

# ESPEN guideline on hospital nutrition

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# 1 ESPEN guideline on hospital nutrition

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# 32 Abstract

33 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 34 35 of diets are based on arbitrary reasons. Often prescriptions are made independently from the 36 evaluation of nutritional status, and without taking into account the nutritional status. 37 Therapeutic diets (low salt, gluten-free, texture and consistency modified,...) are associated 38 with decreased energy delivery (i.e. underfeeding) and increased risk of malnutrition. The 39 European Society for Clinical Nutrition and Metabolism (ESPEN) proposes here evidence-40 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 41 42 nursing home, all of these by taking into account the patient perspectives. We propose a 43 systematic approach to adapt the hospital food to the nutritional status and potential food allergy 44 or intolerances. Particular conditions such as patients with dysphagia, older patients, 45 gastrointestinal diseases, abdominal surgery, diabetes, and obesity, are discussed to guide the 46 practitioner toward the best evidence based therapy. The terminology of the different useful 47 diets is defined. The general objectives are to increase the awareness of physicians, dietitians, 48 nurses, kitchen managers, and stakeholders towards the pivotal role of hospital food in hospital 49 care, to contribute to patient safety within nutritional care, to improve coverage of nutritional 50 needs by hospital food, and reduce the risk of malnutrition and its related complications.

51

# 52 Keywords

53 acute care; food intake; diets; malnutrition; monitoring

54

# 55 List of abbreviations

- 56 BMI, body mass index; BW, body weight; EN, enteral nutrition; FODMAP, fermentable oligo,
- 57 di-, monosaccharides, and polyols; LCT, long-chain triglycerides; MCT, medium-chain
- 58 triglycerides; NCGS, Non-Celiac Gluten Sensitivity; ONS, oral nutritional supplements; PN,
- 59 parenteral nutrition; RCT, randomized controlled trial.
- 60

Journal Pre-proof

#### 61 Introduction

# 62 Background

63 In hospitals throughout Europe and worldwide, the practices regarding hospital food are 64 heterogeneous. The use, and if any, the prescriptions, of hospital diets are sometimes based on 65 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 66 67 texture and consistency 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 68 69 diets are made independently from the evaluation of nutritional status, and without taking into 70 account the nutritional status.

#### 71 **Objectives**

72 With the present guideline, ESPEN aims to provide as much as possible evidence-based 73 recommendations regarding the diets needed in hospitals, rehabilitation centers, and nursing 74 homes, their particular indications, the management of diet supply to improve the prescription 75 of hospital diets and to reduce the risk of malnutrition, and to achieve good patient safety within 76 nutritional care. Where evidence is not available yet, clear recommendations based on best 77 knowledge and consensus among the experts are given. A thorough terminology of the needed 78 diets is also provided. The recommendations are aimed at physicians, dietitians, nurses, and 79 kitchen managers, in hospitals and nursing homes. The recommendations aim to cover all areas 80 of the hospital, except the surgical intensive care unit and major burns units that are out of the 81 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

- 85 nutritionist physicians and dietitians and be integrated into the hospital's nutrition care plan for
- 86 appropriate evaluation [3].

87

# 88 Methodology

# 89 General methodology

- 90 The present guideline was developed according to the standard operating procedure for
- 91 ESPEN guidelines [4]. The guideline was developed by an expert group of seven physicians
- 92 and four dietitians. Based on the standard operating procedures for ESPEN guidelines and
- 93 consensus papers, the first development step of this guideline was the formulation of so-called
- 94 PICO questions to address specific **p**atient groups (or **p**roblems), **i**nterventions, **c**ompare
- 95 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-
- 97 analyses, systematic reviews, and primary studies (for details see below, "search strategy").
- 98 Each PICO question was allocated to subgroups/experts for the different topics and 57
- 99 recommendations answering the PICO questions were formulated. The grading system of the
- 100 Scottish Intercollegiate Guidelines Network (SIGN) was used to grade the literature [6]. The
- 101 allocation of studies to the different levels of evidence is shown in

- **Table 1**. Supporting the recommendations, the working group added commentaries to the
- 103 recommendations to explain the basis of the recommendations.

# 106 **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

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

108

109 According to the levels of evidence assigned, the grades of recommendation were decided

110 (**Table 2**). In some cases, a downgrading from the generated grades of recommendation was

111 necessary based on the levels of evidence according to

- 112 **Table 1** and **Table 2**, e. g. due to a lack of quality of primary studies included in a meta-analysis.
- 113 Such cases are described in the commentaries accompanying the respective recommendations.
- 114 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
- 116 "can" or "may". The good practice points (GPP) are based on experts' opinions due to the lack
- 117 of studies, for which the choice of wording was not restricted.

# 118 **Table 2: Definition of grades of recommendation [5]**

Α	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					
В	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					

119

Between 13<sup>th</sup> February and 15<sup>th</sup> March 2020, online voting on the recommendations was 120 121 performed using the guideline-services.com platform. All ESPEN members were invited to 122 agree or disagree with the recommendations and to provide comments. A first draft of the 123 guideline was also made available to the participants on that occasion. Twenty-nine 124 recommendations reached an agreement >90%, 22 recommendations reached an agreement of 125 >75–90%, and six recommendations an agreement  $\leq$ 75%. Those recommendations with an 126 agreement higher than 90% (indicating a strong consensus, **Table 3**) were directly passed, and 127 all others were revised according to the comments and voted on again. Two recommendations 128 were deleted based on the comments given in the voting. An originally planned physical

129 consensus conference was canceled due to the Covid-19 pandemic. Instead, a second online 130 voting took place between 7<sup>th</sup> July and 31<sup>st</sup> August 2020. Some recommendations which 131 originally had received more than 90% agreement were also voted on during the second online 132 voting due to major changes in wording. During the second voting, all recommendations except 133 for eleven of them received an agreement higher than 90%. Of those below 90%, ten received 134 an agreement >75%, one an agreement > 50%. The final guideline comprises 56 135 recommendations. To support the recommendations and the assigned grades of 136 recommendation, the ESPEN guideline office created evidence tables of relevant meta-137 analyses, systematic reviews, and (randomized) controlled trials. These evidence tables are 138 available online as supplemental material to this guideline.

139

#### 140 **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		

- 141 According to the AWMF methodology [7]
- 142

#### 143 Search strategy

144 The literature search was performed separately for each PICO question in May 2019 by using 145 the Pubmed and Cochrane databases with the search terms presented in Table 4. Existing 146 guidelines were also considered. The aim was to give clear recommendations regarding the 147 indications of therapeutic diets at hospital, rehabilitation center, and nursing home in different 148 settings: e. g. gastroenterology (low-fiber diet, realimentation after gastrointestinal bleeding, 149 pancreatitis, gluten-free diet, FODMAPs, chyle leakage, intestinal lymphagectasia...), 150 endocrinology and nutrition (low-calorie diet, low sugar diet, particularly in the setting of the 151 risk of malnutrition in acute care obese patients, rare metabolic diseases), cardiology –

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	nospital & 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				
	ial[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 disea				
	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				

# 157 **Table 4: Search terms**

155 GLIM consensus [8].

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#### Journal Pre-proo

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

	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)
	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] OR Controlled clinical trial[Publication Type])) OR (Randomized[Title/Abstract] OR Trial[Title/Abstract] OR metaanal*[Title/Abstract] OR Trial[Title/Abstract] OR metaanal*[Title/Abstract] OR Trial[Title/Abstract] OR metaanal*[Title/Abstract] OR Trial[Title/Abstract] OR Randomized[Title/Abstract] OR Trial[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 Drug therapy[MeSH Subheading])) OR ((meta-analysis[MeSH Terms]) AND (systematic* review*[Title/Abstract] OR meta-anal*[Title/Abstract]]) OR metaanal*[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 -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				

Journal Prevention

160 Glossary

*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].

165 Oral nutritional supplements (ONS), are developed to provide energy and nutrient-dense 166 solutions that are provided as ready-to-drink liquids, cremes, or powder supplements that can 167 be prepared as drinks or added to drinks and foods. Liquid ONS (either ready to drink or made 168 up from powders) are sometimes referred to as sip feeds.

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.

*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 diseaserelated metabolic stress. Diet composition takes local food habits and food patterns into account
(Table 5).

*Therapeutic diet.* Therapeutic diets are prescribed according to the specific disease or needs ofa patient.

181 Food product. A food product is any food that is suitable for human consumption which 182 provides energy-containing macronutrients (e.g. carbohydrates, proteins, fats), and/or 183 micronutrients (e.g. vitamins, minerals), and/or other substances which may contribute to 184 fulfilling the nutritional requirements of the patient.

185 Food modification. Some conditions or disorders, e.g. diabetes, hyperlipidemia, hepatic 186 encephalopathy, renal or celiac disease, may require food modifications that could include 187 adjustments of carbohydrate, fat, protein, and micronutrient intake, or the avoidance of specific 188 allergens.

*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.

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

Texture modified food and thickened fluids. Texture modification of food and/or drink is an 198 199 important intervention used so that people with dysphagia can swallow effectively and safely. 200 However, the different names for and number of levels of modification and the characteristics 201 used within and across countries all increase the risk to patient safety. One internationally 202 recognized standardized system for evaluating and describing different levels of texture 203 modified food and thickened fluids is the International Dysphagia Diet Standardisation 204 Initiative (IDDSI), which provides a common terminology for food textures and drink thickness 205 (https://iddsi.org). Although there are no harmonized descriptors, they could be described as 206 follows:

<sup>-</sup> 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 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).

219 *Care catering or hospital catering* is the provision of menu services (in-house or outsourced) 220 in health care facilities. The minimum requirements of hospital and care catering are to serve a 221 variety of foods that are suitable and adapted to all types of patients with a variety of energy 222 and nutrient densities. Special diets, food texture, allergies, and specific cultural aspects have 223 to be considered at all times. For patients with, or at risk, for malnutrition, informed choices 224 concerning food items and portion sizes have to be ensured. Daily (at least from 7 am to 7 pm) 225 access to nutritionally relevant and well-prepared food should be mandatory, and served 226 portions must appear appetizing for the individual. Energy-dense small-size portions should be 227 available as an option for patients at nutritional risk.

228 *Protein intake*. Protein intake is indicated in g/kg body weight/day. In obese individuals, body

229 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  $25 \text{ kg/m}^2$ .

232 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 6-8 g/day.

- 240 Table 5: Nutrient content in the standard and hospital diets. According to countries and
- 241 hospitals, these nutritional objectives can be reached using different number and size of served
- 242 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	<b>X</b>		
Saturated fat (E%)	<10	5		
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		

<sup>243</sup> BW, body weight; d, day; DHA, docosahexaenoic acid; EPA, eicopentaenoic acid; E%,

used in case the objective of 2 g/kg/day of protein needs to be achieved.

<sup>244</sup> percentage of daily total energy; n-3, omega3. \*Oral nutritional supplements are likely to be

#### 246 **Results**

- 247 1. General statements
- 248 **Recommendation 1**
- 249 Each hospital, rehabilitation center, and nursing home should have a list of available diets
- 250 visible for patients and personnel.
- 251 Grade of recommendation GPP strong consensus (96.5% agreement)
- 252 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.

