

REVIEW ARTICLE

NUTRITION IN MEDICINE

Malnutrition in Older Adults

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N Engl J Med 2025;392:2244-55.

DOI: 10.1056/NEJMr2412275

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HEALTHY DIETARY PATTERNS ARE ASSOCIATED WITH LONGER AND healthier lives.¹⁻³ Malnutrition is a state of imbalance between the intake or uptake of nutrients and body needs that leads to altered body composition, reduced physical and mental functioning, and impaired clinical outcomes.^{4,5} Malnutrition is an umbrella term that includes obesity, undernutrition, and single-nutrient deficiencies, but it has also been used as a synonym for undernutrition.⁴ In this article, malnutrition is used to describe undernutrition (protein–energy malnutrition), as defined in the *International Classification of Diseases, 11th Revision*, with emphasis on features that are specific to older adults. A general description of malnutrition has been published in an earlier review article in the *Journal*.⁵ In older adults, malnutrition has been shown to carry serious adverse consequences, including physical and cognitive disability, increased complications and poorer outcomes of disease, increased length of inpatient stay, poor quality of life, and increased costs.⁶⁻⁹

EPIDEMIOLOGIC FACTORS OF MALNUTRITION

Malnutrition is common among older adults, with the risk increasing with age. However, epidemiologic data depend strongly on the care setting, country, and diagnostic criteria used. Traditionally, in the absence of a global consensus on the definition and diagnosis of malnutrition, a screening tool that was developed to identify at-risk older adults — the Mini Nutritional Assessment^{10,11} — has been widely used to assess older adults for malnutrition. Assessments with this tool indicate that the prevalence of malnutrition is approximately 3% among community-dwelling older adults, 22% among hospital inpatients, and nearly 30% in older adults in nursing home, long-term care, or rehabilitation and post-acute care settings.¹² The prevalence of malnutrition in low-resource community settings can be as high as 18%.¹³ The Global Leadership Initiative on Malnutrition (GLIM) diagnostic criteria, which have been endorsed by major scientific societies worldwide,¹⁴ have been used in studies that show an even greater prevalence of malnutrition, ranging from 7 to 13% among older adults in community settings¹⁵⁻¹⁷ and reaching approximately 50% among older patients who are hospitalized, have cancer or heart failure, or who are in geriatric rehabilitation settings or nursing homes.¹⁸⁻²⁴

ETIOLOGIC FACTORS

Malnutrition can be caused by reduced food intake, increased nutritional requirements, impaired gastrointestinal uptake, or increased excretion of nutrients. In contrast to malnutrition among younger adults, which usually occurs in the context of illness,⁵ malnutrition in older adults is more strongly associated with reduced food intake. Here we present an overview of the main causes, risk factors,

KEY POINTS

MALNUTRITION IN OLDER ADULTS

- Malnutrition is common in older adults and has serious adverse consequences.
- The cause of malnutrition is usually multifactorial, owing to the interaction of physiological changes of aging, physical and mental impairments, diseases, medications, social settings, and dietary factors.
- The Global Leadership Initiative on Malnutrition framework is used for the syndromic diagnosis of malnutrition. Once malnutrition is confirmed, a careful search for the underlying causes is indicated.
- Effective guideline-based strategies are available to prevent and treat malnutrition in older adults.

and determinants of malnutrition in older adults (Table 1).

PHYSIOLOGICAL ASPECTS OF AGING

Age-related changes in the complex system of appetite regulation are responsible for anorexia of aging, which is increasingly recognized as a major cause of reduced food intake in older adults.^{25,26} Changes in peripheral gastrointestinal hunger- and satiety-signaling patterns and central hypothalamic control mechanisms result in a reduced feeling of hunger and faster and longer-lasting satiety after a meal. Age-related declines in the perception of smell and taste contribute to age-related anorexia.²⁷ These changes may be a reasonable adaptation to the generally decreasing energy requirements associated with increasing age,²⁸ but they also cause older adults to be susceptible to chronic malnutrition, especially in the presence of other risk factors.

PHYSICAL IMPAIRMENTS

Poor oral health can lead to malnutrition.²⁹ Chewing problems — not only those caused by inadequate dentures but also those due to infection or inflammation in the mouth or xerostomia — hinder food intake, as do swallowing disorders (dysphagia), which are mainly caused by neurologic diseases, especially stroke, dementia, and Parkinson's disease. In addition, disabilities affecting the arms and hands, such as those due to osteoarthritis or stroke, can make it difficult to eat and drink independently, and mobility limitations affect the ability to shop for groceries and cook.

