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ESPEN practical guideline: Clinical nutrition and hydration in geriatrics

Dorothee Volkert[a]*, Anne Marie Beck[b], Tommy Cederholm[c,d], Alfonso Cruz-Jentoft[e], Lee Hooper[f], Eva Kiesswetter[a], Marcello Maggio[g], Agathe Raynaud-Simon[h], Cornel Sieber[a,i], Lubos Sobotka[j], Dieneke van Asselt[k], Rainer Wirth[l], Stephan C. Bischoff[m]

Based on

ESPEN Guideline on Clinical Nutrition and Hydration in Geriatrics

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[a] Institute for Biomedicine of Aging, Friedrich-Alexander-Universität Erlangen-Nürnberg, Nuremberg, Germany.

[b] Dietetic and Nutritional Research Unit, Herlev and Gentofte University Hospital, and University College Copenhagen, Faculty of Health, Institute of Nutrition and Nursing, Copenhagen, Denmark

[c] Department of Public Health and Caring Sciences, Division of Clinical Nutrition and Metabolism, Uppsala University, Uppsala, Sweden

[d] Theme Inflammation and Aging, Karolinska University Hospital, Stockholm, Sweden

[e] Servicio de Geriatría, Hospital Universitario Ramón y Cajal (IRYCIS), Madrid, Spain

[f] Norwich Medical School, University of East Anglia, Norwich, UK

[g] Department of Medicine and Surgery, University of Parma, and Geriatric-Rehabilitation Department, Parma University Hospital, Parma, Italy

[h] APHP, Department of Geriatrics, Bichat hospital, University of Paris, Paris, France

[i] Department of Medicine, Kantonsspital Winterthur, Winterthur, Switzerland

[j] Third department of Medicine, Medical Faculty and Faculty Hospital Hradec Kralove, Charles University, Czech Republic

[k] Department of Geriatric Medicine of the Radboud University Medical Center, Nijmegen, The Netherlands

[l] Marien Hospital Herne, Ruhr-Universität Bochum, Herne, Germany

[m] Department for Clinical Nutrition, University of Hohenheim, Stuttgart, Germany

* Corresponding author: Dorothee Volkert, dorothee.volkert@fau.de

Abstract

Background: Malnutrition and dehydration are widespread in older people, and obesity is an increasing problem. In clinical practice, it is often unclear which strategies are suitable and effective in counteracting these key health threats.

Aim: To provide evidence-based recommendations for clinical nutrition and hydration in older persons in order to prevent and/or treat malnutrition and dehydration. Further, to address whether weight-reducing interventions are appropriate for overweight or obese older persons.

Methods: This guideline was developed according to the standard operating procedure for ESPEN guidelines and consensus papers. A systematic literature search for systematic reviews and primary studies was performed based on 33 clinical questions in PICO format. Existing evidence was graded according to the SIGN grading system. Recommendations were developed and agreed in a multistage consensus process.

Results: We provide eighty-two evidence-based recommendations for nutritional care in older persons, covering four main topics: Basic questions and general principles, recommendations for older persons with malnutrition or at risk of malnutrition, recommendations for older patients with specific diseases, and recommendations to prevent, identify and treat dehydration. Overall, we recommend that all older persons shall routinely be screened for malnutrition in order to identify an existing risk early. Oral nutrition can be supported by nursing interventions, education, nutritional counselling, food modification and oral nutritional supplements. Enteral nutrition should be initiated if oral, and parenteral if enteral nutrition is insufficient or impossible and the general prognosis is altogether favorable. Dietary restrictions should generally be avoided, and weight-reducing diets shall only be considered in obese older persons with weight-related health problems and combined with physical exercise. All older persons should be

considered to be at risk of low-intake dehydration and encouraged to consume adequate amounts of drinks. Generally, interventions shall be individualized, comprehensive and part of a multimodal and multidisciplinary team approach.

Conclusion: A range of effective interventions is available to support adequate nutrition and hydration in older persons in order to maintain or improve nutritional status and improve clinical course and quality of life. These interventions should be implemented in clinical practice and routinely used.

Keywords: Guideline, recommendations, geriatrics, nutritional care, malnutrition, dehydration, obesity

Abbreviations: BMI, body mass index; BW, body weight; EN, enteral nutrition; MNA, Mini Nutritional Assessment; ONS, oral nutritional supplements; PN, parenteral nutrition; RCT, randomized controlled trial; REE, resting energy expenditure; SLR, systematic literature review

Introduction

Older persons, usually defined by an age of 65 years or older, are at increased risk of **malnutrition** due to many factors. Anorexia of aging is crucial in this context. Particularly in advanced age and in the case of acute and chronic illness, nutritional problems are widespread, and a reduced dietary intake in combination with the effects of catabolic disease rapidly leads to malnutrition (1, 2). Malnutrition is related to poor outcome, e.g. increased rates of infections, length of hospital stay, duration of convalescence after acute illness as well as mortality risk (2), and is regarded as one important contributing factor in the complex etiology of sarcopenia and frailty (1, 3, 4). Reported prevalence rates are generally below 10% in independently living older persons and increase up to two thirds in hospitalized older patients (5, 6).

Besides malnutrition, older persons are at increased risk of **dehydration** for various reasons, which is also related to serious health consequences (7, 8). Prevalence rates are also low in independent, community-dwelling older persons but increase to more than one third in more frail and vulnerable older adults and those in need of care (9).

On the other hand, like in the general population, **obesity** with its well-known negative health consequences is an increasing problem also in older people, currently affecting between 18 and 30% of the worldwide population aged 65 years and older (10, 11).

Thus, supporting adequate nutrition including adequate amounts of food and fluid to prevent and treat malnutrition and dehydration as well as obesity is an important public health concern.

The present guideline aims to provide evidence-based recommendations in order to prevent and/or treat malnutrition and dehydration in older persons as far as possible.

Furthermore, the question of whether weight-reducing interventions are appropriate for overweight or obese older persons is addressed.

Methodology

The present practical guideline consists of 82 recommendations and is based on the European Society for Clinical Nutrition and Metabolism (ESPEN) guideline on clinical nutrition and hydration in geriatrics (12). The original guideline was shortened by focusing the commentaries on the evidence and literature on which the recommendations are based on. The recommendations were not changed, but the presentation of the content was transformed into a graphical presentation. The original guideline was developed according to the standard operating procedure (SOP) for ESPEN guidelines and consensus papers (13).

A comprehensive, systematic literature search was performed on 4th July 2016 based on 33 clinical questions in PICO (population of interest, interventions, comparisons, outcomes) format. Existing evidence was graded according to the SIGN (Scottish Intercollegiate Guidelines Network) grading system. Recommendations were developed and graded into four classes (A/B/0/GPP).

All recommendations were agreed in a multistage consensus process, which resulted in a percentage of agreement (%). In brackets, the original recommendation numbers (R1, R2, …) and the grading is indicated. The guideline process was funded exclusively by the ESPEN society. The guideline shortage and dissemination was funded in part by the United European Gastroenterology (UEG) society, and also by the ESPEN society. For further details on methodology, see the full version of the ESPEN guideline (12) and the ESPEN SOP (13).

Recommendations

This practical guideline includes 82 recommendations structured in five main chapters and diverse subchapters (Fig. 1). Unless otherwise stated, the recommendations apply to all health-care settings.

1. General principles (Fig. 2)

1.1 Guidance for nutritional intake

1) Guiding value for energy intake in older persons is 30 kcal per kg body weight and day; this value should be individually adjusted regarding nutritional status, physical activity level, disease status, and tolerance.

(R1, Grade B, strong consensus 93%)

Commentary

With increasing age, resting energy expenditure (REE) is generally decreasing, mainly due to decreasing fat-free body mass. In healthy and sick elderly persons, measurements of REE resulted in about 20 kcal/kg body weight (BW) and day (14-16). Based on usual physical activity levels between 1.2 and 1.8, total energy expenditure amounts to 24 to 36 kcal/kg. Due to their strong relation to fat-free mass, basal energy requirements are also influenced by gender and by nutritional status; in fact, REE/kg BW is higher for men than for women and increases with decreasing body mass index (BMI). For older persons with underweight (BMI ≤21 kg/m^2) energy requirements between 32 and 38 kcal/kg are assumed (16). In sick older people energy requirements may, on the one hand, be reduced due to reduced physical activity, and on the other hand be increased due to disease effects (e.g. inflammation, fever, drug effects). Minimal requirements of ill older persons are estimated to be between 27 and 30 kcal/kg (16).

Based on these figures, about 30 kcal/kg BW is suggested as a rough estimate and general orientation for energy requirements in older persons. This guiding value needs individual adjustment regarding all relevant factors. Adequacy of energy intake needs to be controlled by close monitoring of BW (taking water retention or losses into account), and intake adapted accordingly.

2) Protein intake in older persons should be at least 1 g protein per kg BW and day. The amount should be individually adjusted with regard to nutritional status, physical activity level, disease status, and tolerance.

(R2, Grade B, strong consensus 100%)

Commentary

Growing evidence from experimental and epidemiological research suggests that older people might need higher amounts of protein than younger adults for optimal preservation of lean body mass, body functions, and health. Daily amounts of 1.0 - 1.2 g/kg BW have been suggested for healthy older persons by several expert groups (17-19). In case of illness, protein requirements may even be further increased, e.g. due to inflammation, infections and wounds, however, to which extent is difficult to assess. Very little is known about the protein needs of frail and ill older persons. Daily amounts of 1.2 - 1.5 g/kg have been suggested for older persons with acute or chronic illness (17, 18) and up to 2.0 g/kg BW and day in case of severe illness, injury or malnutrition (17).

Until more evidence is available, intake of at least 1.0 g/kg should be ensured in all older persons, particularly in those at risk of malnutrition, e.g. frail and multimorbid persons, whose intake is often far below this amount (20-22). Increased requirements, e.g. for muscle growth with strength training, for tissue regeneration in malnutrition or wound

171 healing or for increased metabolic demands in case of critical illness, should be met by
172 appropriately increased intake.

173 It is important to bear in mind that an insufficient intake of energy increases protein
174 requirements. Thus, regarding protein status, it is important to ensure not only an
175 adequate intake of protein but also an appropriate energy intake.

176

177 ***3) For EN, fiber-containing products should be used.***

178 ***(R3 Grade B, strong consensus 91%)***

179 **Commentary**

180 Older patients often suffer from gastrointestinal problems including constipation and
181 diarrhea. Since dietary fiber may contribute to the normalization of bowel functions, and
182 intake is usually low in geriatric patients, the importance of an adequate intake of dietary
183 fiber is emphasized. Daily amounts of 25 g are considered adequate for normal laxation
184 in adults of ages (23) and can be regarded as guiding value also for older patients.

185 Also, for enteral nutrition (EN), there is no reason to omit dietary fiber if bowel function
186 is not compromised. Conversely, fiber-containing products for EN have been shown to
187 contribute to normal bowel function (24-30) and are, thus, generally recommended. In
188 addition, enterally nourished patients should not be deprived of the well-known
189 beneficial metabolic effects of dietary fiber.

190

191 ***4) Provided that there is no specific deficiency, micronutrients should be delivered***
192 ***according to the recommendation for healthy older persons.***

193 ***(R4, Grade GPP, strong consensus 91%)***

Commentary

Dietary recommendations for micronutrients for older persons do not differ from those for younger adults, however, our knowledge about requirements in very old, frail or ill persons is poor. Due to an increasing prevalence of gastrointestinal diseases, which are accompanied by reduced nutrient bioavailability (e.g. atrophic gastritis and impaired vitamin B12, calcium and iron absorption), older persons are at increased risk of micronutrient deficiencies, which should be corrected by supplementation. Provided that there is no specific deficiency, micronutrients should be delivered according to the recommendation of the European Food Safety Authority (EFSA) or corresponding national nutrition societies for healthy older persons (31).

5) Older women should be offered at least 1.6 L of drinks each day, while older men should be offered at least 2.0 L of drinks each day unless there is a clinical condition that requires a different approach.

(R61, Grade B, strong consensus 96% agreement)

Commentary

Daily water intake is required to compensate daily losses by respiration, exudation, urine, and feces. An individual's minimum fluid requirement is 'the amount of water that equals losses and prevents adverse effects of insufficient water' (32). We take fluid from drinks and foods, but drinks or beverages account for 70 to 80% of fluid consumed (33).

The EFSA reviewed the literature and recommended an Adequate Intake (AI) of 2.0 L/day for women and 2.5 L/day for men of all ages (from a combination of drinking water, beverages, and food) (32). Assuming 80% of these fluid needs to come from drinks then women would require 1.6 L/d of drinks, and men 2.0 L/d. Minimal drinks

recommendations in women vary from 1.0 L/d in the Nordic countries to 2.2 L/d in the USA, while in men the range is 1.0 to 3.0 L/d of drinks or beverages (34-38). Given this variation, the use of the EFSA fluid recommendation seems appropriately cautious in older adults.

Individual fluid needs are related to energy consumption, water losses and kidney function, so larger people may require more fluid. Needs may also be higher in extreme temperatures (e.g. summer heat) or at times of greater physical activity. Excessive losses due to, fever, diarrhea, vomiting or severe hemorrhage must also be balanced by additional intake. On the other hand, specific clinical situations, namely heart, and renal failure may need a restriction of fluid intake.

1.2 Basic principles of nutritional care

6) In institutional settings, standard operating procedures for nutritional and hydration care shall be established and responsibilities well regulated.

(R7, Grade GPP, strong consensus)

Commentary

In order to assure implementation in everyday practice, SOPs should be established. Nutritional strategies should be supported by the head of the institution, and responsibilities well-regulated. Desirably, each geriatric institution should constitute a multidisciplinary team, including all professions involved. Special attention should be drawn to the interface management, as important information concerning the nutritional situation is frequently lost in the situation of patients' transition to another healthcare sector.

In geriatric acute care and rehabilitation hospital units, nutritional assessment and implementation of a nutritional care plan have been shown to improve energy and protein intake, serum proteins and health-related quality of life of the patients (39). Implementation of a screening and treatment protocol at a geriatric hospital unit including regular team meetings improved BW and hospital-acquired infections compared to standard care (40). Multidisciplinary nutritional care concepts including regular team meetings increased dietary intake and improved quality of life in hip fracture patients (41), and improved nutritional status, wellbeing, and quality of mealtimes in demented nursing home residents (42).

7) Nutritional and hydration care for older persons shall be individualized and comprehensive in order to ensure adequate nutritional intake, maintain or improve nutritional status and improve the clinical course and quality of life.

(R8, Grade A, strong consensus 100%)

Commentary

Five RCTs (all performed in the hospital setting) were identified providing evidence for comprehensive individualized nutritional interventions in older persons with malnutrition or at risk of malnutrition (43-47).

Three RCTs of low to acceptable quality investigated the effects of comprehensive individualized nutritional interventions in older hospitalized patients at nutritional risk with various diagnoses (43, 44) or after acute stroke (45), and reported positive effects on energy and protein intake (43, 44), BW (44, 45), complications, antibiotic use, readmissions (44) and functional measures (44, 45). Additionally, all three studies showed benefits concerning the quality of life in the group receiving individual nutritional

265 care compared to the group with usual care (43-45). No effect was found regarding the
266 length of hospital stay (44, 45). In a further RCT of acceptable quality (46), the effect of
267 additional individual nutritional support by dietetic assistants was investigated in older
268 hospitalized patients with hip fractures. The study reported increased energy intake and
269 decreased mortality in the trauma unit and within four months after discharge in the
270 intervention group compared to the group with standard care. Bodyweight, grip strength,
271 complications, and length of hospital stay were however unaffected. Feldblum et al. (47)
272 extended an individualized nutritional intervention in older internal medical patients to
273 six months after hospitalization and reported an improved Mini Nutritional Assessment
274 (MNA) score and reduced mortality in the intervention compared to the control group,
275 however, no intervention effects on energy or protein intake, BW, and functional
276 measures.

277

278 ***8) Nutritional interventions for older persons should be part of a multimodal and***
279 ***multidisciplinary team intervention in order to support adequate dietary intake,***
280 ***maintain or increase BW and improve functional and clinical outcomes.***
281 ***(R9, Grade B, strong consensus 100%)***

282 **Commentary**

283 Nutritional care comprises different approaches (see recommendations 10, 15-17, 22-39,
284 44), which can complement each other and may require expertise from multiple
285 professions.

