum lipase concentrations in patients with predicted mild acute pancreatitis.

Grade of recommendation A – strong consensus (100% agreement).

4.9.1.2. ***Recommendation from the ESPEN guideline on clinical nutrition in acute and chronic pancreatitis***. Low-fat, soft oral diet shall be used when reinitiating oral feeding in patients with mild acute pancreatitis.

Grade of recommendation A – strong consensus (100% agreement).

4.9.1.3. ***Statement from the ESPEN guideline on clinical nutrition in acute and chronic pancreatitis***. Patients with chronic pancreatitis do not need to follow a restrictive diet.

strong consensus (94% agreement).

4.9.1.4. ***Recommendation from the ESPEN guideline on clinical nutrition in acute and chronic pancreatitis***. Chronic pancreatitis patients with a normal nutritional status should adhere to a well-balanced diet.

Grade of recommendation GPP – strong consensus (94% agreement).

4.9.1.5. ***Recommendation from the ESPEN guideline on clinical nutrition in acute and chronic pancreatitis***. Malnourished patients with chronic pancreatitis should be advised to consume high protein, high-energy food in five to six small meals per day.

Grade of recommendation GPP – strong consensus (94% agreement).

4.9.1.6. ***Recommendation from the ESPEN guideline on clinical nutrition in acute and chronic pancreatitis***. In patients with chronic pancreatitis, diets very high in fiber should be avoided.

Grade of recommendation B – strong consensus (91% agreement).

4.9.1.7. ***Statement from the ESPEN guideline on clinical nutrition in acute and chronic pancreatitis***. In patients with chronic pancreatitis, there is no need for dietary fat restriction unless symptoms of steatorrhea cannot be controlled.

strong consensus (100% agreement).

Commentary.

Before initiating oral food in patients with acute pancreatitis, disease severity should be assessed. Frequent and cautious reassessments are mandatory for safe oral feeding. In patients with mild acute pancreatitis, early oral feeding, with the subjective feeling of hunger, is safe, feasible, and reduces the length of hospital stay [192]). The early oral diet causes no harm to patients with mild disease [193]. Starting early feeding with clear liquids, soft diet, low-fat diet, or solid food was shown to be safe in different RCTs [192,194–200]. Oral refeeding with a full solid diet in mild acute pancreatitis is well tolerated by most patients without abdominal pain relapse [199]. The refeeding regimen may also be gradually progressed from a clear liquid diet to a low-fat solid diet [200].

An RCT including 151 patients showed that oral refeeding with a soft diet in patients with mild acute pancreatitis is safe and results in a shorter length of hospital stay [197]. In another RCT with 72 patients, there was no difference in feeding tolerance comparing immediately full caloric diet versus stepwise increase approach [201]. In this study refeeding after the presence of bowel sounds with an immediate full caloric diet was safe and well-tolerated. A meta-analysis of three RCTs with 362 patients showed the non-liquid soft or solid diet did not increase pain recurrence after refeeding, compared with the clear liquid diet. The non-liquid diet reduced hospitalization with a pooled mean difference being −1.05 days [202]. Only three RCTs were included in this meta-analysis and more multicenter cooperative studies with prospective design are needed. In a prospective Swedish cohort study of individuals with non-gallstone-related acute pancreatitis, there was no clear association between overall diet quality and risk of recurrent and progressive pancreatitis [203]. In patients with moderate to severe acute pancreatitis EN is beneficial and early oral feeding with hospital food is not recommended if there is hemodynamic instability [204]. After severe acute pancreatitis, an early oral diet is recommended at least by soft food. However solid food is not contraindicated but should be build up to a normal diet within days, judging by abdominal pain and postprandial pain [205].

4.9.2. What is the recommended procedure of realimentation after GI surgery (obesity surgery excepted)?

4.9.2.1. ***Recommendation 50***. Small meals five to six times per day may help patients to tolerate oral feeding and achieve nutritional goals faster during the early phase of recovery after surgery.