MENTAL IMPAIRMENTS

Cognitive impairment and dementia usually affect nutrition at some point.³⁰ Behavioral changes often reduce intake and may increase energy expenditure (e.g., wandering); other impairments common in late-stage dementia are weight loss,

dehydration, and the inability to eat, chew, or swallow. Delirium impairs food intake, particularly in hospital settings.³¹ Depression is a cause of anorexia in persons of any age and is considered a major contributor to anorexia and malnutrition in old age.³² In addition, psychiatric eating disorders such as anorexia nervosa, which are thus far rare in old age, should not be overlooked.³³

DISEASES AND MEDICATIONS

Health impairments are a major threat to nutritional intake and status (i.e., disease-related malnutrition), especially in older adults, who have a higher incidence of acute disease and greater prevalence of chronic diseases than younger adults. Acute and chronic diseases can reduce appetite, increase energy and nutrient requirements, and impair digestion and nutrient absorption. In a large data set of geriatric hospitalized patients from five European countries, the severity of inflammation was associated with a reduction in food intake.³⁴ Perioperative anorexia is another relevant but often overlooked risk factor for malnutrition and poor surgical outcomes in older patients.³⁵ Prolonged fasting before testing and surgery may promote the development of malnutrition in hospitalized patients.

Disease-related malnutrition is underdiagnosed and undertreated at all ages but is particularly relevant in older adults with multiple chronic conditions, a fact that in 2023 prompted the World Health Organization to issue a call for action.³⁶ The mechanisms by which different chronic diseases lead to malnutrition are numerous and still not fully understood, especially in the presence of inflammation, when malnutrition is intertwined with cachexia.³⁷ Each condition may affect nutrition through different pathways (e.g., inflammation, metabolic derangements, appetite, and treatments). The association between multiple health conditions and malnutrition is

Table 1. Possible Causes of Insufficient Food Intake and Malnutrition in Older Adults.

Age-related physiological changes
Loss of appetite (anorexia of aging)
Decreased sensory perception (taste, smell, or vision)
Incomplete compensation of weight loss
Physical impairments
Difficulty chewing owing to tooth loss, decayed teeth, ill-fitting dentures, inflammation, oral infections, or dry mouth
Difficulty swallowing (dysphagia)
Impairment in hands or arms resulting in difficulty cutting or preparing food
Limited mobility resulting in difficulty shopping for food and cooking
Mental impairments
Cognitive impairment or dementia (e.g., apraxia, behavioral disorders, and apathy)
Depression or dysthymia
Delirium
Altered day–night rhythm
Psychiatric eating disorder (e.g., anorexia nervosa and delusion of slimming or poisoning)
Health impairments
Gastrointestinal symptoms (e.g., constipation, nausea, and vomiting)
Gastrointestinal diseases
Acute and chronic illness
Acute and chronic pain
Polypharmacy or medication side effects
Food intolerance or allergy
Restrictive prescription diets (e.g., low fat, low cholesterol, and low salt)
Social and financial difficulties
Loneliness or social isolation
Life events (e.g., bereavement and relocation to a nursing home)
Lack of assistance with shopping, meal preparation, and eating
Neglect
Unsatisfactory dining situation in an institution (e.g., environment and company)
Low income or poverty
Direct dietary factors and poor habits
Restrictive diets
Small meals or skipped meals
Unbalanced diet or omission of valuable food groups
Inadequate or unappealing food offered in hospitals and institutions
High alcohol consumption or alcoholism

probably a bidirectional pathway, because malnutrition increases a patient's risk of the development of additional health issues.³⁸ Inflammaging, a chronic low-grade inflammatory state associated with aging and influenced by lifelong diet,³⁹ may modulate appetite, taste, protein metabolism, and response to nutritional interventions.^{39,40}

Most medications have at least one gastrointestinal side effect (e.g., decreased appetite, sensory impairment, nausea, constipation, or xerostomia) that can reduce food intake. Polypharmacy may also adversely affect the bioavailability of nutrients. The risk of drug-related nutrient deficiencies generally increases with the number of medications and the duration of use.⁴¹