286 Four relevant RCTs with several sub-studies of low to acceptable quality focusing on
287 multimodal and multidisciplinary interventions (combining more than two intervention
288 strategies) were identified (48-57): a trial combining different components of nutritional

289 care in older patients from hospital admission up to three months after discharge (63), a
290 multi-facet intervention consisting of home-made nutritional supplements, oral care and
291 group exercise in nursing home residents (49, 50), a multidisciplinary intervention with
292 nutritional support, physio- and occupational therapy in older malnourished people
293 receiving home care or living in nursing homes (48, 51), and a comprehensive
294 rehabilitation program including nutritional intervention in older patients with hip
295 fracture. Positive effects on various outcome parameter were reported (e.g. dietary intake
296 (49, 50, 53), nutritional status, the incidence of falls (53, 56), fall-related injuries (56),
297 health status (55), physical performance (48-51, 57), social activity (49, 50), cost-
298 effectiveness (52) and quality of life (48, 51)), results were however not always consistent.
299 These studies illustrate the complexity of the situation and underline the importance of a
300 comprehensive treatment approach in older patients. Because of partly inconsistent
301 results, the evidence grade was reduced from A to B.

302

303 ***9) Potential causes of malnutrition and dehydration shall be identified and***
304 ***eliminated as far as possible.***
305 ***(R10, Grade GPP, strong consensus 95%)***

306 **Commentary**

307 Potential causes of poor intake and/or poor nutritional status in older persons are
308 manifold and should be explored systematically, e.g. by check-lists and subsequent
309 assessment and diagnostic clarification. Swallowing evaluation, dental examination, oral
310 and general health assessment and check-up of medications for potential side effects
311 impeding adequate nutrition (e.g. by causing anorexia, xerostomia, dysgeusia,
312 gastrointestinal disorders or somnolence), for example, may uncover eating obstacles and
313 provide starting points for adequate interventions. In institutionalized older people,

eating and feeding problems are widespread and should also be identified, e.g. by informal observation during meals, and eliminated as far as possible by appropriate remedial actions (58).

10) Dietary restrictions that may limit dietary intake are potentially harmful and should be avoided.

(R11, Grade GPP, strong consensus 91%)

Commentary

Dietary restrictions are one potential cause of malnutrition since they may limit food choice and eating pleasure and thus bear the risk of limiting dietary intake. As recently reviewed by Darmon et al. (59), restrictive diets furthermore seem to be less effective with increasing age, albeit data about their effects in older persons are rare. In one study, ambulatory patients older than 75 years following a low salt, low cholesterol or diabetic diet for 11 ± 6 years were found to be at increased risk of malnutrition compared to age- and gender-matched controls (60). In a position statement, the American Dietetic Association concludes that the liberalization of diet prescriptions for older adults in long-term care may enhance the nutritional status and quality of life (61). Due to the risk of malnutrition, future studies about the effects of restrictive diets in old age are unlikely, and itis good clinical practice to liberalize dietary restrictions in older persons in order to reduce the risk of malnutrition and related loss of fat-free mass and functional decline.

11) Health care professionals, as well as informal caregivers, should be offered nutritional education in order to ensure awareness of and basic knowledge on nutritional problems and thus promote adequate dietary intake of older persons

with malnutrition or at risk of malnutrition.

(R17, Grade B, strong consensus 95%)

Commentary

One of the barriers to proper nutritional support in hospitals is assumed to be a lack of sufficient education concerning nutrition among all staff groups (62).

Three relevant systematic literature reviews (SLRs) of high (63, 64) or average quality (65) were identified, which examined the effectiveness of training for staff in residential care (64), people with dementia and/or their formal or informal care-givers (63) and informal carers and community care workers (65). Study designs and results of included studies were heterogeneous with partly positive effects on dietary intake and nutritional status. Altogether, scientific evidence is presently poor, but education and support for formal and informal caregivers are rated as one promising strategy among others to support the adequate dietary intake of older persons with malnutrition or at risk of malnutrition. For quality assurance reasons, nutritional information and education should be given by a nutritional expert, e.g. a dietician.

2. Prevention and treatment of malnutrition

2.1 Screening and assessment for malnutrition (Fig. 3)

12) All older persons – independent of specific diagnosis and including also overweight and obese persons – shall routinely be screened for malnutrition with a validated tool in order to identify those with (risk of) malnutrition.

(R5, Grade GPP, strong consensus 100%)

The process of nutritional care for older persons consists of several steps which are based on systematic screening for malnutrition. Independent of specific diagnosis and also in overweight and obese persons, malnutrition and its risk should be systematically and routinely screened at admission to a geriatric institution using a validated tool and thereafter in regular intervals, depending on the patient´s condition (e.g. every three months in long-term care residents in stable condition, at least once a year in general practice) to identify affected individuals early.

2.2 Assessment, intervention, and monitoring (Fig. 3)

13) A positive malnutrition screening shall be followed by a systematic assessment, individualized intervention, monitoring and corresponding adjustment of interventions.

(R6, Grade GPP, strong consensus 100%)

Commentary

Assessment: In individuals who are identified as malnourished or at risk of malnutrition by screening, a comprehensive nutritional assessment should follow, providing

information on kind and severity of malnutrition and its underlying causes as well as on individual preferences (regarding food and beverages as well as enteral and parenteral nutrition (PN)) and resources (e.g. chewing and swallowing ability, eating dependence, gastrointestinal function, severity of disease, general prognosis) for nutritional therapy. Dietary intake monitoring (e.g. by plate diagrams) is recommended for several days in order to estimate the amount of food and fluid consumed (66) and relate dietary intake to individual requirements (see recommendation 1).

Nutritional intervention: Based on the screening and assessment results, individual goals regarding dietary intake and BW / BMI should be defined, and an individualized nutrition care plan developed and implemented in an interdisciplinary team approach. All aspects of the patient – physical and mental/psychic, social, clinical as well as ethical – should be considered, and all options used to ensure an adequate dietary intake. Dietetic, nursing and medical actions should be implemented in a coordinated manner (see recommendation 8).

Monitoring: The intervention process needs to be monitored, and reassessments should be performed at regular intervals, e.g. after several days, in order to check if goals are achieved. If this is not the case, goals and interventions have to be adjusted according to experienced problems and the new situation. In the case of EN or PN criteria for termination of the therapy must be defined (see recommendation 34). In the hospital setting, it is important to initiate adequate nutritional care after discharge at home and to ensure the continuation of the nutritional strategy started in the hospital (see recommendation 29).

All interventions should be coordinated and agreed with all parties involved (e.g. medical specialists, nurses, therapists) (see recommendation 9). Intensive communication with

the patient and his or her family should take place during the whole process, in order to learn and consider the wishes and expectations of the person concerned.

For implementation in daily routines, these general recommendations have to be concretized and adapted to the local conditions of each institution. Standard protocols for nutritional screening, assessment and therapy have to be developed and consistently put into practice (see recommendation 7).

2.3 Prevention and treatment of malnutrition in general (Fig. 4-7)

2.3.1 Supportive interventions (Fig. 4)

14) Older persons with malnutrition or at risk of malnutrition and with eating dependency in institutions (A) as well as at home (GPP) shall be offered mealtime assistance in order to support adequate dietary intake.

(R12, Grade A/GPP, strong consensus 100%)

Commentary

Many older persons are restricted in their ability to eat and drink independently due to functional and cognitive limitations. Support may be needed ranging from adequate positioning at a table and verbal prompting to direct physical assistance to bring foods and fluids into the mouth.

Two relevant SLRs of high quality were identified (64, 67, 68). One (68) examined the effects of mealtime assistance provided to hospitalized patients (≥65 years) by nurses, trained staff or volunteers. Assistance provided at mealtimes included setting up meal trays, positioning patients in a comfortable position, opening food and beverages, removing lids, feeding patients, encouraging intake and providing social support at mealtime. A meta-analysis of four of the five studies included (including one RCT) resulted

in significantly improved daily energy and protein intake in patients with mealtime assistance. Abbott et al. (64) included six feeding assistance studies. Two RCTs and three pre-post comparisons described positive effects on dietary intake. Marginal, non-significant improvements in food intake were also reported from a pre-post trial of reminiscence therapy during mealtimes in a very small study including seven residents with dementia.

No intervention studies have been performed among old people in home-care where malnutrition and risk of malnutrition are also prevalent. Nevertheless, it is reasonable to assume that eating-dependent older persons living in private households may also benefit from mealtime assistance.

15) In institutional settings, food intake of older persons with malnutrition or at risk of malnutrition shall be supported by a home-like, pleasant dining environment in order to support adequate dietary intake and maintain quality of life.

(R13, Grade A, strong consensus 100%)

Commentary

Environmental factors play an important role in the atmosphere during mealtimes and can be modified to support adequate dietary intake.

Two relevant SLRs of high quality were identified (63, 64). One (64) examined the effectiveness of mealtime interventions for older persons living in residential care. The effect of dining environment alteration was examined in eleven studies including three RCTs. All three combined environmental improvement with the introduction of family-style meals and greater staff assistance. Meta-analysis results were in favor of the intervention regarding BW (all three RCTs) and energy intake (two RCTs) but not

449 significant. One of the studies (69) reached individual significance. Findings from the non-
450 randomized studies were also mixed, but the authors conclude that positive findings
451 prevail. Quality of life was examined in two studies which both found beneficial effects.

452 The other SLR (63) focused on interventions to indirectly promote dietary intake in
453 persons with dementia across all settings and levels of care. Seventeen studies (no RCT)
454 were found reporting the effects of various types of dining environment or food service
455 interventions, however all with a high risk of bias. The authors conclude that family-style
456 meals and soothing mealtime music are promising interventions, among others, to
457 support eating and drinking in persons with dementia (63).

458

459 ***16) Older persons with malnutrition or at risk of malnutrition should be***
460 ***encouraged to share their mealtimes with others in order to stimulate dietary***
461 ***intake and improve quality of life.***
462 ***(R14, Grade GPP, strong consensus 100%)***

463 **Commentary**

464 Eating is a social act, and eating in company is known to stimulate dietary intake, also in
465 older persons (70, 71). A literature search identified a systematic review of high-quality
466 including mealtime interventions with a strong focus on the social elements of eating and
467 drinking. No RCTs but four non-randomized trials were identified, assessing the effect of
468 e.g. shared mealtimes with staff or implementation of a breakfast club on various outcome
469 parameters. Although these studies were small and of low quality, they provided a
470 consistent suggestion of improvements in aspects of quality of life. In one of these studies,
471 a significant increase in BW is reported after three months compared to the control group
472 (72). It is however stressed that in case of specific problems and desires, individual

473 approaches are needed, e.g. some older people may be agitated during meals causing
474 disturbances in the dining room. Some older persons may find it disturbing when they
475 have to eat with other people with inferior hygiene and eating habits. On the other hand,
476 persons with severe eating problems may struggle to behave by their own standards, and
477 it has been suggested that the lack of eating competences leads to small portions to
478 decrease exposure to failures in the presence of others (73). As for all other interventions,
479 decisions shall always be individualized according to the persons' needs and preferences.

480

481 ***17) Meals on wheels offered to home-dwelling older persons with malnutrition or at***
482 ***risk of malnutrition should be energy-dense and/or include additional meals to***
483 ***support adequate dietary intake.***
484 ***(R15, Grade B, strong consensus 97%)***

485 **Commentary**

486 Home-delivered meals, also called meals on wheels, are a valuable option for older
487 persons living in private households who are unable to shop and prepare their meals by
488 themselves. A recent review about home-delivered meals admits that the effects of this
489 service are difficult to evaluate (74), but it seems reasonable to assume that persons who
490 are otherwise unable to obtain regular meals may benefit from this support. The question,
491 however, arises if home-delivered meals should meet specific requirements for persons
492 with malnutrition or at risk of malnutrition.

493 Two RCTs comparing specific modes of meals on wheels were identified (75, 76). One of
494 them found that enhancing the energy density of food items regularly served in a home-
495 delivered meals program increased lunch and 24-hour energy and nutrient intakes in a 1-
496 day intervention (76).

In the other RCT participants, who were malnourished or at risk of malnutrition, received either the traditional meals on wheels program of five hot meals per week (providing 33% of RDA) or the restorative, comprehensive new meals on wheels program of three meals and two snacks per day, seven days a week for six months (providing 100% of RDA). The new meals on wheels group gained significantly more weight than the traditional meals on wheels group (75).

Because of presently limited evidence regarding specific modes of home-delivered meals grade of recommendation was downgraded to B.

18) Older persons with malnutrition or at risk of malnutrition should be offered nutritional information and education as part of a comprehensive intervention concept in order to improve awareness of and knowledge about nutritional problems and thus promote adequate dietary intake.

(R16, Grade B, strong consensus 94%)

Commentary

Two SLRs on this topic were identified (63, 77), one (63) was rated as high quality and the other (77) as acceptable. Young et al. (77) reviewed the evidence regarding the effectiveness of nutritional education or advice in people over 65 years of age living at home. Five studies (of 23) had nutritional education as the sole constituent of the program, whilst the rest included it as part of a more complex intervention. There was very limited information about the nutritional status of the participants but few were probably malnourished or at risk of malnutrition. Based on the results presented in the SLR it is not possible to make any specific conclusions about this group. The SLR by Bunn et al. (63) included interventions with an educational and/or awareness component for persons

with dementia and/or their formal or informal care-givers. The overall effect on nutritional status in the three RCTs included was very limited.

Despite presently poor scientific evidence we recommend improving nutritional awareness and knowledge of older persons with malnutrition or at risk of malnutrition by information and education as one of several strategies to support adequate dietary intake. If care-givers are involved in nutritional matters, e.g. in case of cognitive impairment, they should also be addressed (see recommendation 12). For quality assurance reasons, nutritional information and education should be given by a nutritional expert, e.g. a dietician.

19) In addition to nutritional interventions, older persons with malnutrition or at risk of malnutrition should be encouraged to be physically active and to exercise in order to maintain or improve muscle mass and function.

(R41, Grade GPP, strong consensus 100%)

Commentary

In older people weight loss occurs at the expense of muscle mass (78) and is associated with impaired physical function (79). Muscle disuse and periods of bed rest can further exacerbate the degradation of muscle mass and strength (80).

No RCT was found comparing a combined exercise and nutrition intervention with a singular nutritional intervention in older people with malnutrition or at risk of malnutrition using a two-factorial design. Seven RCTs (low/acceptable quality) were found using a four factorial design with an exercise group and a control group in addition to the two aforementioned intervention groups (81-88). Most of these RCTs showed neither a beneficial effect of the combined nor of the singular nutritional intervention on

545 body composition, strength, and functional outcomes. Only Rydwik et al. (81) reported
546 improved muscle strength in the combined intervention group compared to the nutrition
547 group, while other functional and nutritional measures did not differ. Possible reasons for
548 failure might be an insufficient adjustment of interventions to individual nutritional needs
549 and small sample sizes.

550 Despite poor evidence, older persons with malnutrition or at risk of malnutrition should
551 be encouraged to be physically active in addition to nutritional treatment, as the older
552 muscle is still able to react on anabolic stimuli of exercise training (89-91). Before starting
553 the exercise intervention, health status and physical performance level of the patient need
554 to be evaluated to exclude contraindications for exercise training and to identify the
555 appropriate training type, intensity and starting level (92).

556

557 ***20) During periods of exercise interventions, adequate amounts of energy and***
558 ***protein should be provided to older persons with malnutrition or at risk of***
559 ***malnutrition in order to maintain BW and to maintain or improve muscle mass.***
560 ***(R42, Grade B, strong consensus 100%)***

561 **Commentary**

562 Exercise increases energy expenditure. To avoid (further) weight loss and to maintain
563 muscle mass a positive or at least zero energy balance is of particular importance during
564 periods of exercise interventions. As energy needs may vary considerably between
565 individuals, they need to be estimated before the start of an intervention (see
566 recommendation 1). Adequate amounts of protein are at least as important to avoid
567 muscle atrophy and to stimulate muscle protein synthesis (93) (see recommendation 2).

568 Five RCTs were identified comparing combined exercise and nutrition interventions to
569 singular exercise interventions in older people with malnutrition or at risk of

malnutrition (83, 87, 94-96). Four of them – one in COPD patients (94), two in rehabilitation patients (95, 96), one in malnourished patients with lower limb fracture (87) – reported positive effects of oral nutritional supplementation in combination with exercise training on various outcome parameters, e.g. BW (87, 94, 95), MNA score (95), muscle mass (95, 96). One study in malnourished community-dwelling older adults failed to show any effect of individual nutritional advice and physical training (83). However, in this study independent of the interventions, participants who needed to increase their energy intake by ≥ 20% to reach their energy requirements but failed this goal lost weight and fat-free mass during the intervention period whereas no changes were observed in those reaching this goal (83).

Altogether, these studies support the need for adequate amounts of energy and protein during periods of exercise interventions.

