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## **ESPEN guideline on hospital nutrition**

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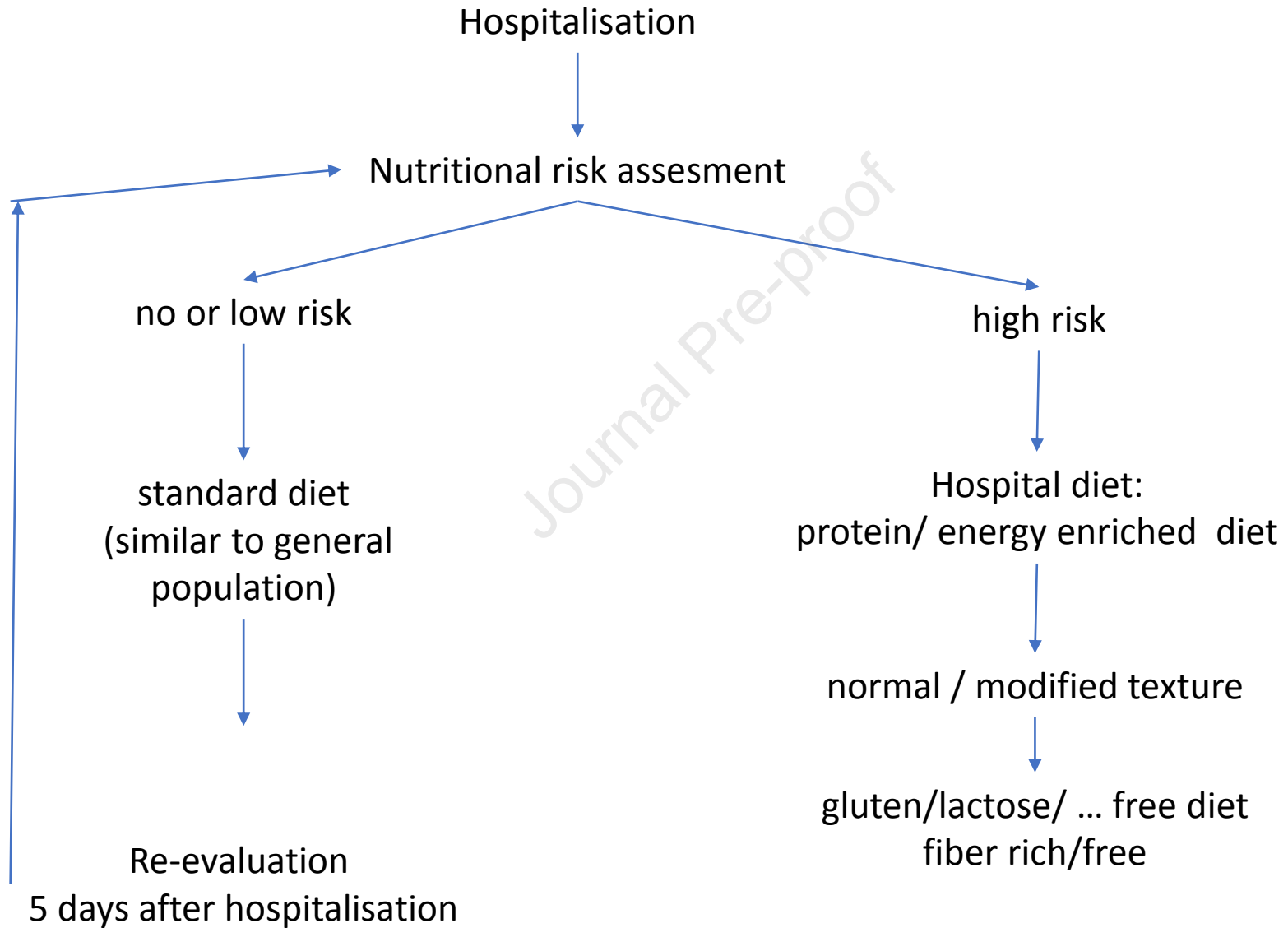
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1 **ESPEN guideline on hospital nutrition**

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**32 Abstract**

33 In hospitals through Europe and worldwide, the practices regarding hospital diets are very  
34 heterogeneous. Hospital diets are rarely prescribed by physicians, and sometimes the choices  
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  
41 indications of diets, as well as monitoring of food intake at hospital, rehabilitation center, and  
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

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## 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  
66 regarding hospital diets revealed that therapeutic diets such as low salt or gluten-free diet, or  
67 texture and consistency modified diets, are associated with decreased energy delivery and thus  
68 associated with an increased risk of malnutrition [1, 2]. In many clinics, prescriptions of hospital  
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.

82 The present European guideline, which is to our knowledge the first on this topic on an  
83 European level, emphasizes the importance of proper nutritional assessment as a prerequisite  
84 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 **o**utcome-related [5]. In total, 24 PICO questions were created; to  
96 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



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

104

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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  
 115 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]**

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

119  
 120 Between 13<sup>th</sup> February and 15<sup>th</sup> March 2020, online voting on the recommendations was  
 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 ≤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 –

152 nephrology-hepatology (low salt diet), geriatrics (diets with texture and consistency modified),  
 153 hematology (neutropenic diet), as well as indications for high-protein diets. This guideline also  
 154 proposes methods for semi-quantitative assessment of food intake as now recommended by the  
 155 GLIM consensus [8].