SOCIAL AND FINANCIAL DIFFICULTIES

Meals are important social events for older adults, and loneliness, eating alone, and social isolation can diminish appetite and reduce food intake.⁴² Major life events, such as the loss of a spouse or a move into a care home, can affect the person's desire to live and eat and can cause serious weight loss. For persons in need of assistance and care, nutrition is highly dependent on the type and extent of support they receive. Poverty is a risk factor for inadequate nutrition and malnutrition, even in affluent societies, that may go unnoticed.⁴³ In hospitals and institutions, the quality of nutritional care — from meals to nursing care to enteral or parenteral nutrition — is critical to the nutritional status of patients and residents, but adequate nutrition is threatened by time and cost pressures as well as a lack of nutritional awareness and knowledge among health care workers.⁴⁴

DIRECT NUTRITIONAL FACTORS

Many dietary factors, such as unbalanced food choices, skipped meals, or high alcohol consumption, can contribute to inadequate intakes of energy and essential nutrients. Many older adults are very careful about adhering to self-imposed or prescribed dietary guidelines, thereby unnecessarily restricting their diet.

RISK FACTORS

As is the case with many syndromes in older adults, malnutrition is usually multifactorial, with an individual mix of triggers that vary in

type and importance from person to person. The presence and relevance of particular factors may also vary in different health care settings, but the scientific evidence is sparse and inconsistent. In geriatric acute care units, acute illness is usually the most important cause of malnutrition, especially in the presence of poor nutritional awareness and practices.⁴⁵ In nursing homes, cognitive and functional impairment are important risk factors.⁴⁶ In community-dwelling older adults, functional limitations and hospitalizations are relevant triggers of malnutrition,^{47,48} and social isolation may also play an important role. In general, the risk of malnutrition increases with the number of individual risk factors that are pres-

ent (e.g., increasing disability and deteriorating health), an association that has been shown in a secondary analysis of cross-sectional studies in different health care settings.⁴⁹

THE DOMAP MODEL

The Determinants of Malnutrition in Aged Persons (DoMAP) model was developed in a multistage consensus process aimed at increasing understanding regarding the etiologic drivers of malnutrition (Fig. 1).⁵⁰ The model not only limits the number of potential influencing factors to those that the experts who designed the model considered to be the most important, but also reflects causal mechanisms by classifying direct and in-

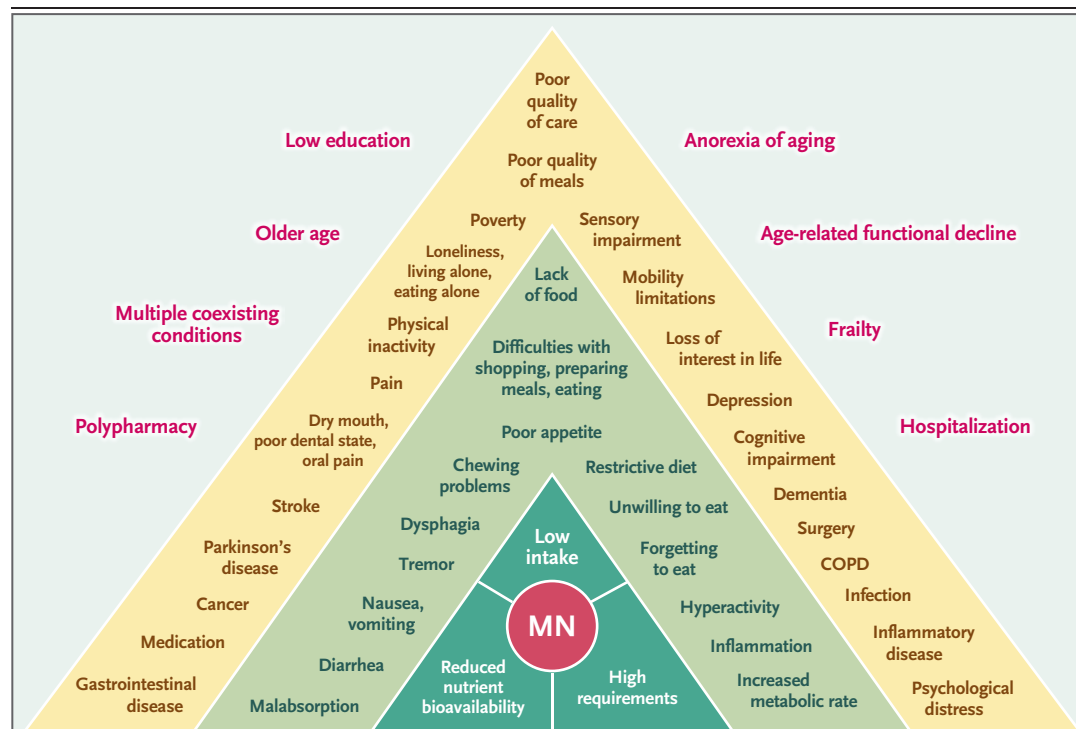


Figure 1. Determinants of Malnutrition in Aged Persons (DoMAP) Model.