2.3.2 Nutritional counseling (Fig. 4)

21) Older persons with malnutrition or at risk of malnutrition and/or their caregivers should be offered individualized nutritional counseling in order to support adequate dietary intake and improve or maintain nutritional status. (R18, Grade B, strong consensus 100%)

Commentary

Nutritional counseling by a health care professional is regarded as the first line of nutrition therapy. It is a supportive process consisting of repeated personal talks and discussions with the patient to develop a sound understanding of nutritional topics and support favorable health-promoting eating habits (97, 98).

One guideline (99) and one SLR (100) were found which examined the effectiveness of individualized nutritional counseling in older persons with malnutrition or at risk of malnutrition.

The guideline (99) identified four relevant studies, which were very heterogeneous and all judged to be of low quality. The narrative summation and meta-analysis did not find any significant effects, but trends in favor of individualized dietary counseling were reported for most outcomes considered (99). Furthermore, a good practice point was made in favor of a longer intervention period (more than twelve weeks of nutritional counseling) (99).

The SLR focused on the effect of individualized dietary counseling in nutritionally at-risk older patients after discharge from an acute hospital. Four RCTs were included, which all were rated to be of a high risk of bias, and used very different intervention schemes (e.g. no or one counseling sessions during hospital stay, three to six counseling sessions after discharge, home visits or telephone calls, with or without prescription of oral nutritional supplements (ONS) and vitamins). Meta-analysis found positive effects on BW, energy, and protein intake but no effect on handgrip strength or mortality compared to brief dietary advice or no intervention (100).

Due to the limited quality of the original studies, restriction to hospital discharge in some of the studies and only rare involvement of caregivers, the recommendation was downgraded to B.

22) Individualized nutritional counseling should be offered by a qualified dietician to affected persons and/or their caregivers, should consist of several (at least 2) individual sessions that may be combined with group sessions, telephone contacts,

and written advice and should be maintained over a longer period.

(R19, Grade GPP, strong consensus)

Commentary

Individual counseling should be performed by trained nutrition professionals (registered/accredited dieticians or nutritionists) and may be combined with educative group sessions, written advice and/or telephone contacts and all other forms of nutritional therapy. In order to be effective, the counseling should consist of several sessions over a longer period of time (at least eight weeks). As this aspect is not addressed in clinical trials, this recommendation is based on clinical experience.

2.3.3 Food modification (Fig. 4)

23) Older persons with malnutrition or at risk of malnutrition should be offered fortified food in order to support adequate dietary intake.

(R20, Grade B, strong consensus 100%)

Commentary

Food fortification (or dietary enrichment) by using natural foods (e.g. oil, cream, butter, eggs) or specific nutrient preparations (e.g. maltodextrin, protein powder) can increase energy and protein density of meals and beverages and thus enable an increased intake by eating similar amounts of food.

Two relevant SLRs of acceptable quality were identified (101, 102). One (102) examined the effects of dietary enrichment with conventional foods on energy and protein intake and included nine studies (including three RCTs and four cluster RCTs), four performed in nursing homes, four in hospitals and one at home. Energy intake increased in seven out of nine studies using energy enrichment and protein intake increased in three out of five

641 studies using protein enrichment. Reporting on other outcomes was scarce, and the
642 quality of studies was described as heterogeneous, e.g. the amount of enrichment was
643 often not clearly reported (102).

644 The other SLR (101) included seven studies (all RCTs) either using additional foods and
645 snacks or increasing energy and nutrient density of the meals. Meta-analysis of four RCTs
646 resulted in significant increases in energy and protein intake. Due to the heterogeneity of
647 the studies, small numbers of participants and poor quality of some studies, the authors
648 concluded that further high-quality studies are required to provide reliable evidence
649 (101).

650 Literature about food fortification with micronutrients was recently summarized in a
651 scoping review for residential care (103) but the evidence is presently insufficient to
652 derive specific recommendations in this regard.

653

654 ***24) Older persons with malnutrition or at risk of malnutrition should be offered***
655 ***additional snacks, and/or finger food, in order to facilitate dietary intake.***
656 ***(R21, Grade GPP, strong consensus 100%)***

657 **Commentary**

658 Dietitians and other healthcare professionals traditionally use several dietary strategies
659 to improve the energy and nutrient intake of older adults with malnutrition or at risk of
660 malnutrition including the use of snacks between meals or finger foods, the latter in
661 particular for persons who have difficulties using cutlery and remaining at the table for
662 the entire duration of a meal.

663 A literature search identified four SLRs that included studies offering additional snacks
664 and/or finger foods (63, 67, 101, 102). These interventions were however mostly

described as part of comprehensive mealtime interventions, where the effects cannot be separated from the other intervention components. Based on one before-after study, constantly accessible snacks in a glass-door refrigerator and additional time for meals are described as promising interventions needing high-quality reassessment (63). In an additional relevant trial in older long-term-care residents at risk of malnutrition, the offering of three snacks between main meals and before bed resulted in an increase in energy intake by about 30% after three and after six weeks (104). Due to little expense and no risk of harm we recommend additional snacks and/or finger food despite presently very limited scientific evidence.

25) Older persons with malnutrition or at risk of malnutrition and signs of oropharyngeal dysphagia and/or chewing problems shall be offered texture-modified, enriched foods as a compensatory strategy to support adequate dietary intake.

(R22, Grade GPP, strong consensus 100%)

Commentary

Chewing and swallowing problems limit the ability to eat foods of normal texture and thus increase the risk of malnutrition. Texture-modified foods intend to compensate for these widespread functional limitations and hence support an adequate dietary intake. Texture-modification can also make the swallowing process slower and thereby safer (105, 106). Nevertheless, insufficient dietary intake is described in older persons with dysphagia receiving texture-modified diets (20-22, 107).

A literature search identified one guideline of high quality giving evidence-based recommendations for the use of texture-modified diets for adults with oropharyngeal dysphagia (108), which was recently updated (109). In the underlying systematic search,

690 no literature assessing the effects of texture-modified food was found, and it was
691 concluded that it is 'good clinical practice' to offer modified foods as a compensatory
692 strategy to facilitate the intake of foods.

693 At present, also no studies about the effects of enrichment of texture-modified diets are
694 available, but based on the positive effects of enrichment of regular texture diets (see
695 recommendation 24) it is assumed that enrichment can have similar effects in texture-
696 modified diets for patients with chewing and/or swallowing problems. As texture-
697 modified diets are usually accompanied by reduced food and fluid intake, nutritional
698 intake should be closely monitored. For more detailed recommendations for patients with
699 dysphagia, we refer to the ESPEN Guideline Clinical Nutrition in Neurology (110).

700

701 *2.3.4 Oral nutritional supplements (Fig. 5)*

702 2.3.4.1 Indication

703 ***26) Older persons with malnutrition or at risk of malnutrition with chronic***
704 ***conditions shall be offered ONS when dietary counseling and food fortification are***
705 ***not sufficient to increase dietary intake and reach nutritional goals.***
706 ***(R23, Grade GPP, strong consensus 100%)***

707 **Commentary**

708 ONS are energy and nutrient-dense products designed to increase dietary intake when
709 diet alone is insufficient to meet daily nutritional requirements. Only very few studies
710 have compared the effectiveness of ONS to that of "normal food" support strategies in
711 older persons. Greater weight gain (111), higher energy and protein intake (104, 112) and
712 better quality of life (112) are reported in the ONS group than dietary counseling (111,
713 112) or additional snack foods (113). However, dietary counseling and food modifications

may be better accepted for longer durations and are cheaper, so we suggest that in chronic clinical situations such as observed in the community or nursing homes, they may be proposed first and that ONS be offered when dietary counseling and food fortification are not sufficient to reach nutritional goals. It is important to mention, however, that these different options to support adequate intake should not be seen as mutually exclusive, but as complementing each other.

27) Hospitalized older persons with malnutrition or at risk of malnutrition shall be offered ONS, in order to improve dietary intake and BW and to lower the risk of complications and readmission.

(R24, Grade A, strong consensus 100%)

A systematic literature search found six high-quality SLRs that have assessed the efficacy of ONS versus usual care in older persons (114-121). The most comprehensive review included 62 randomized or quasi-randomized clinical trials in older persons in a variety of settings and varying nutritional states (119). One SLR examined the effects of ONS following hospital discharge in older patients who were malnourished or at risk of malnutrition (116), the others were not restricted to older persons and focused on high protein ONS (121), on effects on hospital (re)admissions (120), or addressed interventions to support dietary intake in adults (114) or medical inpatients (115). The majority of participants in the included trials were however also older persons.

Altogether, positive effects of ONS on dietary intake (115, 116, 119, 121) and BW (115, 116, 119, 121), and reduced risk of complications (121) and readmissions (115, 120, 121) were reported, whereas the length of hospital stay (114, 115, 121) and mortality risk (114-116, 119, 121) were not significantly reduced. Results regarding functional outcome were conflicting in two meta-analyses of the effects on handgrip strength (119, 121), and

739 it was not possible to combine trials for meta-analyses of other functional outcome
740 parameters.

741

742 ***28) After discharge from the hospital, older persons with malnutrition or at risk of***
743 ***malnutrition shall be offered ONS in order to improve dietary intake and BW and to***
744 ***lower the risk of functional decline.***
745 ***(R25, Grade A, strong consensus 100%)***

746 One SLR focusing on the time following hospital discharge (116) included six trials and
747 found evidence for increased dietary intake and BW with ONS, but not concerning
748 mortality or readmission risk. Two of the included studies found a positive effect on
749 functional outcomes (handgrip (122) and activities of daily living (123)). Two other RCTs
750 (not included in this systematic review) studied the effects of a combined dietary
751 counseling and ONS intervention after hospital discharge and reported prevention of
752 weight loss and improved activities of daily living functions (124) and decreased
753 functional limitations (52, 125). Thus, individual RCTs suggest that nutritional
754 interventions may support the improvement of functional status post-discharge.

755

756 2.3.4.2 Implementation

757 ***29) ONS offered to an older person with malnutrition or at risk of malnutrition, shall***
758 ***provide at least 400 kcal/day including 30 g or more of protein/day.***
759 ***(R26, Grade A, strong consensus 97%)***

760 **Commentary**

761 Subgroup analyses in the largest available SLR including 62 RCTs (119) regarding
762 mortality were consistently statistically significant when limited to trials where 400 kcal

763 or more was provided per day by ONS. Another SLR focusing on high protein ONS (121)
764 demonstrated a range of effects across settings and patient groups including reduced risk
765 of complications, reduced risk of readmissions to hospital, improved grip strength,
766 increased intake of protein and energy with little reduction in normal food intake and
767 improvements in BW. High protein ONS that provided > 400 kcal/day (16 trials)
768 contained in mean 29% of protein (20 – 40%). Thus, we recommend that ONS shall
769 provide at least 400 kcal with 30% of the energy as protein, corresponding to 30 g of
770 protein.

771

772 ***30) When offered to an older person with malnutrition or at risk of malnutrition,***
773 ***ONS shall be continued for at least one month. Efficacy and expected benefit of ONS***
774 ***shall be assessed once a month.***
775 ***(R27, Grade GPP, strong consensus 100%)***

776 **Commentary**

777 Regarding the length of the intervention, subgroup analysis in the meta-analyses from
778 Milne et al. from 2002 (117) and 2005 (118) showed a consistently statistically significant
779 impact of ONS on mortality when supplementation was continued for 35 days or more
780 compared to less than 35 days. This effect was no longer observed in the updated review
781 in 2009 (119), and this issue was not addressed in other SLRs. However, it is important
782 to note that in the 2009 update, the duration of the nutritional intervention was ≥ 35 days
783 in 70% of the trials. Furthermore, older malnourished patients need a higher energy
784 supply than younger adults to gain weight, and the increase in BW and fat-free mass in
785 response to equal energy supply is slower in older patients (126). Thus, nutritional
786 interventions are likely to need time to be effective on nutritional status and other clinical
787 outcomes. So, we recommend consuming ONS for at least one month.

The frequency of reported nutritional assessment in clinical trials is usually limited to the baseline and final assessments, and information on more often and continued monitoring of the nutritional situation is lacking. There was however consensus among the experts that nutritional status (bodyweight), appetite and clinical situation should be assessed at least once a month, when ONS are offered to older persons, to monitor the effects and expected benefits of the intervention as a basis to decide on continuation or cessation of the therapy.

31) When offered to an older person with malnutrition or at risk of malnutrition, compliance in ONS consumption shall be regularly assessed. Type, flavor, texture and time of consumption shall be adapted to the patient's taste and eating capacities.

(R28, Grade GPP, strong consensus 100%)

Commentary

To achieve beneficial effects, compliance is crucial. Compliance with ONS is usually reported to be good in clinical trials. In 46 clinical trials in mostly older participants across healthcare settings (mean age 74 years), overall compliance was 78%, better in the community (81%) than in the hospital (67%) (127). Compliance was higher in older than in younger patients. A close correlation between the amount of energy from ONS prescribed and the amount consumed was reported. There was also a significant positive correlation between compliance and total energy intake (energy intake from food plus ONS energy intake), showing that ONS consumption has little effect on the usual food intake.

In order to support compliance, offered products shall be adapted to the patient's wishes and needs. A wide range of ONS styles (milk, juice, yogurt, savory), formats (liquid, powder, pudding, pre-thickened), volumes, types (high protein, fiber-containing), energy densities (one to three kcal/ml) and flavors are available to suit a wide range of needs and requirements. In particular, swallowing disorders may require texture adaptation of ONS. Because there is a risk that patients get tired of consuming the same ONS day after day, compliance shall be regularly assessed. A varied offer and options for change are proposed to enhance the consumption of the products.

2.3.5 Enteral nutrition (Fig. 6)

2.3.5.1 Indication

32) Older persons with reasonable prognosis shall be offered EN if oral intake is expected to be impossible for more than three days or expected to be below half of the energy requirements for more than one week, despite interventions to ensure adequate oral intake, in order to meet nutritional requirements and maintain or improve nutritional status.

(R29, Grade GPP, strong consensus 100%)

Commentary

The effect of EN is generally not well studied. Rigorous prospective RCTs comparing EN with no feeding are not feasible for ethical reasons. All we know about EN therefore mainly comes from observational trials. EN is frequently commenced late after substantial weight loss has already developed, which is in the stage of severe malnutrition (128, 129) and which hampers effective nutritional therapy (130). In general, the survival after insertion of a percutaneous endoscopic gastrostomy (PEG) in geriatric patients is poor. A

meta-analysis demonstrated the survival of 81% after one month, 56% after six months and 38% after one year (131). However, survival very much depends on the indication and selection of patients (132-137). Several studies demonstrate some improvement of nutritional state after initiation of EN in older patients (129, 130, 138-143). Nevertheless, the effect on functionality, mortality, and quality of life remains unclear (144-155).

33) The expected benefits and potential risks of EN shall be evaluated individually and reassessed regularly and when the clinical condition changes.

(R30, Grade GPP, strong consensus 100%)

Commentary

Several risk factors for early mortality after PEG insertion were identified, e.g. dementia, urinary tract infection, previous aspiration and diabetes (132-136, 149, 156-159). In an individual case, however, these factors can hardly lead the decision-making. Thus, each patient must be evaluated individually with regards to the following questions:

1. Is EN likely to improve or maintain the quality of life of this patient?
2. Is EN likely to improve or maintain the functionality of this patient?
3. Is EN likely to prolong survival in this patient?
4. Is prolongation of life desirable from the patient's perspective?
5. Are the risks of feeding tube insertion and EN lower than the expected benefit?

Complication rates of EN are reported to be generally low (160), but in individual patients, both nasogastric tube feeding and PEG feeding may be harmful (136, 161).

Since the condition of patients on EN may change very quickly, the expected benefits and potential risks of EN should be reassessed regularly. If the patient's ability to eat orally is regained, or conversely an advantage of EN is no longer expected, EN should be

discontinued. In situations where the effect of EN is difficult to anticipate, a treatment trial over a predefined period and with achievable and documented goals may be advisable (162). In patients with severe dementia, the risk-benefit ratio of EN is generally unfavorable and EN thus not recommended. In this situation, we refer to the specific dementia guidelines of ESPEN (163).

34) Older persons with low nutritional intake in the terminal phase of illness shall be offered comfort feeding instead of EN.

(R31, Grade GPP, consensus 88%)

Commentary

EN is in principle a life-prolonging procedure. If the prolongation of life is no longer a desirable goal, the patients' quality of life should be considered exclusively. This is regularly the case in the palliative situation. In this situation, the patient should be offered whatever he or she likes to eat and drink orally, in the amount he or she likes to consume. This approach is mostly described by the term comfort feeding (164). In this situation, covering a patient's nutritional requirements is entirely irrelevant (162).