156

157 **Table 4: Search terms**

PICO question No.	Search terms
1	hospital food (review <10yr), hospital nutrition, energy requirements hospital, protein requirements hospital, nutritional requirements hospital, hospital meal.
2	diet fractioning, fractionation, fractioned meals, meal frequency, meal timing, snacks, hospital
3	hospital distribution system, hospital food service, patient catering, hospital catering, hospital food delivery, logistics
4	hospital & vegan, vegetarian diet, religious diet, food preferences, malnutrition
5	gluten free diet, celiac gluten, malnutrition, lactose intolerance, review
6	((Randomized controlled trial[Publication Type] OR Controlled clinical trial[Publication Type]) OR (Randomized[Title/Abstract] OR Placebo[Title/Abstract] OR Randomly[Title/Abstract] OR Trial[Title/Abstract] OR Groups[Title/Abstract])) OR Drug therapy[MeSH Subheading]) OR ((meta-analysis[MeSH Terms] AND (systematic* review*[Title/Abstract] OR meta-anal*[Title/Abstract] OR metaanal*[Title/Abstract]))) AND Humans[Mesh])) NOT (((((((Randomized controlled trial[Publication Type] OR Controlled clinical trial[Publication Type])) OR (Randomized[Title/Abstract] OR Placebo[Title/Abstract] OR Randomly[Title/Abstract] OR Trial[Title/Abstract] OR Groups[Title/Abstract])) OR Drug therapy[MeSH Subheading])) OR ((meta-analysis[MeSH Terms] AND (systematic* review*[Title/Abstract] OR meta-anal*[Title/Abstract] OR metaanal*[Title/Abstract]))) AND Animals[Mesh:noexp])) NOT (((Adolescent OR middle aged OR young adult OR child OR infant[MeSH Terms])) NOT Aged[MeSH Terms])) AND ((malnutrition[mesh] OR malnutrition[tiab] OR "nutritional deficiencies"[tiab] OR "nutritional deficiency"[tiab] OR malnourishment[tiab] OR undernutrition[tiab])) AND ((diet therapy[mh] OR diet[tiab] OR dietary[tiab] OR "hospital food"[tiab]))
7	Indication for high protein diet AND hospital
8	Indication for low calorie diet AND low Protein diet AND hospital
9	low protein diet AND liver disease, low protein diet AND hepatic encephalopathy, low protein diet AND chronic kidney disease, restricted protein diet AND liver disease, restricted protein diet AND hepatic encephalopathy, restricted protein diet AND chronic kidney disease, nutrition AND liver, nutrition AND kidney, diet AND kidney disease, diet AND liver.
10	Chyle leakage AND diet, chyle AND nutrition, chyle leakage pancreatectomy, chyle leakage esophagectomy, chylous ascites, low fat diet
11	FODMAP AND hospital diet, FODMAP AND hospital menu, FODMAP AND diet, FODMAP AND hospital food, Irritable bowel disease AND hospital diet, fermentable

	oligo-, di-, mono-saccharides AND polyols, FODMAP diet, irritable bowel syndrome diet, FODMAP OR (fermentable oligo-, di-, mono-saccharides and polyols) OR (fermentable, poorly absorbed, short-chain carbohydrates) AND (Nutritional Status) OR (nutrition assessment) OR (nutritional requirements/or recommended dietary allowances), FODMAP OR (fermentable oligo-, di-, mono-saccharides and polyols) OR (fermentable, poorly absorbed, short-chain carbohydrates) AND (parenteral nutrition, total) OR (parenteral nutrition) OR (Enteral nutrition) OR (exp Diet) OR (diet)
12	low fiber diet, low fibre diet, low fiber AND nutrition, low fibre AND nutrition, low fiber AND food
13	Neutropenic diet AND cancer, Neutropenic diet AND haematopoietic stem cell transplantation.
14	sodium restriction AND chronic cardiac failure; sodium restriction AND chronic heart failure; sodium restriction AND chronic renal failure; sodium restriction AND chronic kidney failure; sodium restriction AND chronic kidney disease; sodium restriction AND arterial hypertension; sodium restriction AND liver cirrhosis
15	corticosteroid therapy AND diet; corticosteroid therapy AND sodium restriction; prednisolone AND diet; prednisolone AND calorie restriction; corticosteroid therapy AND malnutrition
16	diabetes AND low carbohydrate diet; diabetes AND diet; diabetes AND malnutrition; insulinotherapy AND diet
17	<p>("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])</p> <p>AND</p> <p>((((((((((Randomized controlled trial[Publication Type] OR Controlled clinical trial[Publication Type])) OR (Randomized[Title/Abstract] OR Placebo[Title/Abstract] OR Randomly[Title/Abstract] OR Trial[Title/Abstract] OR Groups[Title/Abstract])) OR Drug therapy[MeSH Subheading])) OR ((meta-analysis[MeSH Terms]) AND (systematic* review*[Title/Abstract] OR meta-anal*[Title/Abstract] OR metaanal*[Title/Abstract])) AND Humans[Mesh])) NOT (((((((Randomized controlled trial[Publication Type] OR Controlled clinical trial[Publication Type])) OR (Randomized[Title/Abstract] OR Placebo[Title/Abstract] OR Randomly[Title/Abstract] OR Trial[Title/Abstract] OR Groups[Title/Abstract])) OR Drug therapy[MeSH Subheading])) OR ((meta-analysis[MeSH Terms]) AND (systematic* review*[Title/Abstract] OR meta-anal*[Title/Abstract] OR metaanal*[Title/Abstract])) AND Animals[Mesh:noexp])) NOT (((Adolescent OR middle aged OR young adult OR child OR infant[MeSH Terms])) NOT Aged[MeSH Terms]))))</p>
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

158

159

## 160 **Glossary**

161 **Diet(ary) counselling**, in accordance with the professional language for dietitians, is « a  
162 supportive process, characterized by a collaborative counselor-client relationship, to establish  
163 food, nutrition and physical activity priorities, goals, and action plans that acknowledge and  
164 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.

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

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

179 **Therapeutic diet**. Therapeutic diets are prescribed according to the specific disease or needs of  
180 a 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.

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

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

198 **Texture modified food and thickened fluids.** Texture modification of food and/or drink is an  
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:

207 - Liquidized/thin puree; homogenous consistency that does not hold its shape after serving.

208 - Thick puree/soft and smooth; thickened, homogenous consistency that holds its shape after  
209 serving and does not separate into a liquid and solid component during swallowing, i.e.,  
210 cohesive.

211 - Timbal: homogenous smooth consistency that is omelette-like in texture and made from  
212 smooth purees mixed with egg and then baked. Timbal holds its shape after serving, is not sticky  
213 and does not separate into a liquid and solid component after serving or during swallowing, i.e.,  
214 cohesive. Can be eaten with a spoon or fork.