259

260 **Recommendation 2** 

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

- 263 Grade of recommendation GPP consensus (89.5% agreement)
- 264 **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.

# 270 Recommendation 3

- 271 Clear responsibilities for hospital food production and delivery are necessary for all areas
  272 of food supply (ward, kitchen, delivery).
- 273 Grade of recommendation GPP strong consensus (98.3% agreement)

#### 274 Commentary

275 For centers such as small hospitals, rehabilitation centers, or nursing homes that have not their 276 own kitchen, a catering system is providing food, and sometimes hospital central kitchen could 277 distribute the food to several hospitals, rehabilitation centers, or nursing homes. This could not 278 be the case for large hospitals. In some European countries, it could be that catering companies 279 are designing meals that are not adapted for patients with acute diseases who are at high risk of 280 malnutrition or malnourishment. To ensure the best adaptations of hospital food to the patients, 281 a structured hospital facility should be available at the hospital for ordering, cooking, and 282 delivering the food. To optimize the organization, each actor of the chain should have clear 283 roles and responsibilities that should be formally protocoled in each hospital. For example, a 284 dietitian or a nurse or a doctor prescribe the diet at ward in collaboration with the patient. 285 Hospital kitchen is responsible for food production. When the food arrives, nurse or nurse 286 assitant serve the patient.

287

#### 288 <u>Recommendation 4</u>

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.

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

292 Commentary

- 293 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

295 topic besides other authors and organizations.

296

# 297 **Recommendation 5**

- 298 Patient and personnel surveys regarding hospital food and diets should be performed on
- a regular basis, at a minimum once a year.
- 300 Grade of recommendation GPP –consensus (90.0% agreement)

# 301 Commentary

302 The evaluation of the hospital food organization is very important regularly to ensure that the 303 organization is adapted to the overall hospital organization. Food delivery should be handled as 304 easily as possible for the staff, and following patient needs regarding time schedule and food 305 preferences. The food should be served at the right time according to patient availability, time 306 (exams, medical tour, surgical procedures,..), and preferences. These evaluations should 307 integrate surveys on patient's satisfaction towards hospital food organization: ordering, menu 308 composition, and delivery. These surveys should be analyzed and reported to hospital 309 administration to make sure that improvement measures are undertaken.

310

# 311 **Recommendation 6**

- 312 Hospital food ordering should be structured, documented, and protocoled.
- 313 Grade of recommendation GPP strong consensus (95.0% agreement)
- 314 Commentary
- 315 See commentary to recommendation 7.

# 316

# 317 **Recommendation 7**

318 The prescription of hospital food should be performed through the computerized patient

319 medical record.

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

#### 321 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.

329

## 330 **Recommendation 8**

331 Each hospital, rehabilitation center, or nursing home should propose a minimal number

332 of two different regular diets (the standard and the hospital diets) and a minimal number

333 of two different additional diets, adapted to the size and the focus of the hospital.

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

#### 335 **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

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	uman				

- 339 could be a competitive advantage among hospitals since food supply and food quality are well
- 340 recognized by many patients.

341

- 342 **<u>Recommendation 9</u>**
- 343 Therapeutic diets should be only used if medically indicated. Otherwise, a regular diet

344 should be used.

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

346 **Commentary** 

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

348

#### 349 **Recommendation 10**

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

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

#### 353 Commentary

354 Hospital diets should be always prescribed according to the patients' nutritional status, which 355 is often altered. Two regular diets, i.e. the standard diet and the hospital diets, are proposed in 356 this guideline. They should be available in each hospital or healthcare center that receives 357 patients at nutritional risk, i.e. 65 years and older patients, patients with an acute or chronic 358 disease at risk for or with malnutrition or with disease-related metabolic stress. The choice 359 between the two regular diets is based on nutritional risk screening. These two diets should 360 constitute the basis of the hospital food. The therapeutic diets, also named "specific diets", 361 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.

368

#### 369 **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.

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

374 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.

379

# 380 **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

- 385 according to the stage of the disease. For details, see other ESPEN guidelines and evidence
- **herein.**

#### **387** Grade of recommendation GPP – strong consensus (94.9% agreement)

388 Commentary

389 This recommendation is based on recent international or national organization reports making 390 arise the concept of "food for care". Indeed, hospital food is part of daily care. Hospital food is 391 a moving process to be adapted to the course of the disease. Regular diets, i.e. the standard and 392 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 393 394 malnutrition [11]. A switch from the standard to the hospital diet will be a frequent situation 395 (Figure 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 396 397 carefully monitored; in case of underfeeding, the indications of these diets should be re-398 evaluated. In accordance with the benefit-risk ratio balance, and if oral intake is expected to be 399 sufficient to cover nutritional needs, a switch from a therapeutic diet to the hospital diet should 400 happen if the patient becomes malnourished during the hospital stay. Otherwise, in every 401 situation where hospital food would become insufficient to cover the protein and energy needs, 402 nutrition support, i. e. ONS, enteral nutrition (EN), or parenteral nutrition (PN), would be 403 indicated as recommended in the ESPEN guidelines.

#### 404

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

407 **Recommendation 13** 

408 The hospitalized patients without or at low nutritional risk and who do not require special

409 diets should be provided with the standard diet, as advised for the general population.

410 The indication of this diet should be revaluated after three to five days.

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

#### 412 **Commentary**

The choice of the hospital diet is depending on the nutritional risk assessment that is mandatory 413 414 at hospital admission (Figure 1) [12-20]. The indication of the standard diet should be 415 reevaluated at least after five full days of hospital stay according to the assessment of nutritional 416 risk or status. If the hospitalized patients become at high nutritional risk or malnourished, they 417 should be provided with the hospital diet, a protein-energy enriched diet (see recommendation 418 14). The ESPEN guideline on nutrition in cancer patients states the first form of nutritional 419 support should be nutrition counseling to manage symptoms and encourage the intake of 420 energy-enriched foods and fluids; a diet enriched in energy and protein is the preferred way to 421 maintain or improve nutritional status. ONS is prescribed in addition when an enriched diet is 422 not effective in reaching nutritional goals [12]. This recommendation is in accordance with the 423 principle of Food First by BAPEN [21]; e.g. eating little and often, choosing full fat and sugar 424 products, and food enrichment. In the ESPEN guideline on clinical nutrition and hydration in 425 geriatrics, it is stated that food fortification by natural foods or specific nutrient preparations 426 can increase energy and protein density of meals and beverages and thus enable an increased 427 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 [22-428

429 25]with rather acceptable quality that included studies offering additional snacks and/or finger
430 foods were also identified in this guideline [16]. However, the effects of snacks were not
431 analyzed separately and thus no specific conclusions were possible in this regard.

432 Eight studies investigate the effect of dietary enrichment [25-32]. The systematic literature 433 review of Morilla-Herrera et al. concludes: "Despite the poor methodological quality of most 434 studies analyzed, due to their simplicity, low cost, and absence of contraindications, simple 435 dietary interventions based on the food-based fortification or densification with protein or 436 energy of the standard diet could be considered in patients at risk of malnutrition because its 437 effect on the total amount of energy and protein intakes." [25]. The systematic literature review 438 by Kiss et al. [26] on lung cancer patients during chemotherapy and/or radiotherapy suggest 439 that dietary counseling improves energy and protein intake during chemotherapy, but has no 440 benefit to other outcomes during chemotherapy. In the randomized controlled trial (RCT) by 441 Munk et al. [27], the effect on overall protein intake and weight-adjusted energy was shown in 442 hospitalized patients at nutritional risk. In the RCT by Stelten et al. [28] increased protein intake 443 of acutely ill patients could be obtained. In the double-blind RCT by Ziylan et al. [29] on 444 community-dwelling older adults, protein intake could be increased by acceptable and 445 applicable protein-enriched products. In the clustered RCT by Leslie et al. [30] on frail older 446 people living in residential care homes, energy enriched food was shown to increase energy 447 intake and slow chronic weight loss. One means to improve protein and energy delivery and to 448 reach the nutritional targets to hospitalized patients could be to promote six-meal services (three 449 main meals + three snacks; or six small protein-rich meals per day) as the standard hospital 450 food service.

# 452 **Recommendation 14**

- 453 Hospitalized patients at moderate/high nutritional risk or malnourished shall be provided
- 454 with the hospital diet, a protein-energy enriched diet.
- 455 Grade of recommendation A strong consensus (94.2% agreement)

#### 456 **Commentary**

457 Studies that exclusively investigated the effect of diet interventions on malnourished patients 458 are very limited and thus, for the present literature search, studies that combined both the effect 459 of dietary interventions (counseling or more) and prescription of ONS were included. The 460 choice of the hospital diet is depending on the nutritional risk assessment that is mandatory at 461 hospital admission (**Figure 1**) [12-14, 17-20].

In cancer patients who are malnourished or at risk of malnutrition, nutritional therapy has been 462 463 shown to improve body weight and energy intake but not survival. There is good evidence that 464 nutritional support improves intake and weight, and some aspects of quality of life under 465 radiotherapy [12]. Three systematic literature reviews conducted by Baldwin et al were found, 466 all included ONS [33-35]. In the one from 2011, it was concluded that dietary advice with or 467 without ONS may improve weight, body composition, and grip strength [30]. There was no 468 evidence of benefit of dietary advice or ONS given alone or in combination on survival. In the 469 one from 2012, it was concluded that oral nutritional interventions are effective at increasing 470 nutritional intake and improving some aspects of quality of life in patients with cancer who are 471 malnourished or are at nutritional risk but do not appear to improve mortality [31]. In the 472 Cochrane review from 2016, it was concluded that there is evidence of moderate to very low 473 quality to suggest those supportive interventions to improve nutritional care result in minimal 474 weight gain [32]. Most of the evidence for the lower risk of all-cause mortality for supportive 475 interventions comes from hospital-based trials. In the study by Leedo et al [31] on lung cancer, patients with nutritional risk score  $\geq$ 3 (NRS-2002) got home-delivered meals. Increased energy 476

477 and protein intakes were strongly associated with improved quality of life, functional score, 478 hand-grip strength, symptom and performance scores. In the RCT by Canon-Torres et al, 479 hospitalized patients with malnutrition enrolled in the intervention group received an 480 individualized nutrition plan according to energy and protein (1.0-1.5 g/kg) intake 481 requirements, as well as dietary advice. Results suggest dietary advice decreases hospital stay 482 but not mortality. In the RCT by Bouillianne et al [36], dietary protein was spread over four 483 daily meals compared to a pulse diet with 72% of dietary protein consumed in one meal. Pulse 484 feeding had a clinically relevant effect on lean mass in malnourished and at-risk hospitalized 485 elderly patients.

486 In summary, population, intervention, control group, and outcome differ between studies 487 explaining differences in results. The quality of studies also varies. However, all show good 488 concordance in that the enrichment of the diet or counseling aiming to increase energy and 489 protein intake positively affects energy intake and body weight, but effects on hard outcomes 490 as reduced morbidity and mortality and increased functional capacity are rare. Baldwin et al 491 summarize "There is very low-quality evidence regarding adverse effects; therefore whilst 492 some of these interventions are advocated at a national level, clinicians should recognize the 493 lack of clear evidence to support their role."[35].