All the factors shown — regardless of their position within the DoMAP model — are considered to be potential determinants of malnutrition (MN), meaning that they may contribute to the development of malnutrition in a causative manner. The levels illustrate different modes of action: level 1 (dark green) denotes central etiologic mechanisms, level 2 (light green) denotes factors that directly lead to one of the three mechanisms in level 1 (e.g., dysphagia may directly cause low intake), and level 3 (yellow) denotes factors that indirectly lead to one or more of the three central mechanisms through one or more of the direct factors in the green triangle (e.g., stroke may cause low intake due to dysphagia or difficulties with eating). Factors shown in red text are age-related changes and general aspects that also contribute to the development of malnutrition but through means that are more indirect or subtle. The figure is adapted from the Malnutrition in the Elderly Knowledge Hub Toolbox (<https://www.healthydietforhealthylife.eu/manual-toolbox>).

direct factors in separate but adjacent levels. Although the model is as yet unvalidated, it might be useful as a checklist to help identify persons at increased risk for malnutrition and to guide a clinical approach to older patients with malnutrition in clinical practice.

ACUTE VERSUS CHRONIC MALNUTRITION

Malnutrition in older adults often is an acute condition brought on by illness or severe psychological stress, leading to significant weight loss within a few days or weeks. This is usually easily detected in clinical practice both by patients and health professionals. However, weight loss can also occur slowly and continuously over a longer period of time as a result of a persistent slight reduction in food intake or a slight increase in nutritional requirements (e.g., due to chronic illness or stress). For this reason, both U.S. and European nutrition societies recommend the use of validated screening tools to identify malnutrition risk.^{51,52}

DIAGNOSIS

SYNDROMIC DIAGNOSIS

The approach to diagnosing malnutrition in older adults is the same as that used in younger adults — the GLIM framework.¹⁴ This approach is based on the assessment of five criteria, three that are phenotypic (weight loss, low body-mass index [BMI, the weight in kilograms divided by the square of the height in meters], and low muscle mass) and two that are etiologic (low intake [or maldigestion or malabsorption] and inflammation), of which at least one criterion of each group must be present. The only difference in making the diagnosis in the two age groups is that a higher BMI cutoff value is used in persons older than 70 years of age: a BMI of less than 22 in an older adult indicates malnutrition, and a BMI of less than 20 indicates severe malnutrition.

A GLIM diagnosis of malnutrition begins with a screening test, although the necessity of this step is currently under discussion as it pertains to older patients in settings where malnutrition is highly prevalent (e.g., acute geriatric care units).⁵³ The best validated tool for use in assessing malnutrition in older adults is the Mini Nutritional Assessment–Short Form,¹¹ which uses only six

questions (assessing decreased food intake, recent weight loss, mobility, acute illness or stress, neuropsychological problems, and low BMI) to assign a score from 0 to 14 (lower scores indicate worse nutritional status). A score lower than 12 points is considered to indicate a risk of malnutrition; the diagnosis should be confirmed with the etiologic and phenotypic GLIM criteria. Other validated screening tools can be used in older adults in various care settings.⁵⁴ It is important to note that serum albumin and prealbumin levels or other traditionally used biomarker levels should not be used as nutritional markers.⁵⁵

ETIOLOGIC DIAGNOSIS

In resource-limited settings in underprivileged regions of the world, the most common etiologic factor of malnutrition at any age is low nutritional intake owing to limited access to high-quality food. In developed countries, however, malnutrition in older adults is usually the result of many converging factors and is best approached as a geriatric syndrome. When malnutrition is confirmed or there is a risk of malnutrition, a careful search for all possible causes and complicating factors is necessary, because it is unlikely that only nutritional interventions or treatment of any single aspect will reverse or cure malnutrition. The effect of all acute and chronic conditions (and the potential for interactions in persons with multiple conditions), medications, physical and mental disabilities, and social issues should be carefully assessed. This evaluation is best achieved with a comprehensive geriatric assessment, which will identify most of the factors involved.^{50,56,57} In older adults, any clinical situation can change rapidly, so regular reassessment is needed to identify additional complicating factors, especially if treatment does not produce the expected improvement in nutritional status.