215 - Finely minced; soft diet of cohesive, consistent textures requiring some chewing (particle size  
216 most often described as 0.5 \* 0.5 cm).

217 - Modified normal; normal foods of varied textures that require chewing, avoiding particulate  
218 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  
230 BW minus ideal BW) x 0,33”, whereas ideal BW can be calculated as the BW that corresponds  
231 to a body mass index (BMI) of 25 kg/m<sup>2</sup>.

232 The following terms have been established:

- 233 • extra low protein intake: under 0.6 g/kg BW/day
- 234 • low protein intake: 0.6-0.79 g/kg BW/day
- 235 • normal protein intake: 0.8-1.0 g/kg BW/day
- 236 • high protein intake: 1.1-1.3 g/kg BW/day
- 237 • extra high protein intake: over 1.3 g/kg BW/day
- 238 Independent of protein intake, sodium chloride intake should be between 6-8 g/day.
- 239

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).

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

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

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**

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

259

260 **Recommendation 2**

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

263 **Grade of recommendation GPP – consensus (89.5% agreement)**

264 **Commentary**

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

287

288 **Recommendation 4**

289 **Hospitals, rehabilitation centers, and nursing homes should aim to use high-quality and**  
290 **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  
294 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**  
299 **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 protocolled.**

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**

322 Hospital food should be considered as part of medical treatment. As for drug therapy, hospital  
323 food should be prescribed by doctors, physicians, dietitians, or nurses through the computerized  
324 patient medical record, according to the patient's needs, nutritional status, disease, and medical  
325 situation. This means that the list of available diets should be available for the prescribers  
326 (doctors, physicians dietitians, or nurses), and that the indications of each diet should be  
327 specified and protocolled. The computerized prescription would be a good mean to monitor and  
328 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.**

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

335 **Commentary**

336 Larger hospitals would need more diets than recommended here, depending also on the focus  
337 of the hospital. Each hospital should adapt its menu offer based on the indication for therapeutic  
338 diets provided in subsequent chapters of the guideline. Offering comprehensive menus and diets



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

341

342 **Recommendation 9**

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

362 medical indication. These diets can increase the risk of being underfed [1] and finally the risk  
363 of malnutrition. Therefore, therapeutic diets should be limited at hospital, especially in small  
364 hospitals. The choice of the therapeutic diets will depend on the characteristics/profiles of the  
365 usually admitted patients. For example, a hospital in which there are no patients with renal,  
366 hepatic or cardiac disease would not need a salt-reduced diet. As the risk of malnutrition is high,  
367 food restrictions should be avoided at hospital.

368

### 369 **Recommendation 11**

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

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

#### 374 **Commentary**

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

379

### 380 **Recommendation 12**

381 **Hospital nutrition should be checked, re-evaluated, and eventually adapted for each**  
382 **patient at regular intervals (every three to five days) according to the course of the disease,**  
383 **monitored oral intake, and the patient's acceptance. If dietary modifications are**  
384 **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**  
386 **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  
393 prescription should be re-evaluated: the longer the hospital stay, the higher the risk of  
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  
396 increase the risk for malnutrition. If therapeutic diets are indicated, food intake must be  
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 reevaluated after three to five days.**

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

412 **Commentary**

413 The choice of the hospital diet is depending on the nutritional risk assessment that is mandatory  
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  
428 considered relevant and rated of acceptable quality. Four systematic literature reviews [22-

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 Ziyhan 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.

451

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].

462 In cancer patients who are malnourished or at risk of malnutrition, nutritional therapy has been  
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,  
476 patients with nutritional risk score  $\geq 3$  (NRS-2002) got home-delivered meals. Increased energy

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**

496 **The standard diet should cover the minimal energy needs (25 kcal/kg actual BW/day) and**  
497 **the minimum of protein needs (0.8-1.0 g/kg actual BW/day). The hospital diet should**  
498 **cover 30 kcal/kg actual BW/day of energy needs, and at least 1.2 g/kg actual BW/day of**  
499 **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  
513    illness, injury, or malnutrition [37]. The recommended level for protein intake varies between  
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 7**Error! Reference source not found.Error! Reference source not found..

520

**521    Recommendation 16**

522    **The proportions of carbohydrates, lipids, and protein over the total daily energy intake**  
523    **should be 50-60 %, 30-35 %, and 15-20 % for the standard diet, and 45-50%, 35-40%,**  
524    **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**

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

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

541 **Commentary**

542 A third choice could be a vegetarian meal choice. 40-70% of hospitalized patients are at  
543 nutritional risk. For the patients with low or no nutritional risk (i. e. young adults without  
544 inflammation or chronic diseases), the standard diet should be the one that is done for the  
545 healthy individual population; it is based on patient food preferences and menu choices to give  
546 them a chance to eat. We propose here an algorithm (**Figure 1**) to state the indications of the  
547 two regular diets at the hospital: the “standard diet” and the “hospital diet”. They should be  
548 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  $\frac{1}{4}$  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  
560 et al. who showed that overall intake of energy is maximum 15% and overall protein intake is  
561 maximum 28% [40]. Bokhorst et al. showed that patients who experience the worst health ate  
562 the least [41]. There is some evidence that patients eat more when they are offered more meals  
563 a day. Dijkhoorn 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  
567 patients, and showed that patients are provided 75% of estimated needs, and consume less than  
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 Pre-proof

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**

625 **At least one dietitian working in collaboration with the professionals involved in the field**  
626 **(e.g. nutrition support team, dietetic department, cooks, food engineers, food manager)**  
627 **should be dedicated to the hospital kitchen with the role of setting up patients' menus**  
628 **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  
632 are in accordance with needs of patients with different medical conditions and in accordance  
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. Continuous 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**

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

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

**646 Commentary**

647 Patient's needs and capabilities depend on clinic situations and patient perspectives. Hospital  
648 food should be adapted accordingly. For palliative care, the organization of food provision is  
649 part of nutritional care as well as a comprehensive approach to nutritional care and  
650 individualization of nutrition [51].