2.3.5.2 Implementation

35) If EN is indicated, it shall be started without delay.

(R32, Grade GPP, strong consensus 96%)

Commentary

Some studies show that a substantial weight loss has frequently occurred before the initiation of EN, i.e. on average 11.4 kg in the study by Loser et al. (128, 136). As weight loss and poor nutritional state are risk factors for mortality in general and particularly

poor survival after PEG insertion (157), weight loss before initiation of EN should be avoided as far as possible. In addition, in the FOOD trial, which was performed in patients with dysphagic stroke, early EN was associated with an absolute reduction in the risk of death of 5.8% (p=0.09) (165). Although this result was not statistically significant, this trend is an additional argument for early initiation of EN, in the absence of evidence from other randomized trials. Therefore, EN, if indicated, should start without relevant delay.

36) Older patients who require EN presumably for less than four weeks should receive a nasogastric tube.

(R33, Grade GPP, strong consensus 100%)

Commentary

If there is an indication for EN, it must be decided which type of EN is adequate for the individual patient. From a practical point of view, it would be inadequate to undertake an invasive procedure like a PEG placement for a patient who will presumably need EN for only a few days. It is also assumed that EN sometimes may be continued for longer than necessary once a PEG tube has been inserted. In a systematic review that compared nasogastric tube feeding with PEG feeding in older patients with non-stroke dysphagia, a pooled analysis of nine studies involving 847 patients demonstrated no significant differences in the risk of pneumonia and overall complications (166). Within this review, a meta-analysis was not possible for mortality and nutritional outcomes, but three studies suggested improved mortality outcomes with PEG feeding while two out of three studies reported PEG feeding to be better from a nutritional perspective. Within the FOOD trial, which prospectively compared early versus delayed EN as well as PEG feeding with nasogastric feeding in dysphagic stroke patients, PEG feeding was associated with an increased risk of death or poor outcome of 7.8% (p=0.05) (165). These data do not

support a policy of early initiation of PEG feeding in dysphagic stroke patients. However, sufficient data in patients without dysphagia are not available. The recommended time frame of four weeks is thus somehow arbitrary and is meant as advice from the experts' perspective.

37) Older patients expected to require EN for more than four weeks or who do not want or tolerate a nasogastric tube should receive a percutaneous gastrostomy / PEG.

(R34, Grade GPP, strong consensus 100%)

Commentary

In addition to what has been recommended before, a gastrostomy should be undertaken in patients with reasonable prognosis who presumably require EN for a longer period. As mentioned in the commentary to recommendation 33, the time frame of four weeks is somehow arbitrary and mainly aims to prevent a too early gastrostomy. On the other hand, a nasogastric feeding-tube that is well tolerated may be utilized for more than four weeks.

In geriatric patients, nasogastric tubes are frequently not well tolerated but are also often not fixed adequately. In general, frequent dislodgement of nasogastric tubes is associated with poor EN, which is a concern when using nasogastric tubes. However, this should never lead to any physical or chemical restraints in order to avoid manual or accidental dislodgement. If a nasogastric tube is dislodged despite adequate skin fixation, a nasal loop may be an alternative. Two studies on nasal loops in tube-fed stroke patients demonstrated that nasal loops are safe, well-tolerated and effective in delivering full EN (167-169). A RCT observed an increase of 17% mean volume of fluid and tube feed given in the nasal loop group, without any differences in outcome after three months (169). As

a practical alternative to nasal loops, a PEG may be placed in those patients with frequent tube dislodgement who presumably require EN for more than a few days.

38) Tube fed older patients shall be encouraged to maintain oral intake as far as safely possible.

(R35, Grade GPP, strong consensus 100%)

Commentary

Most patients on EN can consume some amount of food and drinks orally. In the case of dysphagia, the texture of food and drinks that can be swallowed safely has to be determined by a dysphagia specialist. Oral intake of the safe texture should be encouraged as far as safely possible because oral intake is associated with sensory input and training of swallowing, increased quality of life and enhances the cleaning of the oropharynx. It has to be kept in mind that even patients with dysphagia and nil-by-mouth have to swallow more than 500 ml of saliva per day which alone is a risk factor for aspiration pneumonia. Aspiration pneumonia is suggested to be mainly caused by the bacterial content of aspirated saliva and not by the saliva itself, or a minimal oral intake (170, 171). However, the ability to have safe oral intake has to be decided individually, depending on the degree of dysphagia, the presence or absence of protective cough reflex and the cough force. For details please see ESPEN Guideline Clinical Nutrition in Neurology (110).

39) EN and PN and hydration shall be considered as medical treatments rather than as basic care, and therefore should only be used if there is a realistic chance of improvement or maintenance of the patient´s condition and quality of life.

(R37, Grade GPP, strong consensus 96%)

Commentary

Any kind of medical treatment is contraindicated when it is obvious that it cannot be helpful for the patient. EN and PN are medical treatments because they require the insertion of a feeding tube or intravenous cannulation and a physician's prescription. The most important reason for the commencement of EN or PN or hydration should be the anticipated beneficial effects of such treatment for the individual. If EN, PN or hydration are initiated, the effect of such treatment should be controlled. Clinical improvement, as well as prevention of further clinical deterioration, can both be relevant goals for an individual patient. Conversely, as for any other medical treatment, EN and PN should not be initiated or are contraindicated in situations when no benefits for the patient are expected. Especially in patients where death is imminent, e.g. within the next four weeks, or in patients with an incurable disease which cannot be improved by any treatment including nutritional support (e.g. advanced dementia, terminal phase of malignant cancer disease), the patient´s comfort is the highest priority (162). Any use of EN, PN or parenteral hydration should be in accord with other palliative treatments, and cessation is possible when the anticipated goals are not reached. Cultural background, economical resources, social facilities as well as ethical and religious motivations may play a substantial role in determining the nutritional treatment and its outcome in very old, frail and chronically ill patients.

40) Older patients should not receive pharmacological sedation or physical restraints to make EN or PN or hydration possible.

(R38, Grade GPP, strong consensus 100%)

Commentary

The goal of nutritional support is to improve or at least maintain the nutritional status of the patient, which should be connected with increased or maintained lean body and especially muscle mass. It was shown and it is obvious that immobilization of the subject leads to loss of fat-free mass and notably skeletal muscle mass, in particular in older persons (80). The loss of physical activity is a logical consequence of pharmacological sedation or physical restraints; consequently, it usually leads to muscle mass loss. As maintenance or gain of BW and muscle mass are the central goals of nutritional support, immobilization and sedation counteract planned goals of nutritional support. In addition, sedation and physical restraints may also lead to cognitive deterioration and should, therefore, be avoided. It has to be mentioned, however, that in rare exceptions, such as hyperactive delirium, it may be advantageous for the patient to use drugs with sedative effects or even physical restraints for a very limited period of time to prevent the patient from self-injury.

41) In older patients with malnutrition, EN and PN shall start early; it shall be gradually increased during the first three days in order to avoid the refeeding syndrome.

(R39, Grade GPP, strong consensus 100%)

Commentary

Refeeding syndrome (RFS) is a condition of potential risk in malnourished patients with electrolyte disturbances leading to clinical deterioration. Consequences include volume overload, redistribution of phosphate, potassium, and magnesium, hypophosphatemia, muscle weakness, anemia and finally organ failure. Possible cardiac sudden death is described in up to 20%.

Known risk factors for the RFS are a reduced BMI, significant unintended weight loss, no nutritional intake for several days, low plasma concentrations of magnesium, potassium or phosphate before feeding and a medical history of drug or alcohol abuse (172), and it has recently been observed that these risk factors are very common in older hospitalized patients (173). A large overlap between the risk of malnutrition according to common screening tools and the risk of RFS was observed in the same patient group (174), suggesting that in older persons with malnutrition or at risk of malnutrition a risk of RFS should generally be taken into consideration.

Particular attention has to be paid within the first 72 hours of nutritional support, which should generally be started early but increased slowly, accompanied by close monitoring of clinical signs and serum levels of phosphate, magnesium, potassium, and thiamine (see also recommendation 43).

42) During the first three days of EN and PN therapy in malnourished older persons, special attention shall be drawn to blood levels of phosphate, magnesium, potassium, and thiamine which shall be supplemented even in case of mild deficiency.

(R40, Grade GPP, strong consensus 100%)

Commentary

Criteria to identify RFS vary from reduced phosphate or any electrolyte serum concentration, the coexistence of electrolyte disturbances and clinical symptoms (e.g. peripheral edema, acute circulatory fluid overload, disturbance to organ function) (175). A standardized definition is unfortunately lacking, and current knowledge about the syndrome is altogether limited. Only two observational studies were performed in older populations (176, 177). Kagansky et al. (176) reported significantly more weight loss,

lower albumin levels, glucose-containing infusions and food supplements in older patients who developed at least one episode of hypophosphatemia (serum phosphate ≤ 0.77 mmol/L), which was detected on average on day 10.9 ± 21.5 of hospitalization. Hypophosphatemia was also associated with an increased length of hospital stay and mortality rate, which was however no longer significant in a multivariate analysis (176). Lubart et al. (177) evaluated 40 frail older patients with prolonged feeding problems before the insertion of a nasogastric tube. A high mortality rate was observed which was mainly related to infectious complications, but in the light of a considerable number of patients with hypophosphatemia, the authors suggested the RFS as a contributing factor to mortality (177).

Further studies would be particularly useful in older patients, given also the high prevalence of kidney dysfunction in this specific population.

2.3.6 Parenteral nutrition (Fig. 7)

2.3.6.1 Indication

43) Older persons with reasonable prognosis (expected benefit) shall be offered PN if oral and enteral intakes are expected to be impossible for more than three days or expected to be below half of the energy requirements for more than one week, in order to meet nutritional requirements and maintain or improve nutritional status. (R36, Grade GPP, strong consensus 100%)

Commentary

PN is a safe and effective therapeutic procedure, which is used for the delivery of all macronutrients and micronutrients into the organism via a central or peripheral vein. It is always indicated and may allow adequate nutrition in patients who need nutrition

support and who cannot meet their nutritional requirements via the enteral route (when EN is contraindicated or poorly tolerated). Age per se is not a reason to exclude patients from PN. Several studies have documented that PN is a feasible and successful method of nutritional support also in older people (130, 178-180), not only in the hospital but also at home (181). It is however only rarely indicated as oral and enteral interventions are generally the first choice for nutritional support (180). When indicated, PN should be initiated immediately due to the risk of loss of independence in older patients and because even short-term starvation in the acutely ill older person leads to loss of lean body mass which can be critical especially in older patients. Indication criteria for PN are the same as in middle-aged subject: older patients facing a period of starvation of more than three days when oral nutrition or EN is impossible, and when oral or EN has been or is likely to be insufficient for more than 7–10 days.

2.3.6.2 Implementation

The recommendations 40-43 in chapter 2.3.5.2 also apply to parenteral nutrition.

2.4. Prevention and treatment of malnutrition in case of specific diseases (Fig. 8)

2.4.1 Hip fracture

44) Older patients with hip fracture shall be offered ONS postoperatively in order to improve dietary intake and reduce the risk of complications.

(R43, Grade A, strong consensus 100%)

Commentary

Older persons suffering from a hip fracture and undergoing orthopedic surgery are generally at risk of malnutrition due to the acute trauma and surgery-associated anorexia

and immobility. Voluntary oral intake in the postoperative phase is often markedly below requirements. As a consequence, rapid deterioration of nutritional status and impairment of recovery and rehabilitation are common. A recent high-quality Cochrane review and meta-analysis included 41 randomized trials involving 3,881 patients with a hip fracture (182). The methodological quality of all included trials was judged to be low to very low. 18 trials (16 RCTs and two quasi-randomized trials) provided standard ONS to hip fracture patients, four RCTs tested ONS with high protein content for at least one up to six months. The use of ONS mostly leads to a significant increase in energy and nutrient intake. Adverse side effects were not increased (six RCTs). Combined analysis of eleven trials using standard ONS indicated a reduced risk of postoperative complications, whereas for high-protein ONS (two RCTs) no such effect was found (182). No effect on mortality risk was found. A second meta-analysis (183) included a subset of ten of these RCTs with a total of 986 patients and came to the same conclusions regarding mortality and complications. Based on these results, we recommend offering ONS to geriatric hip fracture patients, regardless of their nutritional state. To date, there is not sufficient evidence that special ONS (e.g. high in protein) has additional beneficial effects for these patients. ONS shall always be offered in combination with other interventions to increase oral intake (e.g. fortified foods) as part of a multidisciplinary approach (see recommendation 48).

45) Supplementary overnight EN shall NOT be offered to older patients with hip fracture unless there is an indication for EN for other reasons.

(R44, Grade GPP, strong consensus 100%)

Commentary

The Cochrane analysis from Avenell et al. (182) found three RCTs and one quasi-randomized trial that tested the effects of supplementary overnight EN alone and one additional RCT that tested overnight EN followed by ONS. Sample sizes were small (between 18 and 140 participants), the interventions were always started within five days from surgery and usually continued until discharge or until oral intake was sufficient. Supplementary overnight EN was overall poorly tolerated. Regarding mortality and complication risk, the meta-analysis of EN only studies as well as the RCT using EN followed by ONS showed no evidence of an effect. Effects on nutritional status, length of hospital stay and functional status were inconsistent (182). Due to high patient burden, poor tolerance and lack of clear beneficial effects, a negative recommendation is given.

46) In older patients with hip fractures, postoperative ONS may be combined with perioperative PN in order to improve nutritional intake and reduce the risk of complications.

(R45, Grade 0, consensus 83%)

Commentary

Regarding the effects of PN, Avenell et al. (182) included one RCT of low quality that evaluated three days of perioperative peripheral PN followed by seven days of ONS compared with standard care in 80 patients with a fractured hip (184, 185). This short-time combined intervention increased total fluid and energy intake to near-optimal levels during the hospital stay. The risk of complications within four months was significantly reduced (RR 0.21 (99% CI 0.08–0.59), while mortality risk, length of hospital stay and the proportion of participants who were discharged to their own homes were unaffected (185).

Based on this positive result, and bearing the risk of complications associated with PN in mind, it may be considered to offer supplementary PN during the acute perioperative period, combined with ONS and early oral food intake postoperatively, in order to increase nutritional intake and reduce the risk of complications. As presently only one trial of low quality is available, the grade of evidence was reduced to "0".

47) Nutritional interventions in geriatric patients after hip fracture and orthopedic surgery shall be part of an individually tailored, multidimensional and multidisciplinary team intervention in order to ensure adequate dietary intake, improve clinical outcomes and maintain quality of life.

(R46, Grade A, strong consensus 100%)

Commentary

Multicomponent interventions including nutritional measures were examined in three RCTs in hip fracture patients in comparison to usual care. The interventions were complex including e.g. interdisciplinary in-hospital care concepts (55-57, 186), discharge planning and a home-based rehabilitation program (187-192) and high-intensity resistance training (193). Nutritional interventions consisted of nutritional assessment, provision of protein-enriched meals and additional protein drinks or dietetic advice. A range of positive effects are reported after six to twelve months, e.g. reduced length of hospital stay (55, 56), improved independence in activities of daily living (56, 192, 193), improved mobility (56), reduced in-hospital falls and fall-related injuries (57), decreased emergency department visits (192) significantly fewer days of delirium (55), fewer pressure ulcers (55), reduced nursing home admissions (193) and reduced mortality (193) compared with usual care.

These studies illustrate the importance of a holistic view and comprehensive treatment approach in orthogeriatric patients. Nutritional interventions should be continued after hospitalization, as effects were seen as long as nutritional care was provided.

2.4.2 Delirium

48) All older patients hospitalized to have urgent surgery shall receive a multi-component non-pharmacological intervention that includes hydration and nutrition management in order to prevent delirium.

(R47, Grade A, strong consensus 100%)

Commentary

Delirium is common in older people, especially when admitted to the hospital for acute medical or surgical care. Dehydration is a common precipitating factor and malnutrition a common contributing factor to delirium (194, 195).

Several systematic reviews on non-pharmacological approaches to prevent and treat delirium in older patients have been published recently (194, 196, 197). Abraha et al. (196) reviewed any non-pharmacological intervention aiming to prevent or treat delirium in older patients in any setting. They found that multi-component non-pharmacological interventions significantly reduced the incidence of delirium in surgical wards (all except one study included participants in need of urgent surgery). The evidence did not support the efficacy of any intervention in treating established delirium. Nutrition intervention was part of many non-pharmacological interventions, but no trials on nutrition as a single-component intervention to prevent or treat delirium were identified. Other evidence-based recommendations support our recommendations on delirium (196). A more recent Cochrane review focusing on hospitalized non-ICU patients reached similar conclusions: multi-component interventions reduced the incidence of delirium

compared to usual care in medical and surgical settings (197). Furthermore, this review calls attention to the subgroup of patients with pre-existing dementia, where the effect of multi-component interventions remains uncertain. An additional Cochrane review addressed the prevention of delirium in people living in nursing homes. A single, small, low-quality trial showed no significant effect of hydration on the incidence of delirium. No trial that included any other nutrition intervention was identified (194).