494

# 495 **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.

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

## 501 Commentary

502 The indications for the standard diet and the hospital diet differ. The standard diet is aimed 503 mainly at younger patients without disease-related metabolic stress, and who are admitted for a 504 short stay (e.g. scheduled surgery or exams). The hospital diet is aimed at for 65 years and older 505 patients, patients with an acute or chronic disease at risk for or with malnutrition or with disease-506 related metabolic stress. The energy density for the hospital diet should be higher to achieve 507 smaller portion sizes. This is accomplished by the use of less fiber-rich sources for 508 carbohydrates and by less focus on fat quality in favor of enrichment with food rich in fat where 509 appropriate. In the hospital diet, protein intake should be at least 1.0 g/kg actual BW/day. In 510 case of illness, protein requirements may even be further increased, e. g. due to inflammation, 511 infections, and wounds [16]. Levels of 1.2-1.5 g/kg BW/day have been suggested for older 512 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 513 514 studies but most studies referring to a recommendation are in the span between 1.0 - 1.5 g/kg 515 BW/day [28, 29, 32, 36]. In the study by Munk, the range is extended to 2.0 g/kg BW during 516 illness [27]. The study of Leslie et al. [27] refers to the recommendations of COMA (UK 517 committee on medical aspects of food policy): 53.3 and 46.5 g/day respectively in males and 518 females. Examples of menus for standard or hospital diets are shown in the Supplementary 519 Table 7Error! Reference source not found.Error! Reference source not found..

520

#### 521 **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.

#### 525 Grade of recommendation GPP – majority agreement (69.2% agreement)

## 526 Commentary

527 Energy /kg actual BW, energy density, and macronutrient composition in terms of quantity and 528 quality differ between standard and hospital diets. In the standard diet, the macronutrient 529 composition is similar to the recommendations for the general population. This means that 530 sources of carbohydrates should mainly be rich in fiber and that fat quality is following the 531 recommendations for the general population. Strategies to reach energy and macronutrients 532 goals must be adapted to patient capacities and habits (i. e. snacking if needed). Nutritional 533 needs should be assessed individually for every patient including considering nutritional status, 534 physical activity level, disease status and tolerance, length of hospitalization, and chronic 535 disease.

536

# 537 Recommendation 17

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

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

#### 541 **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 (**Figure 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

549 diet is the protein-enriched diet to be given to high nutritional risk patients. The hospital diet 550 should be prescribed taking into account the nutrition support if any. In case a therapeutic diet 551 is indicated (e. g. lactose-free), it should be protein and energy-enriched if the patient is at high 552 nutritional risk. Individual adaptation must be proposed according to food preferences and 553 levels of food intake.

554 Malnutrition is associated with a prolonged length of stay and a higher complication risk, 555 impaired wound healing, and an increased number of infections. Improving hospital diet is 556 therefore desirable. There is not much evidence for the composition of a general hospital diet 557 to prevent malnutrition. Hiesmayr performed a large one-day cross-sectional survey on food 558 intake in hospitalized patients (N=16,290), which showed that eating <sup>1</sup>/<sub>4</sub> meal gave an adjusted 559 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 560 maximum 28% [40]. Bokhorst et al. showed that patients who experience the worst health ate 561 562 the least [41]. There is some evidence that patients eat more when they are offered more meals 563 a day. Dijxhoorn et al showed that patients with the traditional meal service reach 0.7 g/kg/day 564 protein, while patients in the frequent meal service reach 0.9 g/kg/day [42]. Eight percent of 565 patients in traditional meal service reach 1.2 g/kg/day, while in the frequent meal service design 566 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 567 568 required (~50%) [43]. Munk et al showed that protein enriched meals gave a significantly higher 569 protein intake (not energy intake) (the relative risk was 2.20 [44]).

570 The guidelines for the general group of hospitalized patients advise 1.2-1.5 g/kg/day of protein 571 and 25-35 kcal/kg/day of energy. The distribution of macronutrients should be as the guidelines 572 prescribe. There is no evidence that every hospitalized patient should receive more 573 micronutrients. This is the same for salt intake and fatty acid composition. In certain specific

574 patient groups, there may be small evidence suggesting that polyunsaturated and 575 monounsaturated fatty acids are necessary, but for the general hospital diet, a normal 576 composition is appropriate.

577 We do not voluntarily give details regarding the amounts of fiber and saturated fatty acids to be 578 integrated into the hospital diet (Table 5), because hospital kitchens would have difficulty in 579 fully complying with the recommendations.

- 580
- 581

Journal Prevention

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

583

### 584 **Recommendation 18**

585 Systematic "between-meals snacks" shall be offered and consumed to reach nutritional

586 requirements as a standard hospital food service, and prevent night fasting.

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

588 **Commentary** 

589 Hospitalized patients are frequently malnourished or at risk for malnutrition (e. g. older people, 590 patients with acute or chronic diseases), and the risk increases with the length of hospital stay. 591 The prevention of malnutrition or its worsening implies the coverage of at least 80% of 592 estimated energy and protein needs. Hospital snacks are an additional optimal way to increase 593 oral intake. In the study of Pullen et al., patients who consumed hospital snacks (34%) were 594 more likely to meet the nutrient standards [40]. Snack consumption could enhance patient 595 satisfaction and thus contribute to an overall increase in the consumption of food. Snacks can 596 be provided in several types and flavors. They can have various forms, such as salted 597 (sandwiches, cheese) or sweetened (cakes, dairies, dessert cream) and different texture 598 presentations, that can avoid the weariness of the same snack proposals. The number of snacks 599 must be adapted to the patient's needs and capacity to eat, ranging from one to three between-600 meal snacks per day [42, 45]. But giving three snacks a day implies modifying the portion size 601 or number of components of a meal tray to be eaten by the patient and limiting food waste while 602 covering nutritional needs. Particular attention must be taken into account for the older people, 603 because they consider that dietary interventions are less valuable than medical treatment, and 604 therefore did not perceive eating poorly as a problem [46]. Snacking can prevent long overnight 605 fasting at any patient age in hospitals, as well as in nursing homes. The shorter the delay
606 between dinner and breakfast (time slot <10 hours), the better it prevents malnutrition. The 607 optimal snack composition must provide not only carbohydrates but also proteins, lipids, and 608 fibers. Snack delivery and food preservation have to be adapted to local organizations and could 609 be administered at every time if needed (night, patient awake,...). Engelheart et al. showed that 610 the length of fasting of the elderly was significantly shorter in the self-managing elderly than 611 in a nursing home with frail, emphasizing the impact of staff organizations on overnight fasting 612 [47]. Söderström et al. showed that overnight fasts exceeding eleven hours and fewer than four 613 eating episodes a day were associated with both malnutrition and risk of malnutrition [45]. 614 Correa-Arruda et al. showed the impact of overnight fasting on muscular function. The 615 muscular function was impaired after overnight fasting of adult patients hospitalized for 616 medical treatment, especially for those with low ingestion, malnourished and elderly [48]. 617 Therefore, unless the literature according to the topic is poor (no study having compared 618 different meal service times), the group recommended that to prevent nocturnal starving in the 619 people aged 70 or more, the time-space between dinner and breakfast should not be more than 620 ten hours. A hospital food service organization based on systematic between-meals snacks 621 (three meals and three snacks: 7:30 am, 10 am, noon, 3 pm, 7 pm, 10 pm) reaches this objective 622 [49, 50].

623

## 624 **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.

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

# 630 Commentary

631 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 632 633 with patient preferences. It is expected that these dieticians have clinical experience of hospital 634 malnutrition. Furthermore, these dietitians should communicate with the kitchen managers for 635 development of the different menus. Continous education of kitchen staff regarding different 636 menus to satisfy patient heterogeneity and specific needs is desired. In some countries, food 637 managers are equal to administrative dietitians which is not the same as a clinical dietitian. The 638 latter is registered in many countries and always regarded as health care staff. In some countries, 639 some of them might also work in the kitchen but most of them are working solely with patients 640 at the ward.

641

## 642 Recommendation 20

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

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

## 646 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 [51].

651

## 652 **Recommendation 21**

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

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

# 655 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.

659 Concerning patients' capacities, situations are different for:

660 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 661 662 might be beneficial in case of motoric disabilities. Some units experienced the trolley meal 663 system as a strategy to adapt the meal with the patient's desires [52] and to minimize food waste. But units who adopt these meals on wheels distribution have to be aware of the 664 665 nutritional risk due to possible smaller portions served [53, 54]. It requires awareness raising 666 and staff training for serving meals and other strategies to adopt by proposing enriched dishes. 667 Patients in rehabilitation units (with nutritional needs linked to rehabilitation process): 668 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 669 670 National Food Council [55] and of the National Nutrition Council and Finnish Institute for 671 Health and Welfare [56], autonomous patients should stop keeping in their rooms for "single" 672 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 [57, 58] or motivation to eat [59]. The temperature of

the meal, appearance, and aroma of food are important contributors as well as choice and service

staff [58], or ambiance [60]. Improved meal presentation can increase food intake too [61].

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).

684

- 685 **4. Individal exceptions from the standard approach**
- 686 4.1 Should food allergy or food intolerances be taken into account for the composition of the

687 *diet?* 

## 688 **Recommendation 22**

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

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

# 692 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.

# 698

- 699 4.2 Should vegan diet, religious beliefs, food preferences, presumed food intolerance, beliefs
  700 be taken into account for the composition of the standard diet?
- 701

## 702 Recommendation 23

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

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

# 706 Commentary

707 Catering services provide standard propositions that may suit most in-patients from medical 708 perspectives (physiologic requirements, disease-related needs) as well as patient's perspectives. 709 The heterogeneity of the hospitalized population (cultural and religious beliefs) generates a 710 highly variable number of meal requests. The hospital staff is facing a complex situation to 711 satisfy the patients' expectations. Dietary requirements related to religions are heterogeneous, 712 and further variability is due to variations in a single religion depending upon the country of 713 origin [62]. The respect of religious freedom has long been considered a basic civil right [63]. 714 Therefore it seems logical that Kosher, Halal, vegetarian, or other diets should be provided by 715 hospitals, even if these diets have nowadays no medical rationale [64]. Every patient should be 716 able to follow the precepts of his religion (meditation, presence of a minister of his religion, 717 food, freedom of action and expression, etc.) [65]. Far beyond the medical care background, 718 patient food should be considered in all its components (i.e. nutritional, symbolic, and cultural). 719 Health institutions strive "as much as possible" to find alternatives to food that rejected by a 720 fraction of the patients [65]. 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 721

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.

728 Because of the practical difficulties for producing several propositions for the daily meals, 729 patients or their families should be allowed to bring complementary foods - as long as they meet 730 the hygiene and temperature rules and awareness of the patient's frailty with certain foods at 731 risk or whose preservation is impossible. The health care personal should be informed about 732 this option to promote its acceptability and to react appropriately in case of therapeutic diet 733 prescription (e.g. medical gluten-free diet). If these adaptations are impossible or insufficient, 734 patients should be encouraged to suspend their "home" diet to promote a favorable clinical 735 evolution.

736

# 737 Recommendation 24

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

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

741 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 to 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.