651

**652 Recommendation 21**

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

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

655 **Commentary**

656 Food delivery at the hospital is based on local capacities and organizations. Defining standards  
657 for food delivery implies considering patients' capacities to eat and patients' preferences. In the  
658 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  
661 fever, pain, or other medical side effects): meal tray should be adapted. Different eating aids  
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  
664 waste. But units who adopt these meals on wheels distribution have to be aware of the  
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  
669 attention to patients with assisted meals if needed (following recommendations of the French  
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.

673 - Open possibilities to patients to eat at every moment of the day in dedicated places (near  
674 catering units) should be thinking to improve organoleptic qualities, mealtimes and to focus on  
675 patient's choice. Increasing ambulatory hospitalization may accelerate the shift towards this  
676 new organization. Nutritional needs have to meet patients' preferences. Qualitative studies took  
677 account of patients' perception of meals [57, 58] or motivation to eat [59]. The temperature of

678 the meal, appearance, and aroma of food are important contributors as well as choice and service  
679 staff [58], or ambiance [60]. Improved meal presentation can increase food intake too [61].  
680 In conclusion, hospital food delivery should be different regarding the patient's abilities, type  
681 of hospitalization, and perspectives. Meals should meet patient's preferences and abilities to  
682 eat: adaptation of food portion size, modified texture if needed, best conditions to increase meal  
683 intake (varied choice and hot dishes).

684

#### 685 **4. Individual 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**

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

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

#### 692 **Commentary**

693 Food allergy is defined as an immune system reaction that occurs soon after eating a certain  
694 food. Even a tiny amount of the allergy-causing food can trigger signs and symptoms such as  
695 digestive problems, hives, or swollen airways, going until the anaphylactic shock or death  
696 (general ref to be included). These severe clinical manifestations of food allergy justify by  
697 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**

703 **Religious beliefs and food preferences (taste) should be taken into account at best when**  
704 **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  
721 content of a recipe should be easily identifiable by the patient. When Halal or Kosher meat

722 cannot be provided, alternative protein propositions should be available on the menu and  
723 precautions must be taken with clear labeling of the served dishes and ingredients (e.g, the use  
724 of alcohol or wine vinegar in a recipe). In addition, when the standard plate is a three-component  
725 plate (meat, vegetables, and starches served all together), the possibility must be offered to  
726 avoid meat and vegetarian foods on the same serving platter. In all cases, reasons of non-eaten  
727 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**

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

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

#### 741 **Commentary**

742 A vegetarian diet is generally considered as a valid alternative to a specific meal for religious  
743 belief, as long as nutritional needs are covered (i. e 30 kcal/kg/day, protein 1 to 1.2 g/kg/day)  
744 [37]. Currently, the vegetarian diet is often a menu derived from the standard menu by the  
745 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**

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

770 osteoporotic fracture and iron deficiency anemia [69, 70]. Vegans should receive a mandatory  
771 vitamin B12 substitution because of an important risk of deficiency [71]. In conclusion,  
772 following the evolution of food choices and preferences, vegetarian diet demand has also  
773 increased at the hospital. Vegetarian design should meet nutritional requirements as much as  
774 variety, but patients should be aware that a vegan diet is not recommended due to the risk of  
775 malnutrition.

776

## 777 *5. Indications for therapeutic diets*

### 778 *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  
789 in 2012 and the US FDA in 2013 defining foods labeled ‘gluten-free’ as containing <20 parts  
790 per million (ppm) of gluten (equal to 20 mg kg<sup>-1</sup> of food) when measured by an approved system  
791 for testing [73, 74].

792 Industrially purified wheat-starch-based gluten-free products and uncontaminated oat products  
793 containing less than 20 ppm of gluten are allowed for celiac disease patients as a part of a  
794 gluten-free diet, and these products are particularly favored in northern Europe and the United  
795 Kingdom. Previous randomized and long-term follow-up studies also show that these products  
796 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 lose 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.  
824

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**

831 A number of studies clearly indicate that a low-FODMAP diet improves symptoms in patients  
832 with irritable bowel syndrome [87-91]. From these studies it can be deduced that hospitals  
833 should provide a low-FODMAP diet, considering the high prevalence of irritable bowel  
834 syndrome in the general population of > 10%. All patients who need low-FODMAP-diet should  
835 get dietary counselling by a dietitian and should be followed by a physician and/or a dietitian.

836

837 **Recommendation 28**

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

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

841 **Commentary**

842 Lactose is a disaccharide sugar found in mammalian milk; it makes up around 2-8% of milk  
843 (by weight), although the amount varies among species and individuals: 7.2 g/100 mL in mature  
844 human milk, 4.7 g/100 mL in cow's milk. Lactose digestion takes place in the small intestine  
845 by the work of lactase-phlorizin hydrolase, a protein expressed on the brush border of intestinal  
846 villi. If the lactase enzyme is absent (alactasia) or deficient (hypolactasia), unabsorbed lactose  
847 molecules osmotically attract fluid into the bowel lumen, leading to an increased volume and  
848 fluidity of the intestinal content. In addition, the unabsorbed lactose passes into the colon, where

849 it is fermenting by bacteria producing short-chain fatty acids and gases (CO<sub>2</sub>, CH<sub>4</sub>, H<sub>2</sub>) possibly  
850 leading to various gastrointestinal symptoms [92]. Lactose breath tests represent an indirect test  
851 for lactose malabsorption, and it is commonly considered the most reliable, non-invasive, and  
852 inexpensive technique. Based on several different studies, lactose breath tests show good  
853 sensitivity (mean value of 77.5%) and excellent specificity (mean value of 97.6%) [93, 94].  
854 There is currently a tendency towards a lactose-free diet, applied to dysimmune diseases,  
855 inflammatory rheumatism, autism, irritable bowel syndrome, or atopic eczema in children.  
856 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].  
858 Lactase deficiency, which is common in adults, does not mean lactose intolerance. Intolerance  
859 symptoms 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**

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

878 **Malnutrition** or risk for malnutrition is the main indication for a high energy diet, i.e. the  
879 hospital diet (see recommendation 14, **Figure 1**) which usually should contain also a high  
880 protein content. To define patients as being malnourished or at risk for malnutrition, a  
881 standardized screening procedure must be applied at admission in the hospital. For screening  
882 purposes, e. g. the NRS-2002 could be used to identify patients with higher energy and/or  
883 protein need [106]. High energy diet is defined as containing a calorie content of >30 kcal/kg  
884 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):

886 - Polymorbid medical inpatients (at least 1.0 g/kg/day).