In summary, nutrition and hydration interventions have only shown efficacy in the prevention of delirium when they are part of multidisciplinary interventions (10 of 19 trials on multidisciplinary interventions included at least one nutrition/hydration intervention). However, interventions used are heterogeneous and no evidence-based recommendations but common sense is needed to decide how to include nutrition and hydration in local programs.

49) All older patients admitted to a medical ward and at moderate to high risk of delirium shall receive a multi-component non-pharmacological intervention that includes hydration and nutrition management in order to prevent delirium.

(R48, Grade A, strong consensus 95%)

Commentary

Delirium is common in older people, especially when admitted to the hospital for acute medical or surgical care. Dehydration is a common precipitating factor and malnutrition a common contributing factor to delirium (194, 195).

Several systematic reviews on non-pharmacological approaches to prevent and treat delirium in older patients have been published recently (194, 196, 197). Abraha et al. (196) reviewed any non-pharmacological intervention aiming to prevent or treat

delirium in older patients in any setting. They found that multi-component non-pharmacological interventions significantly reduced the incidence of delirium in medical wards in patients at moderate or high risk of delirium. The evidence did not support the efficacy of any intervention in treating established delirium. Nutrition intervention was part of many non-pharmacological interventions, but no trials on nutrition as a single-component intervention to prevent or treat delirium were identified. Other evidence-based recommendations support our recommendations on delirium (196). A more recent Cochrane review focusing on hospitalized non-ICU patients reached similar conclusions: multi-component interventions reduced the incidence of delirium compared to usual care in medical and surgical settings (197). Furthermore, this review calls attention to the subgroup of patients with pre-existing dementia, where the effect of multi-component interventions remains uncertain. An additional Cochrane review addressed the prevention of delirium in people living in nursing homes. A single, small, low-quality trial showed no significant effect of hydration on the incidence of delirium. No trial that included any other nutrition intervention was identified (194).

In summary, nutrition and hydration interventions have only shown efficacy in the prevention of delirium when they are part of multidisciplinary interventions (10 of 19 trials on multidisciplinary interventions included at least one nutrition/hydration intervention). However, interventions used are heterogeneous and no evidence-based recommendations but common sense is needed to decide how to include nutrition and hydration in local programs.

50) Hospitalized older patients with present delirium shall be screened for dehydration and malnutrition as potential causes or consequences of delirium. (R49, Grade GPP, strong consensus 95%)

Commentary

Delirium is common in older people, especially when admitted to the hospital for acute medical or surgical care. Dehydration is a common precipitating factor and malnutrition a common contributing factor to delirium (194, 195). Guidelines on delirium management recommend checking nutrition and hydration in delirious patients in order to correct existing problems (for example, see (198-200)).

2.4.3 Depression

51) Depressed older patients shall be screened for malnutrition.

(R50, Grade GPP, strong consensus 100%)

Commentary

Depression is a common cause of nutritional problems in old age. Having a significant weight loss or weight gain (>5%) or a change in appetite is one of the nine specific symptoms that define a major depressive disorder (201). Thus, detection of nutritional problems is part of the assessment of depression. On the other hand, depression is included in the differential diagnosis of the etiology of malnutrition, especially in older patients, and is included in the comprehensive geriatric assessment. The association between depressed mood and malnutrition is well established (202, 203).

52) Older patients with depression might NOT routinely receive nutritional interventions unless they are malnourished or at risk of malnutrition.

(R51, Grade 0, strong consensus 100%)

Commentary

Data on the impact of nutrition interventions on the outcomes of depression in older subjects are lacking. Two trials have considered the effect of nutrition intervention on depressive symptoms in older hospitalized patients. A first RCT studied the effect of a high-energy (995 kcal/day) ONS used for six weeks in 225 hospitalized patients (roughly, one third had depressive symptoms assessed with the 15-item Geriatric Depression Scale (GDS), baseline nutritional status not described) (204). GDS was significantly better in the intervention compared to the control group at six months, but not at six weeks. A second RCT explored an individualized nutritional intervention in 259 hospitalized older patients and found no changes in GDS scores at six months (47), the number of those with depression is not stated. All these trials used GDS (a validated depression screening instrument that measures depressive symptoms) as the main outcome measure, but the minimum clinically significant difference has not been defined for GDS. No trial has used the cure of depression as an outcome measure for nutritional interventions in older persons. When depressed patients are malnourished or at risk, recommendations for these conditions made elsewhere in this guideline will apply.

2.4.4 Pressure ulcer

53) Nutritional interventions should be offered to older patients at risk of pressure ulcers in order to prevent the development of pressure ulcers.

(R52, Grade B, strong consensus 100%)

Commentary

Two relevant SLRs (205, 206) and two overviews of SLRs (207, 208) were identified. The quality of these reviews was rated as moderate to high, the quality of studies included in these reviews was however rated as low. One additional RCT of moderate quality published later was also considered (209).

Based on the same four RCTs, Stratton et al. (205) and Lozano-Montoya et al. (210) concluded that nutritional intervention during acute hospital admission in patients with no PUs at baseline may reduce the incidence of PUs when compared to standard care. Langer and Fink (206) meta-analyzed eight trials comparing the effects of mixed nutritional supplements with standard hospital diet and found borderline significance for an effect on PU development.

The benefits of nutritional interventions may depend on nutritional status and concomitant relevant health problems causing the (risk of) pressure ulcers. Unfortunately, the majority of trials considered did not distinguish between malnourished and non-malnourished patients. In case of malnutrition, there is a clear need for nutritional interventions, and an early screening of malnutrition should be performed at hospital and nursing home admission independent of the risk or presence of PUs, as described elsewhere in this guideline.

54) Nutritional interventions should be offered to malnourished older patients with pressure ulcers to improve healing.

(R53, Grade B, strong consensus 100%)

Commentary

Two relevant SLRs (205, 206) and two overviews of SLRs (207, 208) were identified. The quality of these reviews was rated as moderate to high, the quality of studies included in these reviews was however rated as low. One additional RCT of moderate quality published later was also considered (209).

Available trials on the healing of existing pressure ulcers were very heterogeneous regarding the type of nutritional supplements, participants, comparisons and outcomes,

therefore, a meta-analysis was not appropriate (205, 206). No clear evidence of an effect was found in any of the individual studies (206).

The benefits of nutritional interventions may depend on nutritional status and concomitant relevant health problems causing the (risk of) pressure ulcers. Unfortunately, the majority of trials considered did not distinguish between malnourished and non-malnourished patients.

Cereda et al. (209) restricted their randomized, controlled and blinded study to 200 malnourished persons with PUs (stage II, III and IV) in long term and home care services and showed that supplementation with an oral nutritional formula enriched with arginine, zinc, and antioxidants improved PU healing compared to an isocaloric isonitrogenous formula (greater and more frequent reduction in PU area). Although the experimental formula was more expensive, it proved to be cost-effective (211).

In case of malnutrition, there is a clear need for nutritional interventions, and an early screening of malnutrition should be performed at hospital and nursing home admission independent of the presence of PUs, as described elsewhere in this guideline. Thus, also in malnourished older patients with pressure ulcer nutritional interventions are indicated; in these patients, they may support healing of PUs. As only one RCT is presently documenting these benefits, the grade of recommendation is downgraded to B. The need for high-quality studies in this specific topic is emphasized.

2.4.5 Diabetes

55) Older patients with diabetes mellitus shall routinely be screened for malnutrition with a validated tool in order to identify those with (risk of)

malnutrition.

(R58, Grade GPP, strong consensus 95%)

Commentary

Our review of the literature disclosed no studies on the prevention or treatment of malnutrition specifically in older persons with diabetes. Based on the few studies on the prevalence of malnutrition in older diabetics it follows that the prevalence of (risk of) malnutrition in older diabetics is as high or even higher than in their non-diabetic counterparts (212). This risk is most likely related to the functional dependence and multimorbidity in these older diabetics. In order to identify those diabetics with (risk of) malnutrition, we recommend screening routinely for malnutrition (see the section on screening and assessment of this guideline).

56) In older patients with diabetes mellitus, restrictive diets shall be avoided in order to prevent malnutrition and accompanying functional decline.

(R59, Grade GPP, strong consensus 100%)

Commentary

To decrease the risk of malnutrition developing in older persons with diabetes we recommend avoiding restrictive diets (see also recommendation 11). These diets have limited benefits and can lead to nutrient deficiencies (59, 213). A balanced diet of about 30 kcal/kg BW/d providing 50-55% of the total energy contribution by carbohydrates, rich in fiber (25-30 g/d) and which favors mono- and polyunsaturated fatty acids is proposed as recommended for the general older population. In the case of obesity in older diabetic patients, we refer to the respective recommendations provided elsewhere in this guideline (see recommendations 80 - 82).

57) Malnutrition and risk of malnutrition in older patients with diabetes mellitus shall be managed according to the recommendations for malnourished older persons without diabetes mellitus.

(R60, Grade GPP, strong consensus 100%)

Commentary

In the case of malnutrition in an older person with diabetes mellitus, we recommend following the same guidelines as for non-diabetic older adults. The use of ONS or EN can result in a rise in glucose levels. However, prevention and treatment of malnutrition with its probable negative short-term outcomes are regarded as more important than possible long-term complications of hyperglycemia.

3. Prevention and treatment of low-intake dehydration

3.1 Screening for low-intake dehydration (Fig. 9)

58) All older persons should be screened for low-intake dehydration when they contact the healthcare system if the clinical condition changes unexpectedly, and periodically when malnourished or at risk of malnutrition.

(R64, Grade GPP, strong consensus 100%)

Commentary

A non-systematic review of studies reporting serum osmolality in older adults suggests that, low intake dehydration is common in older adults (214), especially in those who are more vulnerable and frail, living in residential or long-term care institutions or admitted to hospital.

There is some evidence that older adults with low-intake dehydration have poorer outcomes than those who are well-hydrated (215). High-quality cohort studies which have adjusted for key confounding factors have consistently found that older adults with raised serum osmolality (>300 mOsm/kg or equivalent) have an increased risk of mortality (216-218) and one showed an associated doubling in risk of 4-year disability (217).

Two systematic reviews (219, 220) have assessed RCTs and uncontrolled trials aiming to increase fluid intake in older adults. Unfortunately, most trials assessed fluid intake hydration status and health outcomes poorly, so success in increasing fluid intake is unclear. Nevertheless, regarding the severe consequences of dehydration, we recommend screening for low-intake dehydration to identify dehydration early allowing for timely interventions to normalize hydration status and prevent poor outcomes. This might be of

particular importance in situations of increased risk of dehydration e.g. in case of acute deterioration of health or poor food intake.

3.2 Diagnosis of low-intake dehydration

3.2.1 Recommended diagnostic tools

59) Directly measured serum or plasma osmolality should be used to identify low-intake dehydration in older adults.

(R65, Grade GPP, strong consensus 95%)

Commentary

When we take in too little fluid (drink too little) the fluid within and around our cells becomes more concentrated, raising the osmolality of serum and plasma (221-224). The raised osmolality is the key physiological trigger of protection mechanisms (such as thirst and increased concentration of urine by the kidney). In older adults, renal function is often poor so that renal parameters no longer accurately signal low-intake dehydration (7, 225, 226). Clinical judgment is also highly fallible in older adults (227). For these reasons, the US Panel on Dietary Reference Intakes for Electrolytes and Water stated ‘‘The primary indicator of hydration status is plasma or serum osmolality’’ (36). This statement sets the reference standard for dehydration in older adults. It is based on physiology and biochemistry and has been well agreed by hydration experts for many decades (222-224). In contrast, extracellular water loss (volume depletion) due to diarrhea, vomiting or renal sodium loss is connected with normal or low plasma osmolality.

60) An action threshold of directly measured serum osmolality >300 mOsm/kg should be used to identify low-intake dehydration in older adults.

(R66, Grade B, strong consensus 94%)

Commentary

Threshold values of serum osmolality have been assessed in varied ways, but Cheuvront et al. (221) appear to have developed these most rigorously. They assessed the range of plasma osmolality in hydrated younger adults, then in the same persons who had been dehydrated, identifying the cut-off that best separated the two states. Their suggested threshold is that serum or plasma osmolality >300 mOsm/kg is classified as dehydrated. This cut-off value concurs with observations from cohort studies assessing the effects of raised serum osmolality in older people (216-218, 228).

Serum osmolality is the sum of concentrations of osmotically active components especially of sodium, chloride, bicarbonate, potassium glucose, and urea. Interpretation of raised serum osmolality (>300 mOsm/kg) as a sign of dehydration depends on checking that serum glucose, and to some extent urea are within normal range; if not these should be normalized by adequate treatment. In low-intake dehydration, it is common that despite raised serum osmolality none of the major components (sodium, potassium, urea or glucose) is raised out of the normal range – but general fluid concentration leads to small rises within the normal range in all these components (Hooper unpublished).

61) Where directly measured osmolality is not available then the osmolarity equation (osmolarity = 1.86 × (Na^+ + K^+) + 1.15 × glucose + urea + 14 (all measured in mmol/L) with an action threshold of >295 mmol/L) should be used to screen for low-intake dehydration in older persons.

(R67, Grade B, strong consensus 94%)

Commentary

Work with a set of European cohorts of older adults has suggested that most existing serum osmolarity equations are not diagnostically accurate to calculate serum osmolality in older adults (225, 229). However, one equation (osmolarity = 1.86 × (Na+ + K+) + 1.15 × glucose + urea + 14 (all measured in mmol/L)) usefully predicted serum osmolality in people aged ≥65 years with and without diabetes, poor renal function, dehydration, in men and women, in the community, residential care, and hospital, with a range of ages, health, cognitive and functional status (225, 229). Given costs and prevalence of dehydration in older people, a cut point of 295 mOsm/L will identify most adults with low-intake dehydration (sensitivity 85%, specificity 59%) and should trigger advice and support with drinking and fluid intake. A directly measured serum osmolality test a few days later will identify older adults in need of more intensive support, intervention and/or follow up. This equation has also been found to be useful in younger adults (230).

Note on terms: osmolality is directly measured osmolality, measured using freezing point depression, while osmolarity aims to approximate osmolality and is an estimate based on an equation of several components. The terms are often used incorrectly.

62) Older persons and their informal carers may use appropriate tools to assess fluid intake, but should also ask healthcare providers for assessment of serum osmolality periodically.

(R70, Grade GPP, strong consensus 94%)

Commentary

Unfortunately, the assessment of fluid intake is often highly inaccurate in older adults. A recent study in residential care compared staff-completed drinks intake assessment with

direct observation over 24 hours for 22 older adults, finding a very low correlation (r=0.122) (231). The low correlation appeared to be due to many drinks being omitted from the staff assessments, as well as the recording of drinks referring to the number of drinks given rather than those consumed. On average, staff assessments were 700 ml/d lower than direct observation would suggest. This poor ability to assess drink intake in residential and nursing care facilities has been reported numerous times (232-235). Measurement of serum osmolality is the method of choice (see recommendations 60 and 61).

There is little evidence of the accuracy of assessment of fluid intake by informal carers, but it may be better than for care staff, as informal carers may be more aware of the full liquid intake of the older adult. We have evidence that when older adults record their own drinks intake it is more accurate than that assessed by care staff (236). Older adults and their informal carers may like to use a tool like the Drinks Diary (which explicitly assesses amount consumed, rather than the amount provided (236)) to record fluid intake, but we suggest that they also ask their health care providers to check serum or plasma osmolality. Within health and social care settings, fluid intake or fluid balance should only be assessed in specialist medical units with specifically trained personnel.

3.2.2 Not recommended diagnostic tools

63) Simple signs and tests commonly used to assess low-intake dehydration such as skin turgor, mouth dryness, weight change, urine color or specific gravity, shall NOT be used to assess hydration status in older adults.

(R68, Grade A, consensus 83%)

Commentary

A Cochrane systematic review of diagnostic accuracy of simple signs and tests for dehydration in older adults (aged at least 65 years old) has pooled diagnostic data from studies assessing many single clinical signs and tests against serum osmolality, osmolarity or weight change (237). It found that none was consistently useful in indicating hydration status in older adults (237). The signs have either not been shown to be usefully diagnostic or have been shown not to be usefully diagnostic. These findings have been confirmed by more recent diagnostic accuracy studies in older adults (238-241).