746 Flexitarian diet is becoming a piece of evidence both from an environmental perspective and 747 health perspective (i. e. prevention in chronic kidney disease, the protective effect of a 748 vegetarian diet versus the incidence and/or mortality from ischemic heart disease and incidence 749 from total cancer) [66-68]. This approach requires a complete change in the menu's conception 750 based on the quality of proposed alternative proteins. Animal proteins are, concerning human 751 needs, better balanced in terms of amino acids, in particular essential amino acids. Eating eggs 752 and dairy products make it easier to meet nutritional requirements, even during diseased 753 conditions. But caution must be warned with a vegetarian diet. Protein Digestibility Corrected 754 Amino Acid Score (PDCAAS), a composite index of digestibility and composition in essential 755 amino acids, is lower in plant proteins due to deficiencies in certain essential amino acids. 756 Solutions may come from complementarities between protein sources. Recipes could associate 757 plant proteins such as cereal and legume proteins, or with the mix of vegetable and animal 758 proteins, coming from cereal proteins (wheat, maize, rye, barley, etc.) or milk proteins with 759 legume proteins helping to compensate for the latter's methionine deficiency. In most cases, 760 meat-based products are richer in energy than vegetarian food items. Therefore, energy 761 requirements can be reached by adding lipids (e.g. varied oils that will allow meeting qualitative 762 nutritional goals too) in recipes.

763

# 764 **Recommendation 25**

## 765 A vegan diet should not be offered at the hospital.

## 766 Grade of recommendation B –consensus (76.5% agreement)

# 767 Commentary

Compared to a vegetarian diet, a vegan diet is not recommended in hospital food [69]. Vegans
are at higher risk of iron, B12, and D vitamins and calcium deficiencies with higher rates of

osteoporotic fracture and iron deficiency anemia [69, 70]. Vegans should receive a mandatory vitamin B12 substitution because of an important risk of deficiency [71]. 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.

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776
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- 777 5. Indications for therapeutic diets
- 5.1. What are the indications of gluten, FODMAP and lactose evictions?
- 779 **Recommendation 26**
- 780 A gluten-free diet shall be provided to patients with proven celiac disease.
- 781 Grade of recommendation A strong consensus (100.0% agreement)

## 782 Commentary

783 Celiac disease is a chronic immune-mediated enteropathy precipitated by exposure to dietary 784 gluten in genetically susceptible individuals. celiac disease-related enteropathy leads to 785 multiple nutritional deficiencies involving macronutrients and micronutrients. Currently, 786 medical nutrition therapy consisting of the gluten-free diet is the only accepted treatment for 787 celiac disease [72].

- 788 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  $20 \text{ mg kg}^{-1}$  of food) when measured by an approved system
- 791 for testing [73, 74].

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 [75-79].

797 Gluten-free diets with and without medical reasons have gained popularity. The prevalence of 798 gluten-related disorders is rising, and increasing numbers of individuals are empirically trying 799 a gluten-free diet for a variety of signs and symptoms [80] or to loose weight. But in the National 800 Health and Nutrition Examination Survey (NHANES) 2009-2014, data showed no significant 801 difference in terms of prevalence of metabolic syndrome and cardiovascular risk score in 802 gluten-free followers without celiac disease [81]. Patients may present gastrointestinal signs or 803 symptoms, extra-gastrointestinal signs or symptoms, or both, suggesting that celiac disease is a 804 systemic disease. Non-Celiac Gluten Sensitivity (NCGS) is a syndrome characterized by 805 intestinal and extra-intestinal symptoms related to the ingestion of gluten-containing food, in 806 subjects that are not affected by either celiac disease or wheat allergy [82]. The clinical 807 variability and the lack of validated biomarkers for NCGS make establishing the prevalence, 808 reaching a diagnosis, and further study of this condition difficult. Nevertheless, it is possible to 809 differentiate specific gluten-related disorders from other conditions, based on currently 810 available investigations and algorithms. Clinicians cannot distinguish between celiac disease 811 and NCGS by symptoms, as they are similar in both. Therefore, screening for celiac disease 812 must occur before a gluten-free diet is implemented since once a patient initiates a gluten-free 813 diet, testing for celiac disease is no longer accurate. While the link between gluten and celiac 814 disease is well established, the responsibility of gluten in NCGS remains to be demonstrated 815 [83]. It is therefore not possible to affirm that a gluten-free diet is indicated in the NCGS [84].

816 Concerning conducting a gluten-free diet by conviction/belief, patients have to be informed of 817 its potential detrimental effects, including insufficient dietary fiber intake, deficiencies in 818 dietary minerals (iron) and vitamins (B vitamins), and potential heavy metal exposure [85, 86]. 819 Weight gain and obesity have been added to the list of nutritional consequences of the gluten-820 free diet and have been partially attributed to the hypercaloric content of commercially available 821 gluten-free foods. Follow-up of patients diagnosed with celiac disease after starting the gluten-822 free diet has been reported to be irregular and, hence, less than ideal [72]. It is desirable that all 823 celiac disease after starting the gluten-free diet should be followed by a clinical dietitian.

ournal preve

# 825 **Recommendation 27**

826 For individuals with irritable bowel syndrome, a diet low in fermentable oligo-, di-,

827 monosaccharides, and polyols (low FODMAP diet) should be recommended to improve

- 828 symptoms including abdominal pain and bloating and to increase the quality of life.
- 829 Grade of recommendation B strong consensus (91.8% agreement)

# 830 Commentary

A number of studies clearly indicate that a low-FODMAP diet improves symptoms in patients with irritable bowel syndrome [87-91]. 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.

836

# 837 Recommendation 28

A diet low in lactose (<12 g per meal) shall be provided to patients with proven lactose</li>
intolerance (lactose breath test).

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

## 841 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 [92]. 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%) [93, 94].

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.

857 The only proven indication of the lactose-free diet is the proven lactose intolerance [95, 96].

Lactase deficiency, which is common in adults, does not mean lactose intolerance. Intolerancesymptoms represent only one-third of mal-absorbers [97].

860 Mal-absorbers can tolerate up to 12 g of lactose (corresponding to a glass of milk) when 861 consumed alone and on an empty stomach, and up to 20 g when ingested with other foods [98, 862 99]. Not all foods are equal in terms of tolerance due to their composition (lactose load, fat 863 content, etc.), texture, and association or not with other foods. Anything that slows down gastric 864 emptying can improve lactose tolerance. Drinking milk is the less tolerated form, especially 865 skimmed milk and taken on an empty stomach. It is not necessary to remove lactose from the 866 diet [100-102]. In any case, there is no justification for removing yogurts and cheeses, nor foods 867 that are sources of low amounts of lactose [103].

# 868

869 5.2. What are the indications for a high-energy diet and/or high protein diet?

870 **Recommendation 29** 

871 The hospital diet should be provided in the hospital setting to be served to malnourished

872 patients, patients at risk for malnutrition, and other specific patient groups with a higher

873 need for energy and/or protein.

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

# 875 Commentary

Several European or international guidelines were used to identify the indications for a high
protein / high energy diet [12, 14, 16, 18, 19, 104, 105].

Malnutrition or risk for malnutrition is the main indication for a high energy diet, i.e. the hospital diet (see recommendation 14, **Figure** *I*) 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 [106]. 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.

885 **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
- 888 BW/day, no reduction in hepatic encephalopathy) and with alcoholic steatohepatitis (1.2-1.5g
- 889 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
- 892 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
- 894 g/kg/day, and 1.25 to 1.5 g/kg BW/day in adults at decubitus risk.
- Patients with chronic pancreatitis (amount not specifically defined).
- 896 Other indications for a high energy diet are patients with chronic liver cirrhosis with acute
- 897 complications even if there are not malnourished (>30 kcal/kg actual BW (or adjusted BW if
- 898 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.
- 902

# 903 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.
- 907 Grade of recommendation B– strong consensus (92.0% agreement)

# 908 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 [107] 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

915 increase oral intake. In study conditions, patients who consumed hospital snacks were more 916 likely to meet the nutrient standards [40]. Snacks are associated with better consumption, 917 patient satisfaction and can be more cost-effective than ONS [50] or at least as feasible and 918 effective as ONS [49]. They can have various forms, such as salted (sandwiches, cheese) or 919 sweetened (cakes, dairies, dessert cream) presentations, that can avoid the weariness of the same 920 snack proposals.

921 It was also shown in the multicenter EFFORT study in Switzerland that an intensive and 922 individual in-hospital nutritional intervention in medical patients is capable to increase caloric 923 and protein intake and reducing mortality [108]. However, not in all hospital settings around 924 Europe, these intensive nutritional care processes will be possible, at least due to the lack of 925 nutritional counseling by qualified staff. Furthermore, in chronic diseases and the geriatric 926 population, there is usually a lack of appetite. Therefore, it is important to decrease food volume 927 and increase the energy and protein content of the food. A specifically designed high energy 928 and high protein diet was evaluated in the geriatric setting [109]. The main goal was to provide 929 protein delivery to 75 g per day, an equal amount of protein for the three main meals, and a 930 volume reduction to 2/3 of the usual volume. Those conditions were the basis for the therapeutic 931 diet (Menu compact). Protein intake was increased by 34% and energy intake by 15%. An 932 intervention study on providing a high protein diet to older people with a medium or high risk 933 of malnutrition showed that this diet was able to increase the intake of protein from 0.9 g/kg/day 934 to 1.2 g/kg/day [110]. Ideally, a combination of a specifically designed high energy high protein 935 diet, snacking, ONS, and nutritional counseling should be available in the acute hospital setting 936 to provide the most individualized nutrition therapy.

938 5.3. What are the indications of a low-calorie diet (weight reduction diet) at the hospital?

## 939 **Recommendation 31**

940 Hypocaloric diets are usually not indicated at the hospital and should be avoided because

941 they increase the risk of malnutrition even in acute care obese patients.

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

## 943 Commentary

944 There is no need for a therapeutic diet for acute care obese patients. Obese patients shall receive 945 one of the two regular diets according to nutritional risk as described above (see 946 recommendation 4, Figure 1). In-hospital patients are at high risk for malnutrition. It is known 947 that 40-70% of in-hospital patients (depending on the underlying disease) are at risk for 948 malnutrition or have manifest malnutrition [111]. Obese patients of 65 years and older patients, 949 with an acute or chronic disease at risk for or with malnutrition or with disease-related metabolic 950 stress, should receive the hospital diet. Inconveniently during the hospital stay, 30-80% of 951 patients are losing additional weight [112]. This is the result of multiple reasons, e.g. fasting 952 periods due to examinations, meal timing, unsavory meal conditions, etc. For that reason, it is 953 usually necessary to provide to obese patients at least the isocaloric diet that are recommended 954 to the general population during the hospital stay, the standard diet. However, for specific 955 patient groups, a short-term low-calorie diet could be indicated (see next Recommendation).

956

## 957 Recommendation 32

958 There are very few indications for low-calorie diets in the hospital setting but they 959 temporally can be indicated in refeeding syndrome, obesity with severe insulin resistance, 960 and in rehabilitation units for obesity.