887 - 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).

890 - Patients with cancer (above 1 g/kg/day and, if possible up to 1.5 g/kg/day).

891 - 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].

893 - 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.

895 - 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)).

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

902

### 903 **Recommendation 30**

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

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

### 908 **Commentary**

909 Food delivery at the hospital is based on local capacities and organizations. Nutritional goals  
910 can be achieved by food strategies. This could be reached by [107] implementing protected  
911 mealtimes, a complex healthcare intervention that aims to stop all non-urgent clinical activity  
912 in the ward environment and provide a conducive eating environment, for improving the  
913 nutritional intake of hospitalized patients. Anyhow, this type of intervention has a very low  
914 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.

937

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,  
973 patients with eating disorders, and patients with chronic vomiting or diarrhea have a higher risk  
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.

984 Both the American Diabetes Association (ADA) and the European Association for the Study  
985 of Diabetes (EASD) support the short-term use of low-calorie diets for weight loss in diabetic

986 patients [121, 122]. In the acute hospital setting, it is not generally recommended to provide  
987 low-calorie diets in obese diabetic patients because acute illness can promote malnutrition.  
988 However, in the rare situation where there is no acute illness promoting high blood sugar, it  
989 could be discussed to reduce energy intake (especially from carbohydrates) to reduce the dose  
990 of insulin injection and breakthrough insulin resistance [121, 123].

991

### 992 **Recommendation 33**

993 **In low-calorie diets, the protein content may not be reduced and may be at least 1 g/kg**  
994 **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**

997 During acute or chronic illness, obese patients should be considered to have the same risk of  
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

1015 **Recommendation from the ESPEN guideline on Clinical Nutrition in Liver disease**

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

1020 **Recommendation from the ESPEN guideline on Clinical Nutrition in Kidney disease**

1021 **Chronic kidney disease patients previously maintained on controlled protein intake (the**  
1022 **so-called “low protein diet”) should not be maintained on this regimen during**  
1023 **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].

1035 Hospitalization due to critical or acute illness or major surgery is often characterized by a pro-  
1036 inflammatory status and increased protein catabolism, thus continuing the dietary protein  
1037 restriction is not appropriate in chronic kidney disease patients. The protein need in hospitalized  
1038 patients must be oriented by the baseline illness that caused hospital admission more than by  
1039 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 >1.2  
1053 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 = low fat diet, <1000 mL = low fat diet or total PN  
1061 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**

1078 **Patients with rare fatty acid oxidation disorders, such as long-chain 3-Hydroxyacyl-CoA**  
1079 **Dehydrogenase Deficiency (LCHADD, MIM 609016) and Mitochondrial Trifunctional**  
1080 **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**

1085 There are some rare metabolic disorders in the fatty acid oxidation known, such as long-chain  
1086 3-Hydroxyacyl-CoA Dehydrogenase Deficiency (LCHADD) and Mitochondrial Trifunctional  
1087 Protein Deficiency (MTPD). In these specific patient groups, a diet low in LCT is  
1088 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**

1097 In patients with protein-losing enteropathy due to intestinal lymphangiectasia, a low-fat, high-  
1098 protein, MCT diet may be successful [135, 136]. This approach is associated with favorable  
1099 effects on hypoalbuminemia, gastrointestinal symptoms, and growth. As these patients are  
1100 frequently malnourished, the hospital diet (protein-energy enriched diet) should be provided  
1101 (see recommendation 14).

1102

1103 *5.6 What are the indications of a neutropenic diet, if any?*1104 **Recommendation 37**

1105 **Neutropenic diets (also called “germ-free”, “no microbial” or “sterilized” diets) shall not**  
1106 **be used (e.g. in neutropenic patients with cancer including hematopoietic cell transplant**  
1107 **patients).**

1108 **Grade of recommendation A – strong consensus (93.6% agreement)**1109 **Commentary**

1110 A recent updated systematic review and meta-analysis included six studies (five randomized)  
1111 with 1,116 patients, with 772 (69.1%) having undergone hematopoietic cell transplants [137].

1112 There was found no statistically significant difference between neutropenic diet and usual diet  
1113 in the rates of major infections or bacteremia/fungemia. In hematopoietic cell transplant  
1114 patients, a neutropenic diet was associated with a slightly higher risk of infections. No  
1115 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  
1117 not possible to give recommendations for clinical practice [138]. It was stated that more high-  
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**

1135 There is no clear definition for a low-fiber diet and the terms “low residue” and “low fiber” are  
1136 used interchangeably. Usually a diet with a total daily fiber intake <10g is defined as a low-  
1137 fiber diet [139-141]. A low-fiber diet has been used in colon preparation before a colonoscopy  
1138 [142]. A low-fiber diet combined with cathartic agents does not impair the quality of bowel  
1139 preparation and a better colon cleansing is achieved. Additionally, the low-fiber diet is better  
1140 tolerated by patients and there is increased compliance [142-146].

1141 A recent meta-analysis including 12 RCTs and 3674 participants compared a low residue diet  
1142 (eight RCTs) or a regular diet (four RCTs) to patients receiving a clear liquid diet in bowel  
1143 preparation. Compared with a clear liquid diet, the low residue/regular diet was associated with  
1144 a higher willingness to repeat the procedure and better tolerability. No differences between  
1145 groups were found in terms of adequate bowel preparation and adenoma detection rate [147].  
1146 It may be reasonable for patients without risk factors for poor preparation to undergo a low  
1147 residue diet until lunch the day before colonoscopy.