Grade of recommendation GPP – strong consensus (94.3% agreement).

Moreover, we refer to recommendations 3, 4, and 5 of the ESPEN guideline: Clinical nutrition in surgery [13].

4.9.2.2. ***Recommendation from ESPEN Guideline on Clinical Nutrition in Surgery***. In most instances, oral nutritional intake shall be continued after surgery without interruption.

Grade of recommendation A – strong consensus (90% agreement).

4.9.2.3. ***Recommendation from ESPEN Guideline on Clinical Nutrition in Surgery***. It is recommended to adapt oral intake according to individual tolerance and to the type of surgery carried out with special caution to elderly patients.

Grade of recommendation GPP – strong consensus (100% agreement).

4.9.2.4. ***Recommendation from ESPEN Guideline on Clinical Nutrition in Surgery***. Oral intake, including clear liquids, shall be initiated within hours after surgery in most patients.

Grade of recommendation A – strong consensus (100% agreement).

Commentary.

Most patients should be offered food from the day of surgery. Early resumption of oral intake does not diminish the duration of postoperative ileus or lead to a significantly increased rate of nasogastric tube reinsertion [206]. Time to resumed bowel function is significantly in favor of allowing normal food at will [207]. Two recent meta-analyses showed that early postoperative oral feeding is associated with significant reductions in total complications compared with traditional postoperative feeding practices and does not negatively affect outcomes such as mortality, anastomotic dehiscence, resumption of bowel function, or hospital length of stay [208,209]. Another meta-analysis revealed that early feeding reduced the risk of any type of infection and the mean length of stay [210]. It appears that early EN (within 24–48 h after surgery) has a positive effect on length of stay and no negative effect on complications.

An early normal hospital diet is feasible and safe after colorectal surgery. In a recent RCT in colorectal cancer surgery patients, early oral feeding was demonstrated to be safe and effective, with a shortened hospital stay as the primary benefit [211]. However, in another RCT early postoperative feeding did not reduce hospital stay, nursing workload, or costs and there was a tendency toward increased nasogastric tube use in the early feeding arm [212].

As emphasized by a Cochrane Systematic Review of 17 RCTs with 1437 patients undergoing lower gastrointestinal surgery, although early feeding may lead to a reduced postoperative length of stay, cautious interpretation must be taken due to substantial heterogeneity and low-quality evidence [213].

Evidence for early oral feeding in pancreatic and upper gastrointestinal surgery is scarce. In a single-center RCT of 280 esophagectomy patients, liquids on day one, soft solid foods on day two, and normal hospital food as tolerated were shown to be a safe and feasible strategy. Early recovery of intestinal function and an improvement of quality of life were the main advantages [214]. A Chinese RCT of 100 patients undergoing laparoscopic radical gastrectomy, early oral feeding (liquids on day one, liquid and soft food from day two to six) was shown to be not harmful than traditional delayed feeding. There were no significant differences in postoperative complications between the two groups [215].

A review with 15 studies including 2112 patients undergoing upper gastrointestinal surgery, hospital length of stay is significantly shorter in the early oral feeding group and there was no difference in risk of anastomotic leak, pneumonia, readmission rate, and mortality [216]. After upper gastrointestinal and pancreatic surgery, small meals five to six times per day may help patients to tolerate oral feeding and achieve nutritional goals faster during the early phase of recovery.

A recent meta-analysis of four RCTs compared early oral feeding with conventional care after gastrectomy. In all four studies, early oral feeding was associated with a decreased length of hospital stay ranging from −1.3 to −2.5 days when compared to conventional care. A faster time to first flatus was recorded in all four studies in the early feeding group. Furthermore, this policy does not increase postoperative complication risk when compared to conventional care [217]. On the other hand, most studies have been conducted in an Asian population and larger randomized controlled trials performed amongst other populations are needed to generalize these results. Before early oral feeding after pancreatic and upper gastrointestinal tract surgery could be routinely advocated, multicenter, prospective, large sample size RCTs are required.