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

# 962 Commentary

963 The refeeding syndrome can be a life-threatening metabolic condition after nutritional 964 replenishment if not recognized early and treated adequately. There is a lack of evidence-based 965 treatment and monitoring algorithms for daily clinical practice. An expert consensus guideline 966 for the refeeding syndrome for the medical inpatient (not including anorexic patients) regarding 967 risk factors, diagnostic criteria, and preventive and therapeutic measures based on a previous 968 systematic literature search was published in 2018 [113]. Possible predictors for the refeeding 969 syndrome are analyzed in many studies, for example, low energy intake for over 10 days or 970 weight loss over 15%. However, their sensitivity (67%) and specificity (80%) are low [114]. 971 Low serum magnesium (<0.7 mmol/L) was the only significant predictor in the study of Rio et 972 al. [115]. Starvation itself is the most reliable predictor [115]. In addition to oncologic patients, patients with eating disorders, and patients with chronic vomiting or diarrhea have a higher risk 973 974 of developing a refeeding syndrome [113, 116-123]. Older age, high Nutritional Risk Screening 975 (NRS-2002) scores ( $\geq$ 3), and comorbidities were found to be risk factors for the refeeding 976 syndrome in many studies [119]. For patients with a high risk for refeeding syndrome, an initial 977 phase of a hypocaloric diet is indicated [113]. Most studies as well as the NICE guidelines 978 recommend starting nutritional therapy with low caloric input and increasing step by step over 979 five to ten days, according to the individual's risk of the refeeding syndrome and clinical 980 features [113]. Given the small number of extant randomized studies, this approach shows the 981 best evidence level available [120]. It is recommended to start nutritional support with an 982 amount of 5–15 kcal/kg BW per day (40–60% carbohydrate, 30–40% fat, and 15–20% protein), 983 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 [121, 122]. 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 [121, 123].

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991
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# 992 <u>Recommendation 33</u>

993 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  $\geq$  30.

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

# 996 Commentary

During acute or chronic illness, obese patients should be considered to have the same risk of 997 998 malnutrition as normal weighted patients. Obese patients may have increased muscle 999 proteolysis [124]. Therefore reaching their protein target is important. As proposed by Singer 1000 et al [17], the reference (adjusted) BW should then change from actual BW to ideal BW at a 1001 BMI is  $\geq$ 30 kg/m<sup>2</sup>. Probably using as ideal BW: 0.9 x height in cm -100 (male) (or -106 1002 (female)) is sufficiently precise giving the overall uncertainties. Such an approach would 1003 completely ignore the metabolic demand of adipose tissue and muscle. Adipose tissue utilizes 1004 4.5 kcal/kg/day and muscle 13 kcal/kg/day [125]. The proportion of muscle within the excess 1005 weight of an obese individual might be roughly 10%. A pragmatic approach is to add 20-25% 1006 of the excess weight (actual BW - ideal BW) to ideal BW for all calculations of energy 1007 requirements.

1008

# 1009 5.4 What are the indications of a low protein diet?

1010 For recommendations on protein intake in cirrhotic patients with hepatic encephalopathy, and 1011 chronic kidney disease patients with acute illness, we refer to recommendation 54 of the ESPEN 1012 guideline on clinical nutrition in liver disease [18], and recommendation 21 of the ESPEN 1013 guideline on clinical nutrition in hospitalized patients with acute or chronic kidney disease [20]. 1014 **Recommendation from the ESPEN guideline on Clinical Nutrition in Liver disase** 1015 1016 Protein intake should not be restricted in cirrhotic patients with hepatic encephalopathy 1017 as it increases protein catabolism. 1018 Grade of recommendation B – strong consensus (100% agreement) 1019 Recommendation from the ESPEN guideline on Clinical Nutrition in Kidney disease 1020 1021 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.

1024 Grade of recommendation GPP – strong consensus (100% agreement)

# 1025 Commentary

1026 Cirrhosis is a state of accelerated starvation characterized by decreased protein synthesis and 1027 increased gluconeogenesis with proteolysis which promotes sarcopenia. Sarcopenia contributes 1028 to worse clinical outcomes, independent of the severity of the liver disease. Sufficient protein 1029 intake is necessary to prevent loss of muscle mass **[18]**. In the past, there has been controversy 1030 about whether patients suffering from hepatic encephalopathy should undergo a transient 1031 restriction in protein intake, to limit the synthesis of ammonium and the deamination of protein

1032 to aromatic amino acids. Further studies have shown that protein restriction has no advantage 1033 and may increase protein catabolism, furthermore normal to high protein intake does not 1034 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 proinflammatory 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].

1040

1041 5.5 What are the indications of a low-fat diet?

## 1042 **Recommendation 34**

1043 Patients with a proven chyle leakage should receive a diet low in long-chain triglycerides

1044 (LCT, <5% of total energy intake) and enriched in medium-chain triglycerides (MCT,

1045 **>20% of total energy intake).** 

## 1046 Grade of recommendation B – strong consensus (95.7% agreement)

## 1047 **Commentary**

1048 There is still no strong evidence available in the management of chyle leaks, where a difference 1049 in terms of chyle leaks and diagnostic procedures, leads to the high heterogeneity of results 1050 among the studies [126]. Also, a chylothorax may need a different approach than chylous 1051 ascites. chyle leakage is defined as a triglyceride-rich milk-like output from a drain, drain site, 1052 or wound, on or after postoperative day three, containing triglyceride >110 mg/dL or >1.21053 mmol/L [127]. 1000 mL chyle leakage may contain up to 30 g of protein [128]. High volume 1054 chyle leakage may cause fluid problems, electrolyte disorders, and protein losses, and therefore 1055 induce a risk of malnutrition and a higher complication rate. The key initial step in management

1056 is to optimize the patient's nutritional status [129]. Many publications on the management of 1057 chyle leaks mention standard recommendations: surgical options, nil per os, fat-free diet, MCT-1058 rich diet, EN, or PN, but do not explain clearly how one can "mix and match" various nutrition 1059 strategies [128]. The duration of nutritional interventions also remains unclear. Weijs developed 1060 a step-up treatment: leakage <500 mL/day = 100 fat diet, <1000 mL = 100 fat diet or total PN1061 depending on increasing/decreasing after diagnosis, >1000ml/day = total PN and this was 1062 successful for 90% of their patients [130]. With a low-fat diet, 40 of 61 patients were cured 1063 after a median of nine days of treatment. The exact composition of the low-fat diet remains 1064 unclear, however, a diet low in LCT is often recommended. In addition to a low-fat diet, 1065 enrichment with MCT could be considered to provide energy and maintain nutritional status. 1066 There is some evidence that a low-fat diet in chyle leakage may prevent surgical actions, mostly 1067 in patients with low-volume chyle leakage. Tabchouri concluded that chyle leakage is treated 1068 by most patients with nutritional intervention [131]. Steven et al. conducted a comparison of 1069 success rates between dietary methods in a systematic review and concluded that total PN 1070 should only be used when oral intake is contraindicated, while an MCT diet (LCT restricted) is 1071 more successful as a treatment (77% vs 68.5%) [132]. In patients with high volume chyle 1072 leakage (>1000 ml/day), medical nutrition could be considered, for supplementing electrolytes 1073 and for achieving nutritional goals. Unfortunately, there is no worldwide consensus in the 1074 treatment of chyle leakage, where evidence is lacking. Strong RCTs are needed to define the 1075 optimal treatment.

1076

# 1077 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

- 1081 Dehydrogenase Deficiency (VLCADD, MIM 201475)\* should receive a diet low in LCT
- 1082 (<5% of total energy intake) and enriched in MCT (>20% of total energy intake).
- 1083 Grade of Recommendation 0 strong consensus (92.3% agreement)

# 1084 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 [133, 134].

1089

## 1090 **Recommendation 36**

1091 Some cases of intestinal lymphangiectasia with protein-losing enteropathy should receive

1092 a diet low in LCT (<5% of total energy intake) and enriched in medium-chain

1093 triglycerides (>20% of total energy intake). Energy and protein intakes should be at least

- 1094 **30 kcal/ kg actual BW/day and 1.2 g/kg actual BW/day.**
- 1095 Grade of Recommendation 0 consensus (89.1% agreement)

# 1096 Commentary

In patients with protein-losing enteropathy due to intestinal lymphangiectasia, a low-fat, highprotein, MCT diet may be successful [135, 136]. 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).

# 1102

1103 **5.6** What are the indications of a neutropenic diet, if any?

1104 **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).

1108 Grade of recommendation A – strong consensus (93.6% agreement)

1109 **Commentary** 

A recent updated systematic review and meta-analysis included six studies (five randomized) with 1,116 patients, with 772 (69.1%) having undergone hematopoietic cell transplants [137]. 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.

1116 However, a Cochrane review in 2012 concluded that based on the available evidence, it was not possible to give recommendations for clinical practice [138]. It was stated that more high-1117 1118 quality research is needed. At that moment there was no evidence from individual RCTs in 1119 children and adults with different malignancies that underscores the use of a low bacterial diet 1120 for the prevention of infection and related outcomes. All studies differed concerning co-1121 interventions, outcome definitions, and intervention and control diets. Since pooling of results 1122 was not possible and all studies had serious methodological limitations, no definitive 1123 conclusions can be made. It should be noted that 'no evidence of effect', as identified in this 1124 review [135], is not the same as 'evidence of no effect'.

- 1125 Accordingly, there is currently no clear evidence to support the use of a neutropenic diet or
- 1126 other food restrictions in neutropenic patients with cancer. Patients and clinicians should
- 1127 continue to follow the safe food-handling guidelines as recommended by authorities.
- 1128
- 1129 5.7 What are the indications of a low-fiber diet?

### 1130 **Recommendation 38**

- 1131 Solely on the day preceding a colonoscopy a low fiber diet should be eaten to achieve a
- 1132 better colon cleansing and to reduce patients' discomfort.
- 1133 Grade of recommendation B strong consensus (94.3% agreement)

# 1134 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 lowfiber diet [139-141]. A low-fiber diet has been used in colon preparation before a colonoscopy [142]. 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 [142-146].

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 [147]. 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 [148].

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 [140]. 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.

1159

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

1162

### 1163 **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.

1167 Grade of recommendation B – strong consensus (91.2% agreement)

1168 **Commentary** 

1169 Heart failure is often associated with high blood pressure. The European Society of Cardiology

1170 (ESC) 2012 Guidelines for the Diagnosis and Treatment of Acute and Chronic Heart Failure

1171 and the American College of Cardiology Foundation (ACCF)/American Heart Association

1172 (AHA) 2013 Guideline for the Management of Heart Failure, both provide comprehensive 1173 evidence-based recommendations in caring for patients with heart failure and they do 1174 recommend restricting sodium in heart failure patients [149, 150]. However, they state that the 1175 intake of sodium should be individualized, since their potential benefits from sodium restriction 1176 such as dyspnea and blood pressure reduction, and edema improvement, vary between patients. 1177 On the other hand, that salt restriction might activate the renin-angiotensin-aldosterone-system 1178 and the sympathetic nervous system or increase the inflammatory cytokine levels. A review of 1179 these guidelines underlines the gaps in terms of the controversial effect of sodium and fluid 1180 restriction in patients with heart failure. More specifically, patients with heart failure who are 1181 assigned to a low-sodium diet and fluid restriction showed worse neurohormonal profiles, and 1182 for those with heart failure combined with reduced ejection fraction, an increase in heart failure 1183 admissions. This underlines the necessity for further research in sodium and fluid homeostasis 1184 [151]. A cohort study of 910 participants showed that sodium restriction <2500 mg/day had a 1185 significantly higher risk for the combined primary endpoint of death or heart failure 1186 hospitalization driven primarily by an increased risk of heart failure hospitalization. A Cochrane 1187 Review of eight RCTs (N=3518) concluded that there is insufficient power to confirm clinically 1188 important effects of dietary advice and salt substitution on cardiovascular mortality in 1189 normotensive or hypertensive populations [152].