1148 The role of a low-fiber diet after elective colorectal surgery was studied in one RCT. This RCT  
1149 showed that provision of a low residue diet rather than a clear liquid diet after colorectal surgery  
1150 on day one postoperatively is associated with less nausea, faster return of bowel function, and  
1151 a shorter hospital stay without increasing postoperative morbidity [148].

1152 In patients with irritable bowel syndrome, a low fiber diet may be an effective treatment to  
1153 relieve symptoms such as abdominal pain, cramps, and distension [140]. It is not clear whether  
1154 the dietary fiber recommendations for individuals with irritable bowel syndrome should differ  
1155 from those of the general population. There are no high-quality studies on the effect of a low  
1156 fiber diet on the management of diverticulitis, acute colitis, Crohn's disease, and ulcerative  
1157 colitis. In conclusion, no recommendation can be given regarding the role of a low-fiber diet in  
1158 other clinical conditions than colonoscopy preparation.

1159

1160 *6. Is salt reduction associated with clinical benefits in renal failure, heart failure, arterial*  
1161 *hypertension, liver cirrhosis with edema/ascites, and with which threshold?*

1162

### 1163 **Recommendation 39**

1164 **In the case of chronic cardiac failure, chronic renal failure, or cirrhosis, sodium chloride**  
1165 **reduction should not be decreased below 6 g/day, otherwise, the benefits-risk ratio is**  
1166 **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].

1190 A review of eight studies studying the long-term effects of salt restriction in people with chronic  
1191 kidney disease was unable to determine the direct effects of sodium restriction on primary  
1192 endpoints such as mortality and progression to end-stage kidney disease [153]. A meta-analysis  
1193 published three years later on the long-term effects of salt restriction in people with chronic  
1194 kidney disease showed no direct effects of sodium restriction on primary endpoints such as  
1195 mortality and progression to end-stage kidney disease. Salt reduction in people with chronic  
1196 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. Caution 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.

1205 Liver cirrhosis patients with arterial hypertension usually become normotensive and patients  
1206 with normal blood pressure before disease develop low blood pressure. The guidelines for  
1207 ascites control of the European Association for the Study of the Liver state that “a lower salt  
1208 intake than recommended in the general population is not recommended in case of ascites  
1209 complicating chronic liver disease (cirrhosis)” [155, 156]. Moreover, the guidelines on the  
1210 management of ascites and cirrhosis by Moore et al, dietary salt should be restricted to a no-  
1211 added 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 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,  
1228 these study settings were the primary care, and not the hospital. At hospital, the risk for  
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).**

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

#### 1239 **Commentary**

1240 In an RCT with 410 participants, researchers compared the effects of a normal-sodium (120  
1241 mmol sodium) diet with a low-sodium diet (80 mmol sodium) on readmissions for congestive  
1242 heart failure during 180 days of follow-up in compensated patients with chronic heart failure.  
1243 The group consuming the normal-sodium diet (120 mmol sodium) showed the best results, with  
1244 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**

1258 **Patients treated with a short-term ( $\leq 6$  weeks) systemic corticosteroid therapy may receive**  
1259 **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

1269 erythematosus receiving a low dose of prednisolone over six weeks indicated that significant  
1270 weight loss (mean of 3 kg) and fatigue improvement could be similarly achieved with either a  
1271 standard diet (2000 kcal/day, 50% carbohydrates, 15% proteins, 30% fat) or a low glycemic  
1272 diet (carbohydrate limited to 45 g/day, 10–15% carbohydrates, 25% proteins and 60% saturated  
1273 and unsaturated fat) [162]. Both diets were equally tolerable and did not cause flares in disease  
1274 activity [162]. This study suggested that a restricted diet is not indicated for short-term  
1275 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  
1282 therapy [165]. The only theoretical indication of diet modification could be a salt reduction (but  
1283 >6 g chloride sodium/day) in case of occurrence of arterial hypertension during a long-term  
1284 (>10 weeks) corticosteroid therapy (see recommendation 39). However, a small qualitative  
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].

1289 In patients with corticosteroid therapy, a standard diet could be proposed to cover increased  
1290 energy expenditure and protein catabolism related to inflammatory diseases: carbohydrates 55-  
1291 60% of the total energy intake, proteins 15-20%, and fat 25-30% (saturated, monounsaturated,  
1292 polyunsaturated fatty acids in the ratio 1:1:1) [167]. Unfortunately in real-life practice in  
1293 France, unnecessary measures in most patients (potassium supplementation, prevention of

1294 peptic ulcer, low-sodium diet) were frequently associated with prescription of long-term ( $\geq 3$   
1295 months) systemic glucocorticoid therapy, while other consensual measures (prevention of  
1296 osteoporosis, vaccinations) were prescribed to less than half of patients [168]. The calcium and  
1297 vitamin D supply must be ensured.

1298 Our literature review revealed the lack of substantial evidence about the effect of altered diet  
1299 composition on the nutritional status of hospitalized patients receiving high doses of  
1300 corticosteroids. Therefore, we suggest that diet restriction which might increase the risk of  
1301 malnutrition should not be recommended. Assessment and close monitoring of systemic  
1302 corticosteroid-induced side effects such as hyperglycemia is highly recommended [169]. The  
1303 diet should be adapted accordingly.

1304

## 1305 *7.2 Is there a recommended diet for diabetic patients?*

### 1306 **Recommendation 43**

1307 **Type 1 and 2 diabetic patients should be offered the standard or the hospital diet**  
1308 **according to their nutritional risk/status (see recommendations 12,13,14).**

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

### 1310 **Commentary**

1311 Malnutrition prevention in diabetics patients is as important as for any other patient. Glycemic  
1312 control should not be a pretext to reduce food intake in diabetic patients. Optimization of insulin  
1313 therapy is indicated, but not the reduction of food intake and increasing the risk of malnutrition.  
1314 When hospitalized, diabetic patients could be more at risk of malnutrition especially in case of  
1315 diabetes disequilibrium.