64) Bioelectrical impedance shall NOT be used to assess hydration status in older adults as it is not usefully diagnostic.

(R69, Grade A, strong consensus 100%)

Commentary

The Cochrane systematic review of diagnostic accuracy of simple signs and tests for dehydration in older adults (aged at least 65 years old) described in recommendation 64 also found no evidence of the utility of bioelectrical impedance in the assessment of hydration status in older adults in four included studies (237).

3.3 Prevention of low-intake dehydration (Fig. 10)

65) All older persons should be considered to be at risk of low-intake dehydration and encouraged to consume adequate amounts of drinks.

(R63, Grade GPP, strong consensus 100%)

Commentary

A non-systematic review of studies reporting serum osmolality in older adults suggests that low-intake dehydration is common in this group (214), especially in older adults who

are more vulnerable and frail, living in residential or long-term care institutions or admitted to hospital.

The causes of low-intake dehydration in older adults appear to be varied and inter-related and have been examined in several non-systematic reviews (7, 8, 242). Among age-related physiological changes, reduced thirst and reduced urine concentration by the kidney increase dehydration risk (9, 243-246). In addition, total body water is reduced, and many older adults use medications such as diuretics and laxatives which increase fluid losses (247-251). Besides physiological changes, a range of other risk factors increases vulnerability to dehydration with age. Memory problems may cause older adults to forget to drink and forget that they haven't drunk (7-9, 252). Fluid intake may also be reduced voluntarily, e.g. because of issues about getting to the toilet and continence (8, 226, 253). Furthermore, social contact is a key trigger for drinking – but as social isolation becomes more common, drinking routines are lost and drink intake is reduced (254). Physical access to drinks can also be an issue (8, 255, 256), as can swallowing problems and dysphagia. Thus, older adults are at high risk of dehydration due to drinking insufficient amounts of fluids and should be encouraged to consume adequate amounts of drinks.

66) A range of appropriate (i.e. hydrating) drinks should be offered to older people according to their preferences.

(R62, Grade B, strong consensus 100%)

Commentary

Drinks providing fluid with a hydrating effect on our bodies include water, sparkling water, flavored water, hot or cold tea, coffee, milk and milky drinks, fruit juices, soups, sports or soft drinks and smoothies (257). There is a common myth, which should be

dispelled, that in order to be hydrated we need to drink plain water – this is not the case. Beer and lager are hydrating and may also be appropriate for some older adults (not needing to restrict alcohol for medical or social reasons). Drinks should be chosen according to the preferences of the older person, as well as the drinks' fluid and nutritional content – so that milky drinks, fruit juices and smoothies, high-calorie drinks and fortified drinks all have particular benefits in specific circumstances. Despite worries about "dehydrating" effects of caffeine and alcohol, there is good evidence that coffee does not cause dehydration (257, 258), and nor do alcoholic drinks of up to 4% alcohol (257). If continence is a concern, decaffeinated drinks (such as coffee, tea, and soft drinks) may be tried, but are not necessary unless found helpful (259, 260).

There is good evidence from two randomized controlled trials (RCTs) that the hydration potential for most non-alcoholic drinks is very similar to those of water (257, 258). Although these findings are based on studies in younger adults (257, 258), there is little reason to believe that they would not apply to older adults.

67) To prevent dehydration in older persons living in residential care, institutions should implement multi-component strategies across their institutions for all residents.

(R74, Grade B, strong consensus 100%)

Commentary

No interventions to support adequate drinks intake have been clearly shown to prevent or treat low-intake dehydration in older adults. A recent systematic review assessed the effectiveness of interventions and environmental factors to increase drinking and/or reduce dehydration in older adults living in residential care, including randomized trials,

non-randomized intervention studies and cohort studies (220). The review identified 19 intervention and four observational studies from seven countries but suggested that overall the studies were at high risk of bias. The evidence suggests that multicomponent interventions may be effective (220).

68) Multi-component strategies to prevent dehydration in older persons living in residential care should include high availability of drinks, varied choice of drinks, the frequent offering of drinks, staff awareness of the need for adequate fluid intake, staff support for drinking and staff support in taking older adults to the toilet quickly and when they need it.

(R75, Grade B, strong consensus 100%)

Commentary

The systematic review described before/in recommendation 62 suggests that multicomponent interventions including increased staff awareness, assistance with drinking, support using the toilet and a greater variety of drinks on offer may be effective (220). It was also suggested that the introduction of the US Resident Assessment Instrument (which requires mandatory monitoring and reporting of hydration risks) reduced dehydration in older adults (220, 261). A small single study implied that high contrast red cups helped support drinking in nine men with dementia (220). Large cohort studies in the US and Canada suggested different relationships between care homeownership and dehydration – in Canada for-profit ownership was associated with increased hospital admissions for dehydration while in the US dehydration prevalence did not differ between for-profit and not-for-profit homes (220). No clear relationships were observed between staffing levels and dehydration prevalence (220, 262, 263).

69) Strategies to support adequate fluid intake should be developed including older persons themselves, staff, management, and policymakers.

(R76, Grade B, strong consensus 100%)

Commentary

A recent systematic review (see recommendations 67, 68) suggested that multiple strategies including involvement and input from older adults, staff, management, and policymakers will be needed to address problems with drinking in residential care (220).

70) Care plans for older adults in institutions should record individual preferences for drinks, how and when they are served, as well as continence support, to promote drinking. Assessment of individual barriers and promoters of drinking should lead to tailored plans to support drinking for each older person.

(R77, Grade GPP, strong consensus 100%)

Commentary

A pair of systematic reviews assessed the effectiveness of interventions to support food and drink intake in people with mild cognitive impairment or dementia, which included cohorts of older adults not labeled as having dementia but where a cognitive assessment showed that on average cognitive impairment was present (63, 219, 264), as it is in most care home populations. Included studies were small and fluid intake and hydration status were poorly assessed. No further strategies for supporting fluid intake were identified within these reviews, but a key suggestion from assessments of nutrition more generally was that studies with a strong social element, where socializing around food and drink was supported, tended to improve quality of life, nutritional status and fluid intake (219).

Observational data have suggested that the number of drinks offered to older adults in residential care is strongly positively associated with their fluid intake (8, 231). We found limited information on increasing fluid intake in hospital or community settings.

Overall, it seems reasonable to identify individual preferences as well as barriers and promotors for drinking and to consider these aspects in individualized care plans.

71) At a regulatory level, the strategy of mandatory monitoring and reporting by institutions of hydration risks in individual residents and patients should be considered.

(R78, Grade GPP, strong consensus 100%)

72) Older adults who show signs of dysphagia should be assessed, treated and followed up by an experienced speech and language therapist. Their nutrition and hydration status should be carefully monitored in consultation with the speech and language therapist and a dietician.

(R79, Grade GPP, strong consensus 94%)

Commentary

Patients with dysphagia are at specific high risk of dehydration and fluid intake has been reported to be low, especially when thickened fluids are used to make swallowing safer (360). A partner ESPEN guideline recommends that stroke patients receiving thickened fluids should have their fluid balance monitored by trained professionals (110). A high-quality systematic review, though not specific to older adults, has suggested that the use of chin down swallowing and thin fluids should be the first choice of therapy in chronic dysphagia (108). A small short term RCT in older adults with severe cognitive impairment

suggested that cervical spine manipulation may increase dysphagia limit for those with swallowing problems, but effects on hydration were not assessed (265).

A recent systematic review and guidelines report RCTs showing that in people following stroke, thickened fluids alongside access to free water (no other drinks) compared to thickened liquids alone was effective at protecting against aspiration and increasing fluid intake. The use of pre-thickened drinks rather than drinks thickened with powder at the point of use was also better at supporting fluid intake post-stroke (110).

3.4 Treatment of low-intake dehydration (Fig. 10)

73) Older adults with measured serum or plasma osmolality >300 mOsm/kg (or calculated osmolarity >295 mmol/L) who appear well should be encouraged to increase their fluid intake in the form of drinks preferred by the older adult.
(R71, Grade GPP, strong consensus 100%)

Commentary

Treatment for low-intake dehydration involves the administration of hypotonic fluids (222-224), which will help correct the fluid deficit while diluting down the raised osmolality. In mild dehydration older persons should be encouraged to drink more fluid, which can be in the form of drinks preferred by the older person, such as hot or iced tea, coffee, fruit juice, sparkling water, carbonated beverages/soda, lager or water (257, 258). Oral rehydration therapy (which aims to replace electrolytes lost in volume depletion by diarrhea or vomiting) and sports drinks are NOT indicated. Hydration status should be reassessed regularly until corrected, then monitored periodically alongside excellent support for drinking.

74) For older adults with measured serum or plasma osmolality >300 mOsm/kg (or calculated osmolarity >295 mmol/L) who appear unwell, subcutaneous or intravenous fluids shall be offered in parallel with encouraging oral fluid intake. (R72, Grade A, strong consensus 95%)

Commentary

Several systematic reviews of moderate quality have reviewed the evidence comparing subcutaneous and intravenous fluid administration in older adults (291-292) or more generally (266, 267), and guidelines for older adults have been produced (247, 268).

The earlier systematic review assessing evidence for hypodermoclysis in older people, mainly based on case reports (269) suggested adverse effects in 3% but noted that electrolyte-containing solutions resulted in fewer and less severe side effects than electrolyte-free or hypertonic. The later systematic review re-analyzed the earlier review and included two small later RCTs and a cohort study (270). Overall, the review concluded that the evidence suggests that "appropriate volumes of subcutaneous dextrose infusions (in the form of half-normal saline-glucose 5%, 40 g/L dextrose and 30 mmol/L NaCl, or 5% dextrose solution and 4 g/L NaCl, or two-thirds 5% glucose and one-third normal saline) can be used effectively for the treatment of dehydration, with similar rates of adverse effects to intravenous infusion" (270).

Another systematic review suggests that financial costs of subcutaneous rehydration are probably lower than intravenous, but the systematic review is methodologically poor and the evidence base it collates is of low quality – better-designed studies are needed (266).

75) For older adults with measured serum or plasma osmolality >300 mOsm/kg (or calculated osmolarity >295 mmol/L) and unable to drink, intravenous fluids shall

be considered.

(R73, Grade A, strong consensus 95%)

Commentary

When dehydration is severe and greater fluid volumes are needed or intravenous access is required for administration of medications or nutrition, then administration of intravenous fluid is the method of choice (271, 272). Parenteral hydration should however always be considered as a medical treatment rather than as basic care, and its benefits and risks should be carefully balanced (see Chapter “Parenteral Nutrition”).

Please also refer to recommendation 68 in chapter 2.5.3.

4. Diagnosis and treatment of volume depletion (Fig. 11)

4.1 Excessive blood loss

4.1.1 Diagnosis of volume depletion

76) In older adults, volume depletion following excessive blood loss should be assessed using postural pulse change from lying to standing (≥30 beats per minute) or severe postural dizziness resulting in an inability to stand.

(R80, Grade B, strong consensus 100%)

Volume depletion (reduced volume of extracellular fluids only, due to loss of fluids and electrolytes, also called salt loss or extracellular dehydration) occurs without raised serum or plasma osmolality, and following medical conditions resulting in excessive losses of fluid and electrolytes, such as excessive blood loss, vomiting, and diarrhea (221-224).

The clearest signs following excessive blood loss are a large postural pulse change (≥30 beats per minute) or severe postural dizziness leading to lack of ability to stand (273), which are 97% sensitive and 98% specific when blood loss is at least 630 mL, but much less sensitive at lower levels of blood loss. However, these results were found in younger adults not taking beta-blockers, so sensitivity and specificity may vary in older persons. The authors report that postural hypotension has little additional predictive value.

4.1.2 Treatment of volume depletion

77) Older adults with mild/moderate/severe volume depletion should receive isotonic fluids orally, nasogastrically, subcutaneously or intravenously.

(R82, Grade B, strong consensus 95%)

Commentary

Treatment for volume depletion aims to replace lost water and electrolytes and involves the administration of isotonic fluids (224, 271).

NICE conducted a set of systematic reviews to assess the best protocol for assessment and management of fluid and electrolyte status in hospitalized patients (271), including older adults. Their evidence base was updated in 2017. Their resultant guidance and flowchart suggest that where a patient is hypovolemic and needs fluid resuscitation then this should occur immediately. Where fluid resuscitation is not needed then assessment of patients' likely fluid and electrolyte needs should be met orally or enterally where possible, but if not feasible then intravenous fluid should be considered. Where electrolyte levels are low this would suggest replacement with isotonic fluids (fluids with sodium, potassium and glucose concentrations similar to those within the body) such as oral rehydration therapy. Isotonic or slightly hypotonic fluids are ideal (224). NICE provides a set of interrelated algorithms for assessment, fluid resuscitation, routine intravenous maintenance and replacement and redistribution of fluid and electrolytes.

4.2 Vomiting, diarrhea

4.2.1 Diagnosis of volume depletion

78) In older adults, volume depletion following fluid and salt loss with vomiting or diarrhea should be assessed by checking a set of signs. A person with at least four of the following seven signs is likely to have moderate to severe volume depletion: confusion, non-fluent speech, extremity weakness, dry mucous membranes, dry tongue, furrowed tongue, sunken eyes.

(R81, Grade B, strong consensus 95%)

Commentary

Volume depletion (reduced volume of extracellular fluids only, due to loss of fluids and electrolytes, also called salt loss or extracellular dehydration) occurs without raised serum or plasma osmolality, and following medical conditions resulting in excessive losses of fluid and electrolytes, such as bleeding, vomiting, and diarrhea (221-224).

Signs following fluid and salt loss with vomiting or diarrhea are less clear. A systematic review of signs associated with volume depletion after vomiting or diarrhea suggests that no signs are individually very useful, but that a person having at least four of the following seven signs is likely to have moderate to severe volume depletion: confusion, non-fluent speech, extremity weakness, dry mucous membranes, dry tongue, furrowed tongue, sunken eyes, However, the authors suggested that this form of diagnosis needs further assessment (273). Decreased venous filling (empty veins) and low blood pressure may also be good signs of hypovolemia.

4.2.2 Treatment of volume depletion

Please refer to recommendation 77 in chapter 4.1.2.

5. Treatment of obesity

5.1 Indication of weight-reducing diets

79) In overweight older persons, weight-reducing diets shall be avoided in order to prevent loss of muscle mass and accompanying functional decline.

(R54, Grade GPP, strong consensus 95%)

Commentary

Experts generally agree that there is usually no need for overweight older people to lose weight (274-278) as meta-analyses indicate that the mortality risk of healthy older people is lowest in the overweight range (279-281). Further, weight loss, whether intentional or not, enhances the age-related loss of muscle mass and consequently increases the risk of sarcopenia, frailty, functional decline, fractures, and malnutrition (276, 282, 283). Moreover, the common weight-regain after a weight-reducing diet is predominantly a regain in fat mass and not in lean mass (283). Thus, repeated phases of weight loss and regain, called "weight cycling", might contribute to the development of sarcopenic obesity (the presence of reduced muscle mass together with excess fat mass) (283). Therefore, and to avoid a progression to obesity, maintaining stable BW is considered desirable for overweight older adults (11). A combination of a balanced, nutrient-rich diet providing adequate amounts of energy and protein, and physical activity, if possible even exercise, is a sound strategy to keep weight stable and to prevent obesity (284).

80) In obese older persons with weight-related health problems, weight-reducing diets shall only be considered after careful and individual weighing of benefits and risks.

(R55, Grade GPP, strong consensus 100%)

Commentary

Obesity, especially severe obesity (BMI ≥35 kg/m^2), increases metabolic and cardiovascular risk as well as the risk of mobility limitations and frailty in older persons (277, 278, 285), particularly when marked muscle loss has already occurred (283). Current expert recommendations regarding weight reduction in older people primarily refer to cases of obesity that are associated with comorbidities and obesity-related adverse health effects (276-278, 282). In these cases, positive effects of intended weight loss on orthopedic problems, cardiovascular and metabolic risk, insulin sensitivity, chronic inflammation, and functional limitations have been reported, partly in combination with physical exercise (11, 274, 276, 278, 285, 286). On the other hand, as weight loss in older persons may have harmful effects due to the loss of lean mass (see commentary to recommendation 54), the decision for or against weight reduction shall always be taken at the individual level. It should be based on a careful weighing of possible risks and benefits of the intervention considering functional resources, metabolic risk, comorbidities, patients' perspective and priorities, and estimated effects on his or her quality of life (274, 286). If a decision is made against weight reduction, it is advisable to aim at weight stability and avoidance of further aggravation of obesity (11).