4.9.3. What is the recommended procedure of realimentation after lower or upper GI bleeding (ulcer, esophageal varices)?

4.9.3.1. ***Recommendation 51***. After lower gastrointestinal bleeding, once oral food is authorized, patients should receive the standard hospital diet according to the patient nutritional risk and status.

Grade of recommendation GPP – strong consensus (91.8% agreement).

Commentary.

Although lower gastrointestinal bleeding encompasses a wide clinical spectrum, in the majority of patients, bleeding stops spontaneously [218,219]. If the patient is stable and not actively bleeding standard hospital diet should be offered [220]. No RCTs are investigating the optimal dietary management of patients with lower gastrointestinal bleeding.

4.9.3.2. ***Recommendation 52***. After upper gastrointestinal system bleeding, once oral food is authorized, oral feeding should be initiated with liquids and advanced within 24 h to standard or hospital diet according to the patient nutritional risk and status.

Grade of recommendation B – strong consensus (93.8% agreement).

Commentary.

There is limited evidence for realimentation after gastrointestinal bleeding. Patients with clean-based ulcers or nonbleeding Mallory-Weiss tears may be refed early with the regular hospital diet and discharged home immediately after stabilization [221]. Similarly, early feeding does not worsen outcomes in patients with active bleeding peptic ulcer treated by sclerotherapy and reduces the length of hospital stay [222]. In an RCT including 100 patients early feeding starting on day one shortened the hospital stay and did not affect treatment outcomes compared to nil by mouth until day three [223].

A recent meta-analysis of five trials involving 313 patients showed that early oral feeding within 24 h does not result in a significantly higher risk of rebleeding and mortality compared with delayed oral feeding, but decreases hospital length of stay [193]. Usually, a liquid diet is initiated immediately, and subsequently, a soft diet is given [193]. In unstable patients and patients with endoscopic findings predictive of a high risk of rebleeding, feeding should be delayed.

An RCT showed that early feeding with a regular solid diet in patients after successful variceal ligation for esophageal varices is safe, provides better nutrition, and results in a lower incidence of infections in bleeders compared to delayed feeding [224]. The results are promising, however, they included only patients with low-risk varices. More studies on the timing and type of nutrition in patients with variceal bleeding and with high-risk stigmata are needed [225].

4.9.4. What is the recommended procedure of realimentation after endoscopy including gastrostomy interventional procedure?

4.9.4.1. ***Recommendation 53***. Patients undergoing an endoscopic procedure should return to a standard hospital diet after the release of medication (anesthesia) to prevent malnutrition risk during hospitalization.

Grade of recommendation GPP – strong consensus (97.3% agreement).

Commentary.

After performing an extensive literature review, no study on the recommended procedure of realimentation after endoscopy (gastroscopy, colonoscopy) or radiology procedure was found. In the absence of demonstrated benefits, there is no need of starving or restricted diet after an uncomplicated procedure. Based on expert clinical experience, we suggest that patients should return to consuming a standard hospital diet after the release of medication (anesthesia) to prevent malnutrition risk during hospitalization.

4.10. Other issues

4.10.1. Could a combination of diets be indicated?

4.10.1.1. ***Recommendation 54***. The combination of therapeutic diets may not be prescribed, as the risk of insufficient food intake and malnutrition is high.

Grade of recommendation 0 – strong consensus (91.4% agreement).

Commentary.

The more therapeutic diets, the higher the risk of insufficient energy and protein food intake [1]. Therapeutic diets must be prescribed only with a proven medical indication (such as proven food allergy, celiac disease, lactose intolerance, renal disease, as well as restrictive diets: low-calorie diet, low protein diet, low fiber diet). For these patients it is important that a clinical dietitian evaluate the energy and nutrient content of the diets to prevent malnutrition.