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 [153]. 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

1197 proteinuria. If such reductions could be maintained long-term, this effect may translate to 1198 clinically significant reductions in end-stage kidney disease incidence and cardiovascular 1199 events, but research into the long-term effects of sodium-restricted diet for people with chronic 1200 kidney disease is warranted, as is the investigation into adherence to a low salt diet [154]. In 1201 summary, salt reduction to a minimum of 3.8 g/day should be indicated in patients with chronic 1202 renal failure complicated with arterial hypertension. Cautious should be given to avoid 1203 cumulating restrictive diets (i.e low protein + salt-reduced diets) that are at high risk of 1204 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)" [155, 156]. Moreover, the guidelines on the management of ascites and cirrhosis by Moore et al, dietary salt should be restricted to a noadded salt diet of 90 mmol salt/day (5.2 g salt/day) [155, 156].

1212

### 1213 Recommendation 40

1214 In case of arterial hypertension or acute decompensated heart failure, sodium chloride
1215 (salt) intake shall be no more than 6 g per day.

1216 Grade of recommendation B – strong consensus (91.8% agreement)

1217 Commentary

1218 It has been well documented with a RCT of 412 participants with and without hypertension,

1219 that reduced dietary sodium and the dietary approaches to stop hypertension (DASH) diet are

1220 associated with a significantly lower systolic blood pressure with the dietary approaches

1221 having a greater effect on the reduction of blood pressure [157]. More recently, a Cochrane 1222 systematic review of 185 RCTs (N=12210) showed that sodium reduction from an average high 1223 usual sodium intake level (201 mmol/day, i.e. 11.5 g sodium chloride/day) to an average level 1224 of 66 mmol/day (3.8 g sodium chloride per day), which is below the recommended upper level 1225 of 100 mmol/day (5.8 g sodium chloride per day), resulted in a decrease in systolic/diastolic 1226 blood pressure in white, Asian and black participants with normotension and an even greater 1227 decrease in systolic/diastolic blood pressure in participants with hypertension [158]. However, these study settings were the primary care, and not the hospital. At hospital, the risk for 1228 1229 malnutrition is worsening by a too strict salt diet restriction. Therefore, we propose that sodium 1230 chloride (salt) intake shall be no more than 6 g per day in case of arterial hypertension or acute 1231 decompensated heart failure. This is in line with the recommendations for other several 1232 diseases, such as chronic heart failure, liver cirrhosis with edema or ascites, and chronic renal 1233 failure (see recommendation 39).

1234

## 1235 **Recommendation 41**

1236 In patients admitted for acute decompensated heart failure, sodium should not be
1237 restricted to < 120 mmol/day (i.e. 2.8 g sodium chloride per day).</li>

1238 Grade of recommendation B – strong consensus (93.5% agreement)

## 1239 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

1245 plasma renin activity compared with the other groups consuming lower sodium dosages during 1246 follow-up (p < 0.001) [159]. The results of another RCT on salt reduction and fluid restriction 1247 with the use of furosemide showed that the combination of a normal-sodium diet with high 1248 diuretic doses and fluid intake restriction, compared with different combinations of sodium 1249 diets with more modest fluid intake restrictions and conventional diuretic doses, leads to 1250 reductions in readmissions, neurohormonal activation, and renal dysfunction [160]. Another 1251 RCT with an aggressive reduction in salt intake (maximum dietary intake, 800 mg/day) and a 1252 fluid-restricted (maximum fluid intake, 800 mL/day) showed that sodium and water restriction 1253 in patients admitted for ADHF are unnecessary [149].

- 1254
- 1255 7. Diets for special patient groups
- 1256 7.1 Is a therapeutic diet indicated with a corticosteroid therapy?
- 1257 Recommendation 42
- Patients treated with a short-term (≤6 weeks) systemic corticosteroid therapy may receive
  the hospital diet (see recommendation 14).
- -
- 1260 Grade of recommendation 0 consensus (87.8% agreement)
- 1261 Commentary

1262 Chronic or acute diseases where systemic corticosteroid therapy is indicated are frequently 1263 associated with inflammation and malnutrition. Therefore, prevention of malnutrition is highly 1264 warranted. In the case of systemic corticosteroid therapy, salt, sugar, fat, or calorie reduction 1265 should not be recommended, as the benefits-risk ratio is unfavorable towards a higher risk for 1266 malnutrition. At short-term (six weeks), sodium intake (<3 vs >6 g/day) does not seem to 1267 influence blood pressure variations in patients starting systemic corticosteroid therapy [161]. A 1268 controlled trial in 23 women with BMI >25 kg/m<sup>2</sup>, 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) [162]. Both diets were equally tolerable and did not cause flares in disease activity [162]. This study suggested that a restricted diet is not indicated for short-term corticosteroid therapy.

1276 Calorie intake higher than 30 kcal/kg/day could favor corticosteroid-induced lipodystrophy 1277 during prolonged (>3 months) corticosteroid therapy [163]. As shown on an RCT of 60 1278 participants, a salt reduction might have some positive effect on the metabolic side effects 1279 (blood glucose, lipid profile, blood pressure, and anthropometric measurements) in patients 1280 receiving corticosteroid medication for more than ten weeks [164]. The salt reduction is not 1281 indicated as the primary prevention of arterial hypertension in patients with corticosteroid therapy [165]. The only theoretical indication of diet modification could be a salt reduction (but 1282 1283 >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 1284 1285 study of 16 adult patients under long-term corticosteroid ( $\geq$  3 months,  $\geq$  5 mg/day) treatment 1286 from both general medicine and rheumatology practices highlighted the difficulties and the 1287 psychological distress encountered by patients in comprehending and implementing diet 1288 recommendations in the context of long-term corticosteroid use [166].

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) [167]. 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 ( $\geq$ 3 months) systemic glucocorticoid therapy, while other consensual measures (prevention of osteoporosis, vaccinations) were prescribed to less than half of patients [168]. 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 [169]. The diet should be adapted accordingly.

1304

1305 7.2 Is there a recommended diet for diabetic patients?

# 1306 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).

# 1309 Grade of recommendation GPP –consensus (84.0% agreement)

# 1310 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.

# 1317 Recommendation 44

- 1318 Patients with insulin therapy shall receive support to identify and quantify their dietary
- 1319 carbohydrate intake for glycemic control.
- 1320 Grade of recommendation A strong consensus (97.1% agreement)

## 1321 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 [170-173].

1327

# 1328 **Recommendation 45**

1329 Snacks containing mixed carbohydrates and protein should be offered between meals
1330 according to individual care (e.g. usually with mealtime short- and median-acting insulin)
1331 and glycemic control.

- 1332 Grade of recommendation GPP –consensus (89.4% agreement)
- 1333 Commentary
- 1334 Snacks containing mixed carbohydrate, protein, and fat intakes induce better glycemic control
- 1335 than carbohydrate only.

1336

# 1337 **Recommendation 46**

- 1338 In hospitalized diabetic patients, the low carbohydrate diet (<40% of energy intake)
- 1339 should be avoided as it is associated with lower energy intake and the risk of malnutrition.

## 1340 Grade of recommendation GPP – strong consensus (91.8% agreement)

## 1341 **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 [174], lower limb ulcers, and amputations [175]. The risk of frailty and sarcopenia is higher in people with diabetes [176]. 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.

1348

# 1349 **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-

1352 **based.** 

1353 Grade of recommendation GPP – strong consensus (97.3% agreement)

## 1354 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 [177]. 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 [175]. Key features of these and Nordic diets include:

- 1360 1) decrease salt intake (<6 g/day);
- 1361 2) eat two portions of oily fish each week;
- 1362 3) choose whole grains instead of refined grain;
- 4) eat everyday vegetables at least 300 g and fruit and berries at least 200 g;

1364 5) eat nuts and legumes (pulses) three times per week;

6) consume less red and processed meat, refined carbohydrates, and sugar-sweetenedbeverages:

1367 7) replace saturated fats with unsaturated fats;

1368 8) limit alcohol intake to  $\leq 14$  units/week (in hospitals: zero alcohol).

1369 In Diabetes UK Position Statements [175] they concluded "There is no convincing evidence for 1370 recommended ideal amount of carbohydrate for maintaining long-term glycemic control for 1371 people with type 1 diabetes". As well the exact proportion of energy that should be derived 1372 from total fat intake does not appear to be critical. In people with diabetes, studies 1373 recommending up to 40% of energy from fat - mostly unsaturated fat. From the evidence, there 1374 is no reason to recommend any specific ideal portion of macronutrients specifically for optimal 1375 glycemic control for type 2 diabetes. However total energy intake, overall diet composition and 1376 controlled total energy intake for weight management are vital. The overall diet quality also has 1377 a significant impact on diabetes complications e.g., cardiovascular disease [175].

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 [178]. 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 [179].

1389 For persons with diabetic nephropathy, national and international guidelines recommend that

1390 appropriate dietary advice tailored to the stage of kidney disease should be given concerning

1391 potassium, phosphate, salt, and energy intake, ensuring malnutrition prevented [180].

1392

1393 8. Indications for modified texture diets

# 1394 8.1 What are the indications of modified texture diets in geriatrics?

- 1395 For the indications of modified texture diets in geriatric patients, we refer to recommendation
- 1396 22 of the ESPEN guideline on clinical nutrition and hydration in geriatrics [16].

1397

- 1398 <u>Recommendation from the ESPEN guideline on clinical nutrition and hydration in</u>
   1399 <u>geriatrics</u>
- 1400 Older persons with malnutrition or at risk of malnutrition and signs of oropharyngeal
- 1401 dysphagia and/or chewing problems shall be offered texture-modified, enriched foods as
- 1402 a compensatory strategy to support adequate dietary intake.
- 1403 Grade of recommendation GPP strong consensus (100 % agreement)

## 1404 **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 [181], 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.

1412 Texture modified food means a challenge for the hospital kitchen in terms of nutritional as well 1413 as sensory aspects since pureed diets usually have a low energy density, indicating that a greater 1414 quantity of food needs to be consumed to meet nutrient needs which may impose a 1415 physiological burden on older adults [182]. Furthermore, texture-modified food might look 1416 unappealing [182]. Oral dysphagia becomes prevalent in high ages according to several age-1417 related changes in the oral cavity, pharynx, and esophagus [183]. Histologically, the swallowing 1418 muscles are different from somatic muscles as they receive continuous stimulation from the 1419 respiratory center, but are inevitably affected by malnutrition and disuse; accumulating 1420 evidence is available regarding the negative influence on swallowing [184].

1421

1422 8.2 What are the indications of modified texture diets in other situations than geriatrics?

### 1423 **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.

### 1429 Grade of recommendation GPP – strong consensus (91.7% agreement)

### 1430 **Commentary**

1432

1431 Oral-pharyngeal dysphagia is associated with many medical conditions, including stroke,

1433 hereditary ataxia, inflammatory bowel disease, and traumatic cervical spinal cord injury.