1316

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**

1322 On a meal-by-meal basis, matching insulin to the amount of carbohydrate consumed  
1323 (carbohydrate counting and insulin dose adjustment) is an effective strategy for improving  
1324 glycemic control. Randomized controlled trials in adults with type 1 diabetes have shown  
1325 carbohydrate counting can improve glycemic control, quality of life, and general well-being  
1326 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**

1342 In the case of diabetes disequilibrium, optimization of insulin or antidiabetic drug is warranted,  
1343 whereas calorie restriction is not. Diabetes is an important factor associated with low dietary  
1344 intake, e.g. in hemodialysis patients [174], lower limb ulcers, and amputations [175]. The risk  
1345 of frailty and sarcopenia is higher in people with diabetes [176]. This risk is increased in case  
1346 of acute or chronic illnesses associated with diabetes. Restrictive regimens should be avoided  
1347 to prevent malnutrition and support nutrition when needed.

1348

1349 **Recommendation 47**

1350 **With diabetic complications (e.g. diabetic nephropathy, diabetic gastroparesis, lower limb**  
1351 **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**

1355 Individuals with type 1 and type 2 diabetes have about a twofold increased risk of developing  
1356 a range of cardiovascular diseases compared to those without diabetes [177]. Dietary patterns,  
1357 specifically the Mediterranean and dietary approaches to stop hypertension (DASH)-style diets,  
1358 are recommended to reduce cardiovascular disease risk factors and cardiovascular disease  
1359 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;

1363 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;

1365 6) consume less red and processed meat, refined carbohydrates, and sugar-sweetened  
1366 beverages;

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].

1378 In case of hyperglycemia, insulin and antidiabetic therapy should be adapted, and the strategy  
1379 consisting of reducing food/carbohydrate intake to decrease glycemia should be avoided.

1380 Insulin should be adjusted to carbohydrate intake in patients using multiple daily injections and  
1381 continuous subcutaneous insulin (insulin pump).

1382 For persons with gastroparesis, the choice of nutritional support depends on the severity of the  
1383 disease. In mild diabetic gastroparesis, maintaining oral nutrition is the goal of therapy and  
1384 dietary recommendations rely on measures that optimize gastric emptying. These are low-fat,  
1385 low-fiber meals, small frequent meals, complex carbohydrates, and energy-dense liquids in  
1386 small volumes [178]. For the person with severe gastroparesis who is unable to maintain  
1387 nutrition with oral intake, a feeding jejunostomy tube, which bypasses the affected stomach,  
1388 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 **Recommendation from the ESPEN guideline on clinical nutrition and hydration in** 1399 **geriatrics**

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**

1405 The evidence for prescription of texture-modified diets for dysphagia is limited, but good  
1406 clinical practice pointing for the use of texture modified foods in patients with oral dysphagia  
1407 [181], in agreement with the ESPEN Guideline on clinical nutrition and hydration in geriatrics  
1408 [16] and neurology [15] which grade of recommendation is good practice strong consensus  
1409 (100% agreement) for the use of texture-modified, enriched foods as a compensatory strategy  
1410 to support adequate dietary intake according to signs of oropharyngeal dysphagia and/or  
1411 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**

1424 **In clinical situations at risk of dysphagia (stroke, neurogenic and neuromuscular**  
1425 **disorders, head and neck cancer, amyotrophic lateral sclerosis, hereditary ataxia,**  
1426 **multiple sclerosis, or traumatic cervical spinal cord injury), systematic screening of**  
1427 **dysphagia should be performed, and the need and type of modified texture diet should be**  
1428 **identified.**

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

1430 **Commentary**

1431 Oral-pharyngeal dysphagia is associated with many medical conditions, including stroke,  
1432 neurogenic and neuromuscular disorders, head and neck cancer, amyotrophic lateral sclerosis,  
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



1436 published literature, the overall incidence of dysphagia in traumatic and non-traumatic cervical  
1437 spinal 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-](https://iddsi.org/Translations/Available-Translations)  
1457 [Translations](https://iddsi.org/Translations/Available-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 that 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 **pancreatitis**

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 **pancreatitis**

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)**

1503

1504 **Statement from the ESPEN guideline on clinical nutrition in acute and chronic**  
1505 **pancreatitis**

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 **pancreatitis**

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 **pancreatitis**

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 **Statement from the ESPEN guideline on clinical nutrition in acute and chronic**  
1527 **pancreatitis**

1528 **In patients with chronic pancreatitis, there is no need for dietary fat restriction unless**  
1529 **symptoms of steatorrhea cannot be controlled.**

1530 **strong consensus (100% agreement)**

1531 **Commentary**

1532 Before initiating oral food in patients with acute pancreatitis, disease severity should be  
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,  
1535 feasible, and reduces the length of hospital stay [193]). The early oral diet causes no harm to  
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  
1550 prospective design are needed. In a prospective Swedish cohort study of individuals with non-

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

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

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.

1592 An early normal hospital diet is feasible and safe after colorectal surgery. In a recent RCT in  
1593 colorectal cancer surgery patients, early oral feeding was demonstrated to be safe and effective,  
1594 with a shortened hospital stay as the primary benefit [212]. However, in another RCT early

1595 postoperative feeding did not reduce hospital stay, nursing workload, or costs and there was a  
1596 tendency toward increased nasogastric tube use in the early feeding arm [213].

1597 As emphasized by a Cochrane Systematic Review of 17 RCTs with 1437 patients undergoing  
1598 lower gastrointestinal surgery, although early feeding may lead to a reduced postoperative  
1599 length of stay, cautious interpretation must be taken due to substantial heterogeneity and low-  
1600 quality 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].

1609 A review with 15 studies including 2112 patients undergoing upper gastrointestinal surgery,  
1610 hospital length of stay is significantly shorter in the early oral feeding group and there was no  
1611 difference in risk of anastomotic leak, pneumonia, readmission rate, and mortality [217]. After  
1612 upper gastrointestinal and pancreatic surgery, small meals five to six times per day may help  
1613 patients to tolerate oral feeding and achieve nutritional goals faster during the early phase of  
1614 recovery.