In some situations, patients are prescribed simultaneous therapeutic diets (e.g., sugar-free, less salted, lipid-free …), thus. Reducing the variety of possible dishes, increasing the risk of low food intake and malnutrition. These prescriptions often come from additional prescriptions made without knowing the previous ones. Therefore, all prescriptions should be re-evaluated and a priority must be given to limit therapeutic diet prescriptions to the current situation. Computerized meal ordering systems should limit the cumulative possibility of diets to a maximum of two options for the same individual. A prescription with more than two restrictions must be of an exception that needs to be time-limited, real oral intake monitored and prescription revaluated. Restrictive diets must be avoided for older persons regarding potential risks in terms of malnutrition, quality of life, morbidity, and mortality [226,227]. A particular attention is to address to a texture-modified diet that is one restriction as its own. Most of the time a texture-modified diet corresponds to a low energy diet due to the absence of bread and a limited number of dishes. This food offer is associated to lower energy and protein intake in the older people [228,229]. Moreover, this often provides reduced food choices to patients and represents an additional risk of malnutrition [230]. In conclusion, the combination of restrictive diets should be avoided due to the risk of malnutrition and food intake should be monitored.

4.10.2. How and when to assess food intake at the hospital?

4.10.2.1. ***Recommendation 55***. Food intake is part of nutritional assessment and should be monitored by semi-quantitative methods at hospital admission, at least every week during the hospital stay in patients with no nutritional risk, and every day in patients with nutritional risk or malnourished.

Grade of recommendation B – strong consensus (96.1% agreement).

Commentary.

Malnutrition affects 30–50% of adult patients admitted to hospitals [231,232]. Hospital stay is a risk factor for underfeeding [1] and malnutrition [111,231,232]. At the hospital, malnutrition is associated with increased mortality, morbidity, length of stay, and costs [111]. Therefore, early detection and care for malnutrition are highly warranted to prevent its worsening and its related complications, such as infections, pressure sores, delayed healing, or hospital readmissions.

The assessment of food energy intake has long been considered a key part of the nutritional assessment [8,105,233]. Indeed, reduction of dietary intake, together with the increase of energy requirements, is the main cause of hospital malnutrition. Since 2018 and the Global Leadership Initiative on Malnutrition (GLIM) [8], an international consensus for malnutrition diagnosis, reduced food intake, or assimilation should be considered as one of the top five criteria to diagnose malnutrition [8], together with BMI, weight loss, muscle mass, and inflammatory conditions. Knowing that more than two-thirds of hospitalized patients reported decreased food intake [1], and that undernutrition is the main cause of malnutrition, identifying patients not eating enough is a good way to diagnose malnourished patients. One study reported that a lower food intake before hospital admission alone was an even better risk predictor of complications after gastrointestinal surgery than NRS-2002 [234].

A correlation was found between reduced food intake and low BMI [235]. With the same methodology and greater number of patients, the same authors identified the factors the most strongly associated with reduced food intake on the day of nutritionDay® survey: as compared with full meal intake, reduced intake during the previous week (OR: 0.20; 95% CI: 0.17, 0.22), confinement to bed (OR: 0.49; 95% CI: 0.44, 0.55), female sex (OR: 0.53; 95% CI: 0.5, 0.56), younger age (OR: 0.74; 95% CI: 0.64, 0.85) and older age (OR: 0.80; 95% CI: 0.74; 0.88), and low BMI (OR: 0.84; 95% CI: 0.79, 0.90) [235].

4.10.2.2. ***Recommendation 56****.* In nutritionally at-risk patients, insufficient food intake equal to or less than 50% of energy requirements over 3 days during the hospital stay should trigger a nutritional intervention.

Grade of recommendation B – strong consensus (94.1% agreement).

Commentary.