1434 Dysphagia is associated with many negative clinical short- and long-term outcomes, such as

1435 pneumonia, malnutrition, dehydration, and reduced quality of life [185-188]. According to the

neurogenic and neuromuscular disorders, head and neck cancer, amyotrophic lateral sclerosis,
published literature, the overall incidence of dysphagia in traumatic and non-traumatic cervicalspinal cord injury patients varies from 16% to 80% [187].

1438 The evidence for the prescription of texture-modified diets for dysphagia is limited [181]. Many 1439 guidelines [15, 189] and studies [189] recommend: In initial stages of dysphagia, adequate 1440 nutrition intake may be achieved through dietary modification to include soft, semisolid, or 1441 semi-liquid consistencies, partnered with appropriate swallowing techniques. There is a lack of 1442 evidence on the positives well as on the adverse effects of texture-modified diets in stroke 1443 patients with dysphagia [15]. In IBD patients with intestinal strictures or stenosis in 1444 combination with obstructive symptoms, a diet with adapted texture, or distal (post-stenosis) 1445 EN can be recommended. There is no robust data, this is just a logical practical approach [190]. 1446 The term dysphagia refers to difficulties in swallowing. In general, evaluation of swallowing 1447 usually begins with a screening and/or bedside examination and, if indicated, swallowing 1448 assessment by a speech therapist. This may be often followed by an instrumental evaluation 1449 with a videofluoroscopic swallowing study (VFSS) and/or fiberoptic endoscopic evaluation of 1450 swallowing (FEES). The goals of the swallowing assessment are to determine the optimal 1451 nutrition method (oral vs. nonoral) to support adequate nutrition and hydration and to maximize 1452 safe swallowing since proper swallowing safety aims to reduce the pulmonary complications 1453 associated with penetration-aspiration. videofluoroscopic swallowing study is conducted by a 1454 speech therapist and a radiologist [187]. Multi-professional work is important and adds the 1455 patient safety. One internationally recognized system for different textures is the International 1456 Dysphagia Diet Standardisation Initiative (IDDSI) (https://iddsi.org/Translations/Available-1457 Translations).

1458

## 1459 **Recommendation 49**

1460 In the initial stages of dysphagia, adequate nutrition intake may be achieved through 1461 dietary modification to include soft, semisolid, or semi-liquid consistencies, in 1462 combination with appropriate swallowing techniques.

1463 Grade of recommendation GPP – strong consensus (97.3% agreement)

#### 1464 **Commentary**

1465 Historically, in 2002 the American Dietetic Association proposed standardized terminology and 1466 definitions of diet modification for patients with dysphagia. And the National Dysphagia Diet 1467 proposed definitions of solid food textures and viscosity ranges for thin, nectar-like, honey-like, 1468 and spoon-thick liquids. But now, from October 2021, it is imperative that all healthcare 1469 providers globally implement IDDSI, both to ensure patient safety and to maintain current 1470 standards of practice. The Academy of Nutrition and Dietetics has announced hat beginning 1471 October 2021, IDDSI will be the only texture-modified diet recognized by Full Nutrition Care 1472 Manual (NCM)®. The National Dysphagia Diet (NDD) and associated resources will no longer 1473 be included in the NCM® past October 2021. Some studies have made of the use of thickening 1474 agents (and xanthan gum seems to be better than starch) [80, 191]. Newman et al (2016) wrote 1475 as background for their study "Fluid thickening is a well-established management strategy for 1476 oropharyngeal dysphagia [192]. However, the effects of thickening agents on the physiology of 1477 impaired swallow responses are not fully understood, and there is no agreement on the degree 1478 of bolus thickening. European Society for Swallowing Disorders (ESSD) concludes that there 1479 is evidence for increasing viscosity to reduce the risk of airway invasion and that it is a valid 1480 management strategy for oropharyngeal dysphagia [192]. However, new thickening agents 1481 should be developed to avoid the negative effects of increased viscosity on residue, palatability, 1482 and treatment compliance. New RCTs should establish the optimal viscosity level for each

1483	phenotype of dysphagic patients and descriptors, terminology, and viscosity measurements
1484	must be standardized. This white paper is the first step towards the development of a clinical
1485	guideline on bolus modification for patients with oropharyngeal dysphagia [192].
1486	
1487	9. Procedures of realimentation
1488	9.1 What is the recommended procedure of realimentation after acute pancreatitis?
1489	We refer to recommendations 2, 3, 21, 22, 23 and statements 4 and 5 of the ESPEN guideline
1490	on clinical nutrition in acute and chronic pancreatitis [19].
1491	
1492	Recommendation from the ESPEN guideline on clinical nutrition in acute and chronic
1493	<u>pancreatitis</u>
1494	Oral feeding shall be offered as soon as clinically tolerated and independent of serum
1495	lipase concentrations in patients with predicted mild acute pancreatitis.
1496	Grade of recommendation A – strong consensus (100% agreement)
1497	
1498	Recommendation from the ESPEN guideline on clinical nutrition in acute and chronic
1499	<u>pancreatitis</u>
1500	Low-fat, soft oral diet shall be used when reinitiating oral feeding in patients with mild
1501	acute pancreatitis.
1502	Grade of recommendation A – strong consensus (100% agreement)
1502	

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oumai	

1504	Statement from the ESPEN guideline on clinical nutrition in acute and chronic
1505	<u>pancreatitis</u>
1506	Patients with chronic pancreatitis do not need to follow a restrictive diet.
1507	strong consensus (94% agreement)
1508	
1509	Recommendation from the ESPEN guideline on clinical nutrition in acute and chronic
1510	pancreatitis
1511	Chronic pancreatitis patients with a normal nutritional status should adhere to a well-
1512	balanced diet.
1513	Grade of recommendation GPP – strong consensus (94% agreement)
1514	
1515	Recommendation from the ESPEN guideline on clinical nutrition in acute and chronic
1516	<u>pancreatitis</u>
1517	Malnourished patients with chronic pancreatitis should be advised to consume high
1518	protein, high-energy food in five to six small meals per day.
1519	Grade of recommendation GPP – strong consensus (94% agreement)
1520	
1521	Recommendation from the ESPEN guideline on clinical nutrition in acute and chronic
1522	<u>pancreatitis</u>
1523	In patients with chronic pancreatitis, diets very high in fiber should be avoided.
1524	Grade of recommendation B – strong consensus (91% agreement)
1525	

# 1526 <u>Statement from the ESPEN guideline on clinical nutrition in acute and chronic</u> 1527 <u>pancreatitis</u>

In patients with chronic pancreatitis, there is no need for dietary fat restriction unless
symptoms of steatorrhea cannot be controlled.

1530 strong consensus (100% agreement)

## 1531 Commentary

Before initiating oral food in patients with acute pancreatitis, disease severity should be 1532 1533 assessed. Frequent and cautious reassessments are mandatory for safe oral feeding. In patients 1534 with mild acute pancreatitis, early oral feeding, with the subjective feeling of hunger, is safe, feasible, and reduces the length of hospital stay [193]). The early oral diet causes no harm to 1535 1536 patients with mild disease [194]. Starting early feeding with clear liquids, soft diet, low-fat diet, 1537 or solid food was shown to be safe in different RCTs [193, 195-201]. Oral refeeding with a full 1538 solid diet in mild acute pancreatitis is well tolerated by most patients without abdominal pain 1539 relapse [200]. The refeeding regimen may also be gradually progressed from a clear liquid diet 1540 to a low-fat solid diet [201].

1541 An RCT including 151 patients showed that oral refeeding with a soft diet in patients with mild 1542 acute pancreatitis is safe and results in a shorter length of hospital stay [198]. In another RCT 1543 with 72 patients, there was no difference in feeding tolerance comparing immediately full 1544 caloric diet versus stepwise increase approach [202]. In this study refeeding after the presence 1545 of bowel sounds with an immediate full caloric diet was safe and well-tolerated. A meta-1546 analysis of three RCTs with 362 patients showed the non-liquid soft or solid diet did not 1547 increase pain recurrence after refeeding, compared with the clear liquid diet. The non-liquid 1548 diet reduced hospitalization with a pooled mean difference being -1.05 days [203]. Only three 1549 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-1550

1551	gallstone-related acute pancreatitis, there was no clear association between overall diet quality
1552	and risk of recurrent and progressive pancreatitis [204]. In patients with moderate to severe
1553	acute pancreatitis EN is beneficial and early oral feeding with hospital food is not recommended
1554	if there is hemodynamic instability [205]. After severe acute pancreatitis, an early oral diet is
1555	recommended at least by soft food. However solid food is not contraindicated but should be
1556	build up to a normal diet within days, judging by abdominal pain and postprandial pain [206].
1557	
1558	9.2 What is the recommended procedure of realimentation after GI surgery (obesity surgery
1559	excepted)?
1560	Recommendation 50
1561	Small meals five to six times per day may help patients to tolerate oral feeding and achieve
1562	nutritional goals faster during the early phase of recovery after surgery.
1563	Grade of recommendation GPP – strong consensus (94.3% agreement)
1564	
1565	Moreover, we refer to recommendations 3, 4, and 5 of the ESPEN guideline: Clinical nutrition
1566	in surgery [13].
1567	<b>Recommendation from ESPEN Guideline on Clinical Nutrition in Surgery</b>
1568	In most instances, oral nutritional intake shall be continued after surgery without
1569	interruption.
1570	Grade of recommendation A – strong consensus (90 % agreement)
1571	

## 1572 **Recommendation from ESPEN Guideline on Clinical Nutrition in Surgery**

- 1573 It is recommended to adapt oral intake according to individual tolerance and to the type
- 1574 of surgery carried out with special caution to elderly patients.
- 1575 Grade of recommendation GPP strong consensus (100 % agreement)
- 1576

## 1577 <u>Recommendation from ESPEN Guideline on Clinical Nutrition in Surgery</u>

- 1578 Oral intake, including clear liquids, shall be initiated within hours after surgery in most
- 1579 patients.
- 1580 Grade of recommendation A strong consensus (100 % agreement)

## 1581 Commentary

1582 Most patients should be offered food from the day of surgery. Early resumption of oral intake 1583 does not diminish the duration of postoperative ileus or lead to a significantly increased rate of 1584 nasogastric tube reinsertion [207]. Time to resumed bowel function is significantly in favor of 1585 allowing normal food at will [208]. Two recent meta-analyses showed that early postoperative 1586 oral feeding is associated with significant reductions in total complications compared with 1587 traditional postoperative feeding practices and does not negatively affect outcomes such as 1588 mortality, anastomotic dehiscence, resumption of bowel function, or hospital length of stay 1589 [209, 210]. Another meta-analysis revealed that early feeding reduced the risk of any type of 1590 infection and the mean length of stay [211]. It appears that early EN (within 24-48 h after 1591 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 [212]. However, in another RCT early

postoperative feeding did not reduce hospital stay, nursing workload, or costs and there was atendency toward increased nasogastric tube use in the early feeding arm [213].

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 lowquality evidence [214].