5.2 Implementation of weight-reducing diets

81) If weight reduction is considered in obese older persons, energy restriction shall be only moderate in order to achieve a slow weight reduction and preserve muscle mass.

(R56, Grade GPP, strong consensus 95%)

Commentary

If weight reduction is considered to be beneficial, it has to be approached with great care (274, 275). Interventions working in young adults cannot simply be extrapolated to older populations with low muscle mass and frailty (282). To avoid loss of muscle mass and to achieve a slow weight reduction in older persons, the dietary intervention should consist of a balanced diet, as generally recommended for older adults, with a maximally moderate caloric restriction (~500 kcal/d less than estimated needs and maintaining a minimum intake of 1000-1200 kcal/d) targeting a weight loss of 0.25-1 kg/week (~5-10% of initial BW after six months or more) and assuring a protein intake of at least 1 g/kg BW/d and appropriate intake of micronutrients (276, 278, 287). Strict dietary regimens, like diets with very low energy intake (<1000 kcal/day), are strongly discouraged in the older population due to the risk of developing malnutrition and promoting functional decline (60, 278, 283).

82) If weight reduction is considered in obese older persons, dietary interventions shall be combined with physical exercise whenever possible in order to preserve muscle mass.

(R57, Grade A, strong consensus 100%)

Commentary

Twelve RCTs were identified that compared the effects of a dietary weight loss intervention alone to a combination of the same dietary intervention with an exercise intervention in older persons (288-299). Three studies were restricted to obese persons (289, 291, 292), the others included mixed samples of obese and overweight older persons.

In ten trials, a weight-reducing diet alone resulted in the desired weight loss, which consisted of fat mass as well as lean mass (290-292, 294-299). The combination with

exercise training had comparable if not greater effects than the singular weight-reducing diets regarding the reduction of BW and fat mass, while often preserving lean mass better than diet alone (289-291, 295-297, 299). Moreover, for several physical and strength-performance measures, greater improvements were observed in the combined groups than in the diet-only groups (288-291, 293-297, 299). In these studies, the weight-reducing diets consisted of a balanced diet with a daily energy deficit of 300-1000 kcal, aiming at a weight loss of 5-10% of initial BW and/or 0.25-1 kg per week (288-299).

It should be considered that the participants of the above-mentioned RCTs were mostly "young-old" (60-70 years) not representing a typical geriatric population. As very old and frail persons are more vulnerable to any kind of stress, decisions for or against weight loss require particular care in this population subgroup (see commentary to Recommendation 55). Also, interventions need to be conducted with particular caution and close monitoring (11, 275).

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Fig. 1

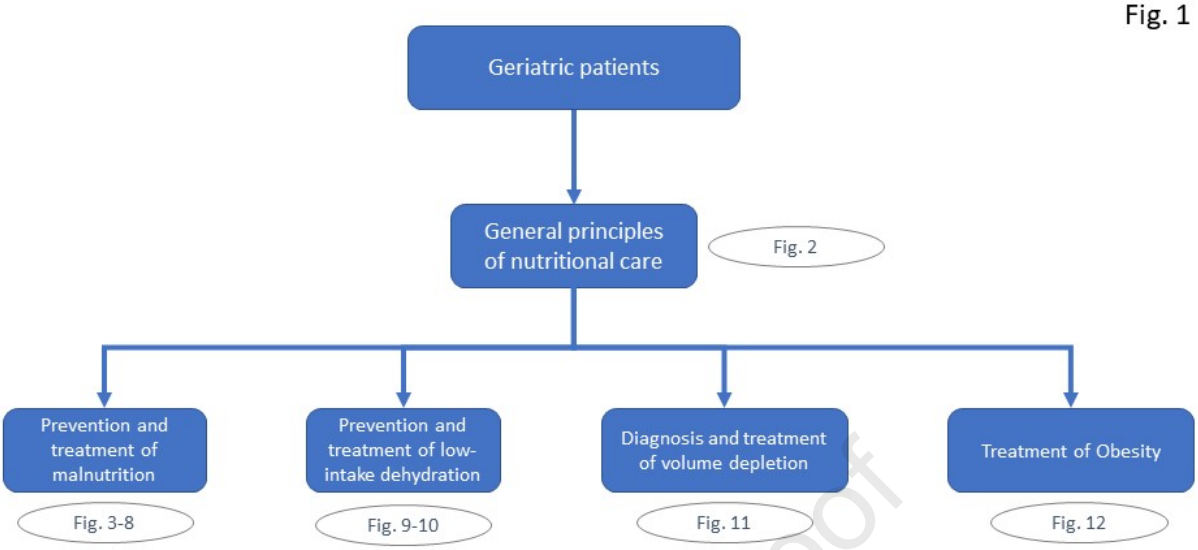
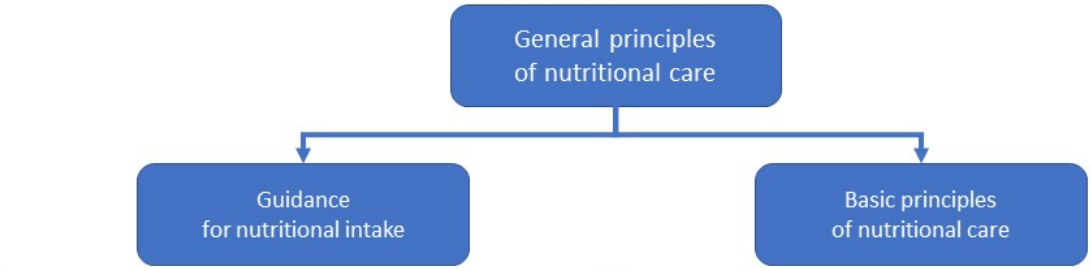


Fig. 2



R1) Guiding value for **energy** intake in older persons is **30 kcal per kg body weight** and day; this value should be individually adjusted with regard to nutritional status, physical activity level, disease status and tolerance. (R1)

R2) **Protein** intake in older persons should be at least **1 g protein per kg body weight** and day. The amount should be individually adjusted with regard to nutritional status, physical activity level, disease status and tolerance. (R2)

R3) For EN, **fiber**-containing products should be used. (R3)

R4) Provided that there is no specific deficiency, **micronutrients** should be delivered according to the recommendation for healthy older persons. (R4)

R5) Older **women** should be offered at least **1.6 L of drinks each day**, while older **men** should be offered at least **2.0 L of drinks each day** unless there is a clinical condition that requires different approach. (R61)

R6) In institutional settings, **standard operating procedures** for nutritional and hydration care shall be established and responsibilities well regulated. (R7)

R7) Nutritional and hydration care for older persons shall be **individualized** and **comprehensive** in order to ensure adequate nutritional intake, maintain or improve nutritional status and improve clinical course and quality of life. (R8)

R8) Nutritional interventions for older persons should be part of a **multimodal** and **multidisciplinary team intervention** in order to support adequate dietary intake, maintain or increase body weight and improve functional and clinical outcome. (R9)

R9) Potential **causes** of malnutrition and dehydration shall be **identified and eliminated** as far as possible. (R10)

R10) **Dietary restrictions** that may limit dietary intake are potentially harmful and should be **avoided**. (R11)

R11) Health care professionals as well as informal caregivers should be offered **nutritional education** in order to ensure awareness of and basic knowledge on nutritional problems and thus promote adequate dietary intake of older persons with malnutrition or at risk of malnutrition. (R17)

Fig. 3

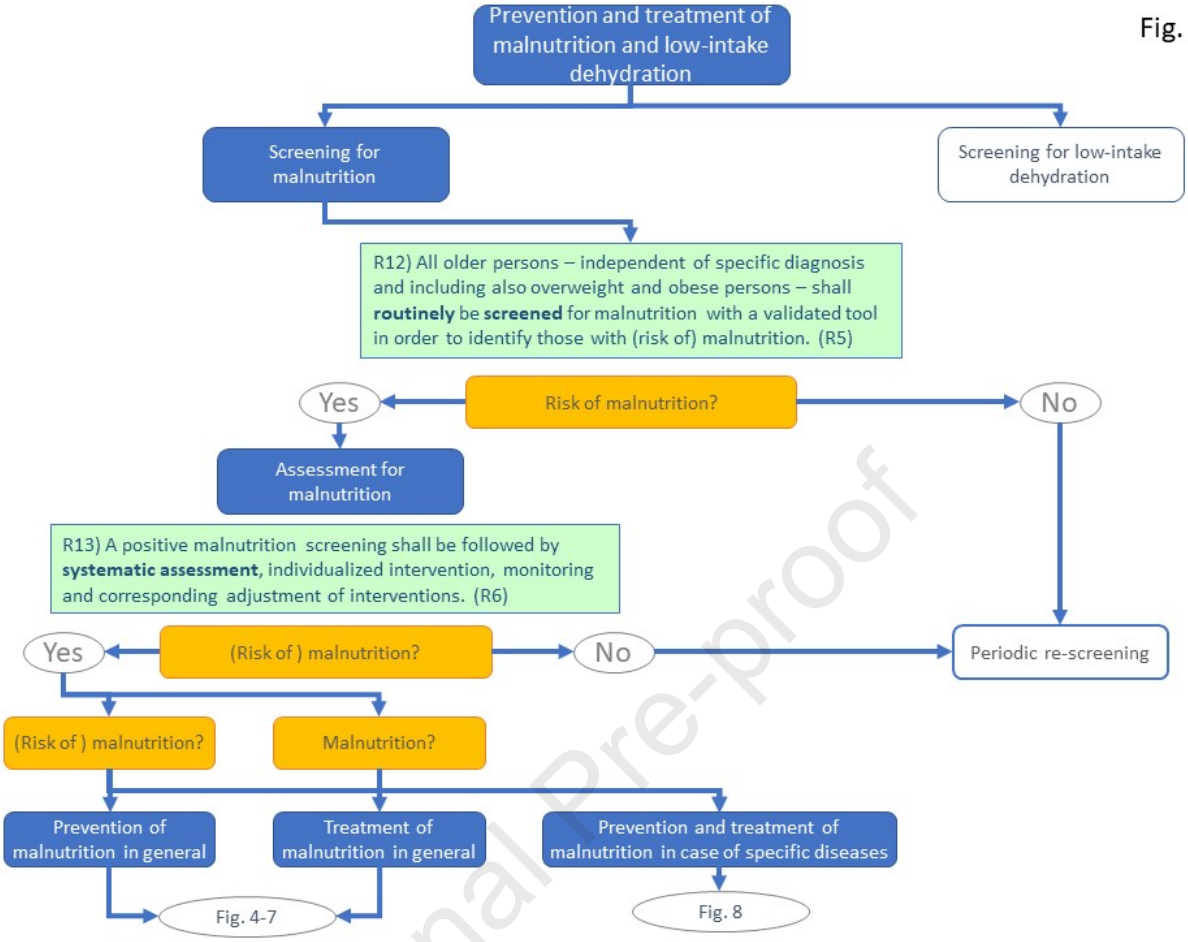


Fig. 4

R14) Older persons with malnutrition or at risk of malnutrition and with eating dependency in institutions (A) as well as at home (GPP) shall be offered **mealtime assistance** in order to support adequate dietary intake. (R12)

R15) In institutional settings, food intake of older persons with malnutrition or at risk of malnutrition shall be supported by a **home-like, pleasant dining environment** in order to support adequate dietary intake and maintain quality of life. (R13)

R16) Older persons with malnutrition or at risk of malnutrition should be encouraged to **share** their **mealtimes with others** in order to stimulate dietary intake and improve quality of life. (R14)

R17) **Meals on wheels** offered to home-dwelling older persons with malnutrition or at risk of malnutrition should be **energy-dense** and/or include **additional meals** to support adequate dietary intake. (R15)

R18) Older persons with malnutrition or at risk of malnutrition should be offered **nutritional information and education** as part of a comprehensive intervention concept in order to improve awareness of and knowledge about nutritional problems and thus promote adequate dietary intake. (R16)

R19) In addition to nutritional interventions, older persons with malnutrition or at risk of malnutrition should be encouraged to be physically active and to exercise in order to maintain or improve muscle mass and function. (R41)

R20) During periods of exercise interventions, adequate amounts of energy and protein should be provided to older persons with malnutrition or at risk of malnutrition to maintain body weight and maintain/improve muscle mass. (R42)

R21) Older persons with malnutrition or at risk of malnutrition and/or their caregivers should be offered **individualized nutritional counselling** in order to support adequate dietary intake and improve or maintain nutritional status. (R18)

R22) Individualized nutritional counselling should be offered by a qualified dietician to affected persons and/or their caregivers, should consist of several (at least 2) individual sessions that may be combined with group sessions, telephone contacts and written advice and should be maintained over a longer period of time. (R19)

R23) Older persons with malnutrition or at risk of malnutrition should be offered **fortified food** in order to support adequate dietary intake. (R20)

R24) Older persons with malnutrition or at risk of malnutrition should be offered **additional snacks**, and/or **finger food**, in order to facilitate dietary intake. (R21)

R25) Older persons with malnutrition or at risk of malnutrition and signs of oropharyngeal dysphagia and/or chewing problems shall be offered **texture-modified, enriched foods** as a compensatory strategy to support adequate dietary intake. (R22)

Fig. 5

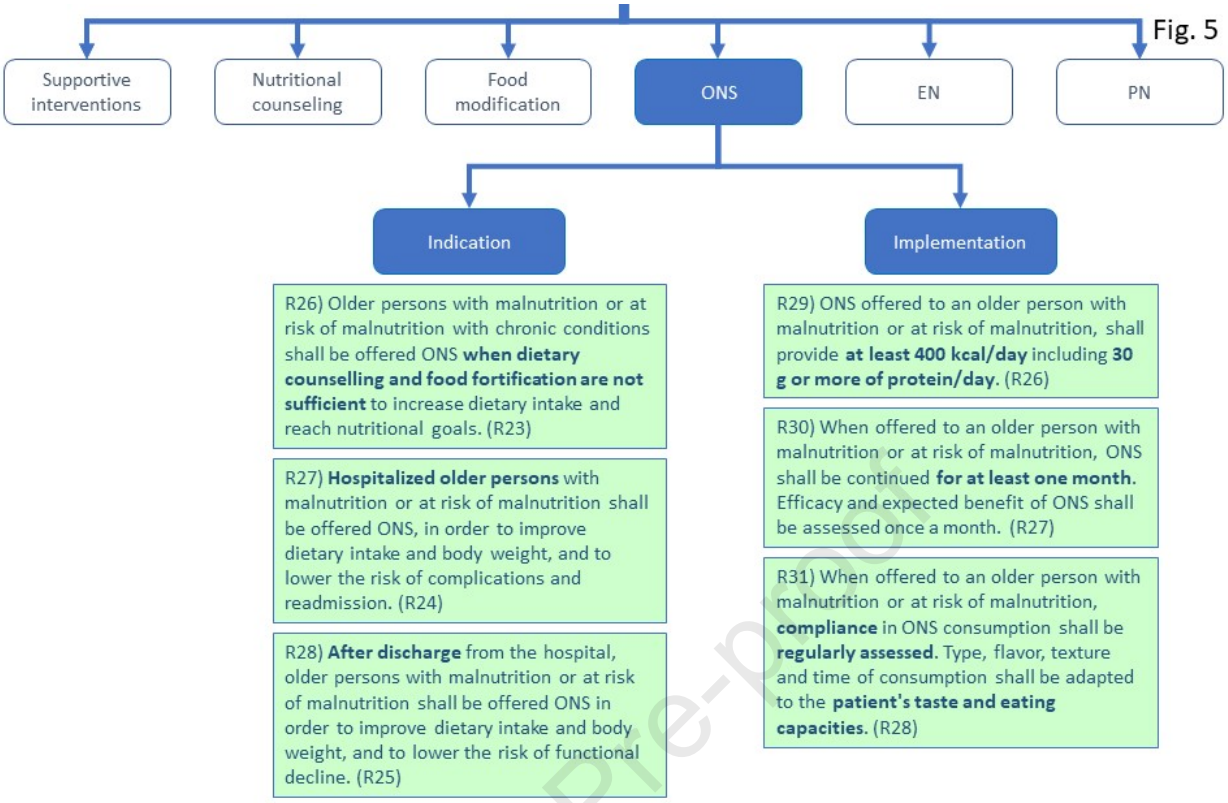
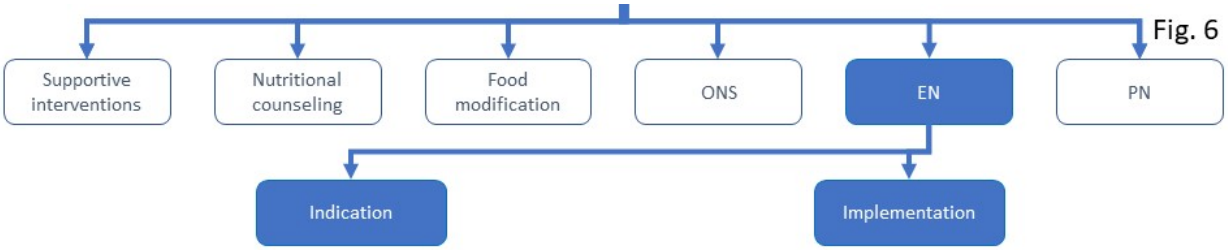