To assess food intake, the GLIM advocated the use of semi-quantitative methods [8]: reduced food intake is defined as food intake equal to or less than 50% of energy requirements over one week, or any reduction in food intake for more than two weeks. The former definition is based on the results of the European multicenter NutritionDay® survey showing that food consumption ≤50% of offered portions at lunch or dinner was independently associated with an increased (by a factor of two to eight) mortality in 16,290 adult hospitalized patients worldwide [39] and in 9959 US patients [236]. The assessment of consumed food portions has only be evaluated in the hospital setting, in the situations where the health caregivers, e.g. nurse assistants, could observe directly the consumed food by clearing the meal tray as did in NutritionDay® [39].

Another semi-quantitative way of assessing food intake could be the use of a 10-point analog visual scale for food intake [237]. In 2009, the use of 10-point analog scales was proposed to assess food intake in both in- and out-patients as it is feasible, easy to use, and extremely well correlated with daily energy intake assessed by the 3-day dietary record, especially in malnourished patients [237]. Since these results were confirmed by an independent study conducted in 1762 medical oncology patients [238]. Moreover, the 10-point visual analog scale for food intake could help to identify hospitalized patients at risk of malnutrition with 81% of those with a score <7 were at high nutritional risk [237] according to the Nutritional Risk Index (NRI) [239]. Nowadays, the French-Speaking Society for Clinical Nutrition and Metabolism (SFNCM) recommended the use of a 10-point analog visual scale for malnutrition screening in oncology patients [240]. The Simple Evaluation of Food Intake (SEFI®) (www.sefi-nutrition.com, Knoë, le Kremlin Bicêtre, France) (ex-EPA) is approved by SFNCM to assess food intake [241]. SEFI® is of simple use and assesses food intake according to two different procedures: a 10-point visual analog scale that was used in this study, and a visual assessment of consumed portions according to the NutritionDay® survey [39]. To assess food intake, in the setting of hospital malnutrition screening, the use of semi-quantitative methods represents a gain of time when the 3-day dietary record takes several days, is often not accurate enough, and thus is responsible for a delay in malnutrition diagnosis and management. Clearly, nowadays, assessment of food intake could be performed with very simple, easy-to-use, and useful semi-quantitative methods, that could be very easily implemented in daily hospital practice. These methods could be helpful to timely identify the patients who need the effort to be focussed on the best optimized nutritional care, without any delay in nutritional care decision. Food intake should be monitored weekly during the hospital stay.

5. General conclusion

This unique guideline provides 56 recommendations to all relevant topic of Hospital Nutrition and therefore should be helpful to organize nutritional issues in hospitals, rehabilitation centers, and nursing homes, and for achievement good patient safety within nutritional care. Despite its value for personnel responsible for hospital kitchens, as well as for nutritionist physicians, dietitians, and nurses, it is worth to mention that 30 out of 56 recommendations, which is more than half, are not based on evidence from literature, but on extrapolations or just expert knowledge. This indicates the gaps in research in this particular area and may motivate researchers and cargiver to spend more efforts to generate knowledge on this topic.

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Author contributions

All authors contributed: literature research, PICO questions and writing the corresponding recommendation and comments; RT: overall manuscript writing and editing; SCB: critical revision of the final manuscript; all authors approved the final submitted version of the manuscript.

Conflict of interest

The expert members of the working group were accredited by the ESPEN Guidelines Group, the ESPEN Education and Clinical Practice Committee, and the ESPEN executive. All expert members have declared their individual conflicts of interest according to the rules of the International Committee of Medical Journal Editors (ICMJE). If potential conflicts were indicated, they were reviewed by the ESPEN guideline officers and, in cases of doubts, by the ESPEN executive. None of the expert panel had to be excluded from the working group or from co-authorship because of serious conflicts. The conflict of interest forms are stored at the ESPEN guideline office and can be reviewed by ESPEN members with legitimate interest upon request to the ESPEN executive.

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Appendix A. Supplementary data

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