1615 A recent meta-analysis of four RCTs compared early oral feeding with conventional care after  
1616 gastrectomy. In all four studies, early oral feeding was associated with a decreased length of  
1617 hospital stay ranging from -1.3 to -2.5 days when compared to conventional care. A faster time  
1618 to first flatus was recorded in all four studies in the early feeding group. Furthermore, this policy  
1619 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**

1643 There is limited evidence for realimentation after gastrointestinal bleeding. Patients with clean-  
1644 based ulcers or nonbleeding Mallory-Weiss tears may be refeed early with the regular hospital  
1645 diet and discharged home immediately after stabilization [222]. Similarly, early feeding does  
1646 not worsen outcomes in patients with active bleeding peptic ulcer treated by sclerotherapy and  
1647 reduces the length of hospital stay [223]. In an RCT including 100 patients early feeding starting  
1648 on day one shortened the hospital stay and did not affect treatment outcomes compared to nil  
1649 by mouth until day three [224].

1650 A recent meta-analysis of five trials involving 313 patients showed that early oral feeding within  
1651 24 hours does not result in a significantly higher risk of rebleeding and mortality compared  
1652 with delayed oral feeding, but decreases hospital length of stay [194]. Usually, a liquid diet is  
1653 initiated immediately, and subsequently, a soft diet is given [194]. In unstable patients and  
1654 patients with endoscopic findings predictive of a high risk of rebleeding, feeding should be  
1655 delayed.

1656 An RCT showed that early feeding with a regular solid diet in patients after successful variceal  
1657 ligation for esophageal varices is safe, provides better nutrition, and results in a lower incidence  
1658 of infections in bleeders compared to delayed feeding [225]. The results are promising,  
1659 however, they included only patients with low-risk varices. More studies on the timing and type  
1660 of nutrition in patients with variceal bleeding and with high-risk stigmata are needed [226].

1661

1662 **9.4 What is the recommended procedure of realimentation after endoscopy including**  
1663 **gastrostomy interventional procedure?**

1664 **Recommendation 53**

1665 **Patients undergoing an endoscopic procedure should return to a standard hospital diet**  
1666 **after the release of medication (anesthesia) to prevent malnutrition risk during**  
1667 **hospitalization.**

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

1669 **Commentary**

1670 After performing an extensive literature review, no study on the recommended procedure of  
1671 realimentation after endoscopy (gastroscopy, colonoscopy) or radiology procedure was found.  
1672 In the absence of demonstrated benefits, there is no need of starving or restricted diet after an  
1673 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**

1684 The more therapeutic diets, the higher the risk of insufficient energy and protein food intake  
1685 [227]. Therapeutic diets must be prescribed only with a proven medical indication (such as  
1686 proven food allergy, celiac disease, lactose intolerance, renal disease, as well as restrictive diets:  
1687 low-calorie diet, low protein diet, low fiber diet). For these patients it is important that a clinical  
1688 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  
1695 maximum of two options for the same individual. A prescription with more than two restrictions  
1696 must be of an exception that needs to be time-limited, real oral intake monitored and  
1697 prescription reevaluated. 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**

1708 **Food intake is part of nutritional assessment and should be monitored by semi-**  
1709 **quantitative methods at hospital admission, at least every week during the hospital stay**  
1710 **in patients with no nutritional risk, and every day in patients with nutritional risk or**  
1711 **malnourished.**

1712 **Grade of recommendation B – strong consensus (96.1% agreement)**1713 **Commentary**

1714 Malnutrition affects 30–50% of adult patients admitted to hospitals [233, 234]. Hospital stay is  
1715 a risk factor for underfeeding [227] and malnutrition [112, 233, 234]. At the hospital,  
1716 malnutrition is associated with increased mortality, morbidity, length of stay, and costs [112].  
1717 Therefore, early detection and care for malnutrition are highly warranted to prevent its  
1718 worsening and its related complications, such as infections, pressure sores, delayed healing, or  
1719 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

1729 study reported that a lower food intake before hospital admission alone was an even better risk  
1730 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  
1732 methodology and greater number of patients, the same authors identified the factors the most  
1733 strongly associated with reduced food intake on the day of nutritionDay® survey: as compared  
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].

1738

#### 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 in  
1754 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  
1764 (SFNCM) recommended the use of a 10-point analog visual scale for malnutrition screening in  
1765 oncology patients [242]. The Simple Evaluation of Food Intake (SEFI®) ([www.sefi-](http://www.sefi-nutrition.com)  
1766 [nutrition.com](http://www.sefi-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 caregiver to spend more efforts to generate knowledge on this topic.

1788

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1792

**1793 Author contributions**

1794 All authors contributed: literature research, PICO questions and writing the corresponding  
1795 recommendation and comments; RT: overall manuscript writing and editing; SCB: critical  
1796 revision of the final manuscript; all authors approved the final submitted version of the  
1797 manuscript.

1798

**1799 Conflict of interest**

1800 The expert members of the working group were accredited by the ESPEN Guidelines Group,  
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1803 International Committee of Medical Journal Editors (ICMJE). If potential conflicts were  
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1805 ESPEN executive. None of the expert panel had to be excluded from the working group or from  
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1809

1810

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2375 **Supplementary Materials**

2376

2377 **Supplementary Table 6. Evidence table.**

2378 See attached file

2379

2380 **Supplementary Table 7. Examples of hospital menus from different European countries**

2381 **indicating what could be the two types of regular diets proposed in this guideline: the**

2382 **standard & hospital diets.**

2383 See attached file

2384

2385 **Figure legend**

2386

2387 **Figure 1. Indications for the standard and the hospital diets at hospital admission based**  
2388 **on the nutritional risk assessment, e.g. according to the GLIM criteria [8].** Indications of  
2389 the standard diet should be re-evaluated five days after admission, according to the disease and  
2390 patient's outcomes.

2391

Journal Pre-proof