1601 Evidence for early oral feeding in pancreatic and upper gastrointestinal surgery is scarce. In a 1602 single-center RCT of 280 esophagectomy patients, liquids on day one, soft solid foods on day 1603 two, and normal hospital food as tolerated were shown to be a safe and feasible strategy. Early 1604 recovery of intestinal function and an improvement of quality of life were the main advantages 1605 [215]. A Chinese RCT of 100 patients undergoing laparoscopic radical gastrectomy, early oral 1606 feeding (liquids on day one, liquid and soft food from day two to six) was shown to be not 1607 harmful than traditional delayed feeding. There were no significant differences in postoperative 1608 complications between the two groups [216].

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 [217]. 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 [218].

1620	On the other hand, most studies have been conducted in an Asian population and larger
1621	randomized controlled trials performed amongst other populations are needed to generalize
1622	these results. Before early oral feeding after pancreatic and upper gastrointestinal tract surgery
1623	could be routinely advocated, multi-center, prospective, large sample size RCTs are required.
1624	
1625	9.3 What is the recommended procedure of realimentation after lower or upper GI bleeding
1626	(ulcer, esophageal varices)?
1627	Recommendation 51
1628	After lower gastrointestinal bleeding, once oral food is authorized, patients should receive
1629	the standard hospital diet according to the patient nutritional risk and status.
1630	Grade of recommendation GPP – strong consensus (91.8% agreement)
1631	Commentary
1632	Although lower gastrointestinal bleeding encompasses a wide clinical spectrum, in the majority
1633	of patients, bleeding stops spontaneously [219, 220]. If the patient is stable and not actively
1634	bleeding standard hospital diet should be offered [221]. No RCTs are investigating the optimal
1635	dietary management of patients with lower gastrointestinal bleeding.
1636	
1637	Recommendation 52
1638	After upper gastrointestinal system bleeding, once oral food is authorized, oral feeding
1639	should be initiated with liquids and advanced within 24 hours to standard or hospital diet
1640	according to the patient nutritional risk and status.
1641	Grade of recommendation B – strong consensus (93.8% agreement)
1642	Commentary

There is limited evidence for realimentation after gastrointestinal bleeding. Patients with cleanbased ulcers or nonbleeding Mallory-Weiss tears may be refed early with the regular hospital diet and discharged home immediately after stabilization [222]. Similarly, early feeding does not worsen outcomes in patients with active bleeding peptic ulcer treated by sclerotherapy and reduces the length of hospital stay [223]. 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 [224].

A recent meta-analysis of five trials involving 313 patients showed that early oral feeding within 24 hours does not result in a significantly higher risk of rebleeding and mortality compared with delayed oral feeding, but decreases hospital length of stay [194]. Usually, a liquid diet is initiated immediately, and subsequently, a soft diet is given [194]. 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 [225]. 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 [226].

1661

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

## 1664 **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.

1668 Grade of recommendation GPP – strong consensus (97.3% agreement)

## 1669 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

1674 return to consuming a standard hospital diet after the release of medication (anesthesia) to

1675 prevent malnutrition risk during hospitalization.

1676

- 1677 10. Other issues
- 1678 10.1 Could a combination of diets be indicated?

## 1679 **Recommendation 54**

- 1680 The combination of therapeutic diets may not be prescribed, as the risk of insufficient
- 1681 **food intake and malnutrition is high.**
- 1682 Grade of recommendation 0 strong consensus (91.4% agreement)
- 1683 Commentary

The more therapeutic diets, the higher the risk of insufficient energy and protein food intake [227]. 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.

1689 In some situations, patients are prescribed simultaneous therapeutic diets (e.g., sugar-free, less 1690 salted, lipid-free...), thus. reducing the variety of possible dishes, increasing the risk of low 1691 food intake and malnutrition. These prescriptions often come from additional prescriptions 1692 made without knowing the previous ones. Therefore, all prescriptions should be re-evaluated 1693 and a priority must be given to limit therapeutic diet prescriptions to the current situation. 1694 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 1695 1696 must be of an exception that needs to be time-limited, real oral intake monitored and 1697 prescription revaluated. Restrictive diets must be avoided for older persons regarding potential 1698 risks in terms of malnutrition, quality of life, morbidity, and mortality [228, 229]. A particular 1699 attention is to address to a texture-modified diet that is one restriction as its own. Most of the 1700 time a texture-modified diet corresponds to a low energy diet due to the absence of bread and a 1701 limited number of dishes. This food offer is associated to lower energy and protein intake in the 1702 older people [230, 231]. Moreover, this often provides reduced food choices to patients and 1703 represents an additional risk of malnutrition [232]. In conclusion, the combination of restrictive 1704 diets should be avoided due to the risk of malnutrition and food intake should be monitored.

## 1705

## 1706 10.2 How and when to assess food intake at the hospital?

#### 1707 **Recommendation 55**

Food intake is part of nutritional assessment and should be monitored by semiquantitative 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.

1712 Grade of recommendation B – strong consensus (96.1% agreement)

## 1713 **Commentary**

Malnutrition affects 30–50% of adult patients admitted to hospitals [233, 234]. Hospital stay is a risk factor for underfeeding [227] and malnutrition [112, 233, 234]. At the hospital, malnutrition is associated with increased mortality, morbidity, length of stay, and costs [112]. 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.

1720 The assessment of food energy intake has long been considered a key part of the nutritional 1721 assessment [8, 106, 235]. Indeed, reduction of dietary intake, together with the increase of 1722 energy requirements, is the main cause of hospital malnutrition. Since 2018 and the Global 1723 Leadership Initiative on Malnutrition (GLIM) [8], an international consensus for malnutrition 1724 diagnosis, reduced food intake, or assimilation should be considered as one of the top five 1725 criteria to diagnose malnutrition [8], together with BMI, weight loss, muscle mass, and 1726 inflammatory conditions. Knowing that more than two-thirds of hospitalized patients reported 1727 decreased food intake [227], and that undernutrition is the main cause of malnutrition, 1728 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 [236].

1731 A correlation was found between reduced food intake and low BMI [237]. With the same

1733 strongly associated with reduced food intake on the day of nutritionDay® survey: as compared

methodology and greater number of patients, the same authors identified the factors the most

1734 with full meal intake, reduced intake during the previous week (OR: 0.20; 95% CI: 0.17, 0.22),

1735 confinement to bed (OR: 0.49; 95% CI: 0.44, 0.55), female sex (OR: 0.53; 95% CI: 0.5, 0.56),

1736 younger age (OR: 0.74; 95% CI: 0.64, 0.85) and older age (OR: 0.80; 95% CI: 0.74; 0.88), and

1737 low BMI (OR: 0.84; 95% CI: 0.79, 0.90) [237].

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## 1739 **Recommendation 56**

1740 In nutritionally at-risk patients, insufficient food intake equal to or less than 50% of
1741 energy requirements over 3 days during the hospital stay should trigger a nutritional
1742 intervention.

## 1743 Grade of recommendation B – strong consensus (94.1% agreement)

#### 1744 Commentary

1745 To assess food intake, the GLIM advocated the use of semi-quantitative methods [8]: reduced 1746 food intake is defined as food intake equal to or less than 50% of energy requirements over one 1747 week, or any reduction in food intake for more than two weeks. The former definition is based 1748 on the results of the European multicenter NutritionDay® survey showing that food 1749 consumption  $\leq$  50% of offered portions at lunch or dinner was independently associated with an 1750 increased (by a factor of two to eight) mortality in 16,290 adult hospitalized patients worldwide 1751 [39] and in 9,959 US patients [238]. The assessment of consumed food portions has only be 1752 evaluated in the hospital setting, in the situations where the health caregivers, e.g. nurse

1753 assistants, could observe directly the consumed food by clearing the meal tray as did in1754 NutritionDay® [39].

1755 Another semi-quantitative way of assessing food intake could be the use of a 10-point analog 1756 visual scale for food intake [239]. In 2009, the use of 10-point analog scales was proposed to 1757 assess food intake in both in- and out-patients as it is feasible, easy to use, and extremely well 1758 correlated with daily energy intake assessed by the 3-day dietary record, especially in 1759 malnourished patients [239]. Since these results were confirmed by an independent study 1760 conducted in 1762 medical oncology patients [240]. Moreover, the 10-point visual analog scale 1761 for food intake could help to identify hospitalized patients at risk of malnutrition with 81% of 1762 those with a score <7 were at high nutritional risk [239] according to the Nutritional Risk Index 1763 (NRI) [241]. 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 1764 1765 oncology patients [242]. The Simple Evaluation of Food Intake (SEFI®) (www.sefi-1766 nutrition.com, Knoë, le Kremlin Bicêtre, France) (ex-EPA) is approved by SFNCM to assess 1767 food intake [243]. SEFI® is of simple use and assesses food intake according to two different 1768 procedures: a 10-point visual analog scale that was used in this study, and a visual assessment 1769 of consumed portions according to the NutritionDay® survey [39]. To assess food intake, in 1770 the setting of hospital malnutrition screening, the use of semi-quantitative methods represents 1771 a gain of time when the 3-day dietary record takes several days, is often not accurate enough, 1772 and thus is responsible for a delay in malnutrition diagnosis and management. Clearly, 1773 nowadays, assessment of food intake could be performed with very simple, easy-to-use, and 1774 useful semi-quantitative methods, that could be very easily implemented in daily hospital 1775 practice. These methods could be helpful to timely identify the patients who need the effort to 1776 be focussed on the best optimized nutritional care, without any delay in nutritional care 1777 decision. Food intake should be monitored weekly during the hospital stay.

## 1778

## 1779 General conclusion

1780 This unique guideline provides 56 recommendations to all relevant topic of Hospital Nutrition 1781 and therefore should be helpful to organize nutritional issues in hospitals, rehabilitation centers, 1782 and nursing homes, and for achievement good patient safety within nutritional care. Despite its 1783 value for personnel responsible for hospital kitchens, as well as for nutritionist physicians, 1784 dietitians, and nurses, it is worth to mention that 30 out of 56 recommendations, which is more 1785 than half, are not based on evidence from literature, but on extrapolations or just expert 1786 knowledge. This indicates the gaps in research in this particular area and may motivate 1787 researchers and cargiver to spend more efforts to generate knowledge on this topic.

1788

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1792

## 1793 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.

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## 1799 **Conflict of interest**

1800 The expert members of the working group were accredited by the ESPEN Guidelines Group,

1801 the ESPEN Education and Clinical Practice Committee, and the ESPEN executive. All expert

1802 members have declared their individual conflicts of interest according to the rules of the

1803 International Committee of Medical Journal Editors (ICMJE). If potential conflicts were 1804 indicated, they were reviewed by the ESPEN guideline officers and, in cases of doubts, by the 1805 ESPEN executive. None of the expert panel had to be excluded from the working group or from 1806 co-authorship because of serious conflicts. The conflict of interest forms are stored at the 1807 ESPEN guideline office and can be reviewed by ESPEN members with legitimate interest upon 1808 request to the ESPEN executive.

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- 1810

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- **Supplementary Materials**
- Supplementary Table 6. Evidence table.
- See attached file
- **Supplementary Table 7. Examples of hospital menus from different European countries**
- indicating what could be the two types of regular diets proposed in this guideline: the
- standard & hospital diets.
- See attached file

#### **Figure legend**

- Figure 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.