Fig. 6



Indication

R32) Older persons with reasonable prognosis shall be offered EN if oral intake is expected to be impossible for more than three days or expected to be below half of energy requirements for more than one week, despite interventions to ensure adequate oral intake, in order to meet the nutritional requirements and maintain or improve nutritional status. (R29)

R33) The expected benefits and potential risks of EN shall be evaluated individually and reassessed regularly and when the clinical condition changes. (R30)

R34) Older persons with low nutritional intake in the terminal phase of illness shall be offered **comfort feeding** instead of EN. (R31)

Implementation

R35) If EN is indicated, it shall be **started without delay**. (R32)

R36) Older patients who require EN presumably for less than four weeks should receive a **nasogastric tube**. (R33)

R37) Older patients expected to require EN for more than four weeks or who do not want or tolerate a nasogastric tube should receive a percutaneous gastrostomy / **PEG**. (R34)

R38) Tube fed older patients shall be encouraged to **maintain oral intake** as far as safely possible. (R35)

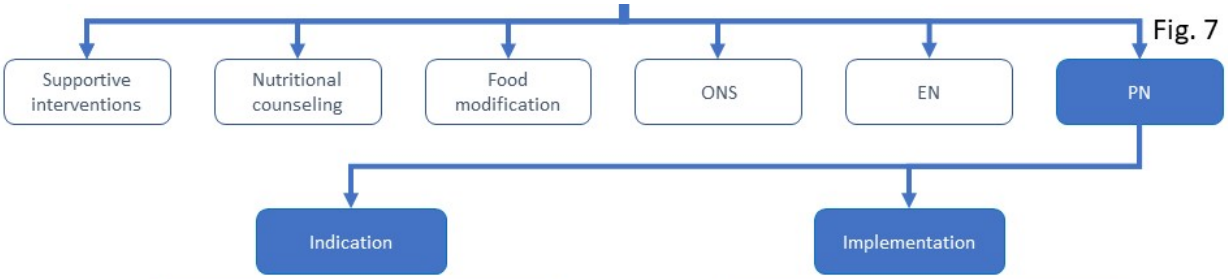
R39) EN and PN and hydration shall be considered as **medical treatments** rather than as basic care, and therefore should only be used if there is a realistic chance of improvement or maintenance of the patient´s condition and quality of life. (R37)

R40) Older patients should **NOT** receive **pharmacological sedation** or **physical restraints** to make EN or PN or hydration possible. (R38)

R41) In older patients with malnutrition, EN and PN shall **start early**; it shall be **gradually increased** during the first three days in order to avoid the refeeding syndrome. (R39)

R42) During the first three days of EN and PN therapy in malnourished older persons, **special attention** shall be drawn **to blood levels of phosphate, magnesium, potassium and thiamine** which shall be supplemented even in case of mild deficiency. (R40)

Fig. 7



R43) Older persons with reasonable prognosis (expected benefit) shall be offered PN if oral and enteral intake are expected to be impossible for more than three days or expected to be below half of energy requirements for more than one week, in order to meet nutritional requirements and maintain or improve nutritional status. (R36)

R39) EN and PN and hydration shall be considered as **medical treatments** rather than as basic care, and therefore should only be used if there is a realistic chance of improvement or maintenance of the patient´s condition and quality of life. (R37)

R40) Older patients should **NOT** receive **pharmacological sedation** or **physical restraints** to make EN or PN or hydration possible. (R38)

R41) In older patients with malnutrition, EN and PN shall **start early**; it shall be **gradually increased** during the first three days in order to avoid the refeeding syndrome. (R39)

R42) During the first three days of EN and PN therapy in malnourished older persons, **special attention** shall be drawn **to blood levels of phosphate, magnesium, potassium and thiamine** which shall be supplemented even in case of mild deficiency. (R40)

Fig. 8

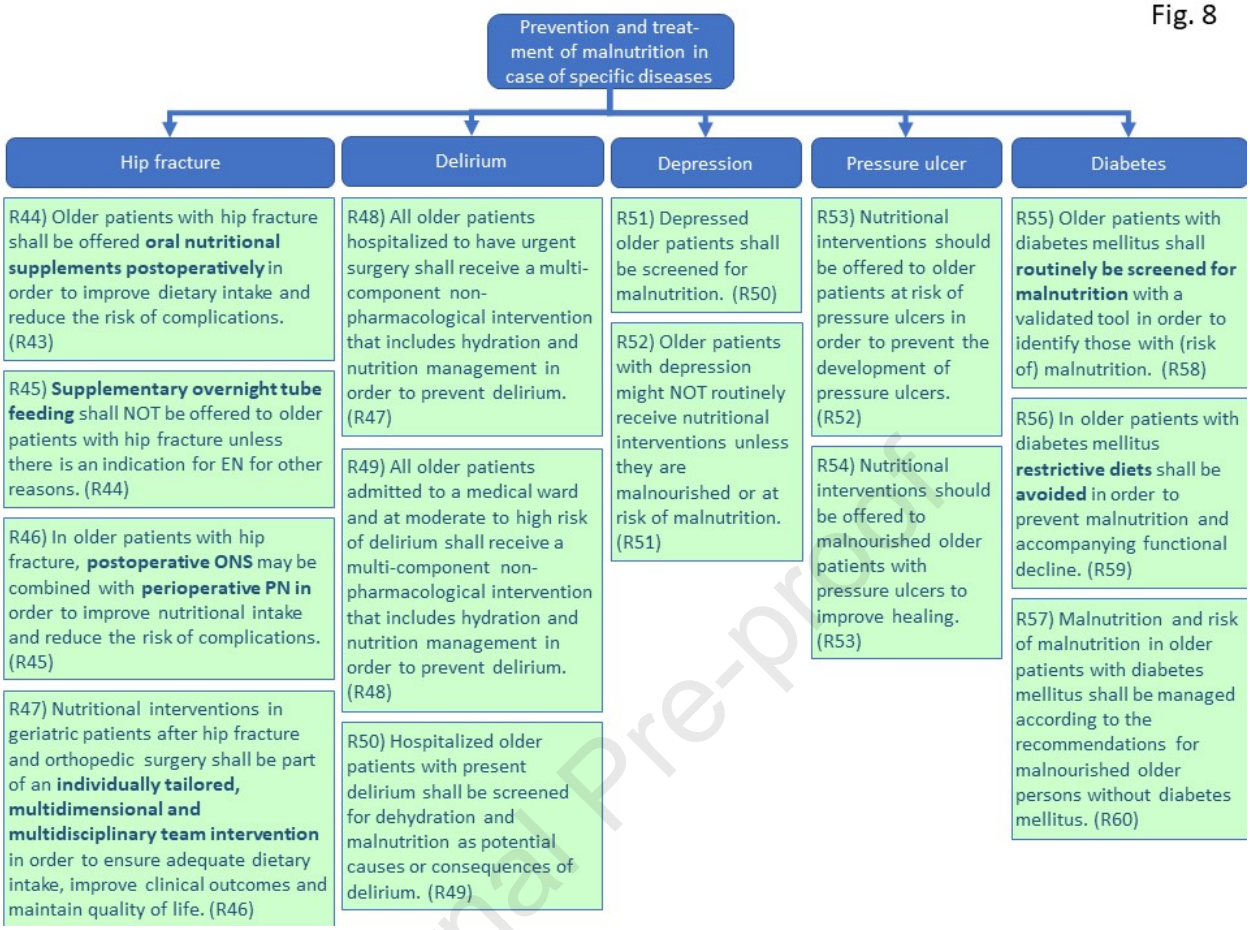


Fig. 9

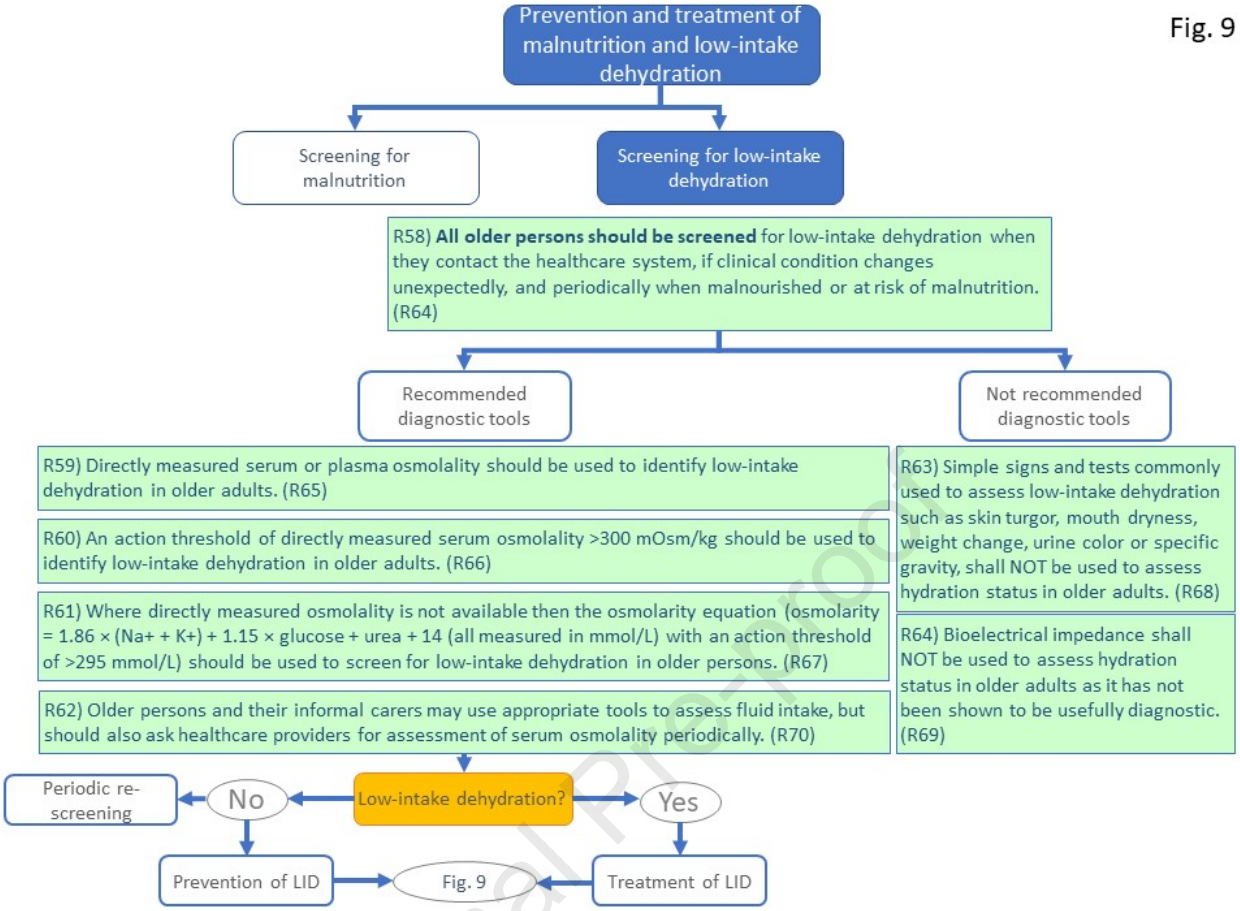


Fig. 10

Prevention of LID

R65) **All older persons** should be considered to be **at risk** of low-intake dehydration and encouraged to consume adequate amounts of drinks. (R63)

R66) A **range of appropriate** (i.e. hydrating) **drinks** should be offered to older people according to their preferences. (R62)

R67) To prevent dehydration in older persons living in residential care, institutions should implement multicomponent strategies across their institutions for all residents. (R74)

R68) Multi-component strategies to prevent dehydration in older persons living in residential care should include high availability of drinks, varied choice of drinks, frequent offering of drinks, staff awareness of the need for adequate fluid intake, staff support for drinking and staff support in taking older adults to the toilet quickly and when they need it. (R75)

R69)Strategies to support adequate fluid intake should be developed including older persons themselves, staff, management and policymakers. (R76)

R70) Care plans for older adults in institutions should record individual preferences for drinks, how and when they are served, as well as continence support, to promote drinking. Assessment of individual barriers and promoters of drinking should lead to plans for supporting drinking specific to each older person. (R77)

R71) At a regulatory level, the strategy of mandatory monitoring and reporting by institutions of hydration risks in individual residents and patients should be considered. (R78)

R72) Older adults who show signs of dysphagia should be assessed, treated and followed up by an experienced speech and language therapist. Their nutrition and hydration status should be carefully monitored in consultation with the speech and language therapist and a dietician. (R79)

Treatment of LID

R73) Older adults with measured serum or plasma osmolality >300 mOsm/kg (or calculated osmolarity >295 mmol/L) who appear well should be encouraged to increase their fluid intake in the form of drinks preferred by the older adult. (R71)

R74) For older adults with measured serum or plasma osmolality >300 mOsm/kg (or calculated osmolarity >295 mmol/L) who appear unwell, subcutaneous or intravenous fluids shall be offered in parallel with encouraging oral fluid intake. (R72)

R75) For older adults with measured serum or plasma osmolality >300 mOsm/kg (or calculated osmolarity >295 mmol/L) and unable to drink, intravenous fluids shall be considered. (R73)

Fig. 11

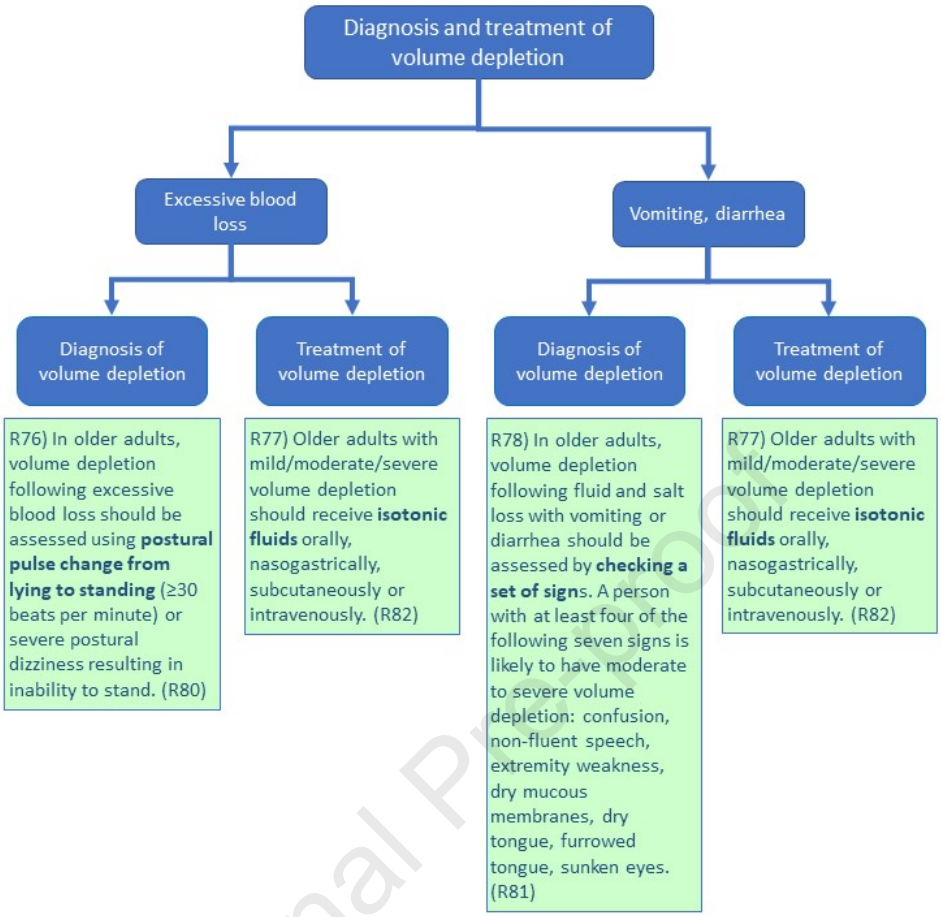


Fig. 12