DIFFERENTIAL DIAGNOSES

Malnutrition in older people is often associated with other common geriatric syndromes, particularly those in which nutrition plays a key etiologic role.^{58,59} Sarcopenia is the accelerated loss of skeletal muscle mass and function that is commonly, but not exclusively, associated with advancing age.⁶⁰ When low muscle mass is identified in the diagnosis of malnutrition (a GLIM etiologic criterion), assessment of muscle strength is essential, because sarcopenia can be a compli-

Table 2. Evidence-Based Intervention Strategies and Recommendations for the Management of Malnutrition.*

Strategy or Recommendation	Grade of Recommendation
Basic recommendations	
Routine screening for malnutrition with a validated tool in all older adults regardless of their nutritional status, followed by assessment, individualized intervention, and monitoring and adjustment of interventions	Good practice point
Individualized and comprehensive nutrition and hydration care	Strong evidence
Nutrition interventions as part of a multimodal and multidisciplinary team approach	Medium evidence
Nutrition education for health care professionals and informal caregivers	Medium evidence
Etiologic interventions	
Identification and management of potential causes of malnutrition and dehydration	Good practice point
Avoidance of dietary restrictions that may limit intake	Good practice point
Supportive interventions	
Mealtime assistance for persons with limited ability to feed themselves	Strong evidence in institutions, good practice point in home care
Homelike, pleasant eating environment in institutions	Strong evidence
Shared mealtimes with others	Good practice point
Energy-dense delivered meals (e.g., Meals on Wheels), with additional meals	Medium evidence
Nutrition information and education for older adults with malnutrition or at risk for malnutrition	Medium evidence
Physical activity to help maintain or improve appetite, muscle mass, and function	Good practice point
Individualized nutrition counseling for older adults and their caregivers	Medium evidence
Food modification	
Food fortification	Medium evidence
Supplementary snacks and finger foods	Good practice point
Texture-modified, fortified foods for older adults with malnutrition or at risk for malnutrition and signs of oropharyngeal dysphagia or masticatory problems	Good practice point
Oral nutritional supplements when dietary counseling and food fortification are not sufficient to meet nutritional goals	Strong evidence, good practice point (recommendations equally divided between the two grades) [†]
Enteral or parenteral nutrition for older adults with a reasonable prognosis (expected benefit) when oral or oral and enteral intake is expected to be impossible for more than 3 days or to be less than half the energy required for more than 1 week, despite interventions to ensure adequate oral intake	Good practice point [‡]

* Grades of recommendation are derived from European Society of Parenteral and Enteral Nutrition practical guidelines⁵²: strong evidence (at least one high-quality randomized, controlled trial), medium evidence (high-quality case-control studies or cohort studies), and good practice point, based on the clinical experience of the guideline-development group and strong consensus from a large expert panel.

[†] The recommendations in this category reflect summaries of 6 separate recommendations.

[‡] The recommendation in this category reflects a summary of 12 separate recommendations (all of which were good practice points).

ating condition of malnutrition that leads to impaired physical function and other adverse outcomes.⁶¹ Conversely, when sarcopenia is diagnosed, assessment for malnutrition should be made according to GLIM criteria, because malnutrition is a key etiologic factor in sarcopenia.^{51,52}

Cachexia has always been associated with malnutrition, because severe weight loss is key to the condition. Cachexia is associated with end-stage organ disease (e.g., heart failure or liver failure) and with conditions associated with high levels of inflammation. The diagnostic criteria for ca-

chexia have some elements in common with those for malnutrition (i.e., inflammation and weight loss). In the presence of cachexia or severe inflammation, nutritional interventions would not be expected to reverse the condition, so recognition and subsequent treatment of cachexia are important in an older patient with weight loss.^{62,63}

PREVENTION AND TREATMENT

Effective strategies exist to prevent malnutrition in persons who are at risk and to treat malnutrition when it is present. The current state of knowledge is summarized in the evidence-based guideline of the European Society of Parenteral and Enteral Nutrition regarding clinical nutrition and hydration in geriatric patients.⁵² Table 2 provides an overview of the main recommendations of this guideline.

DEFINITION OF TREATMENT GOALS

Individual treatment goals should be defined in terms of nutritional intake (specifically, energy and protein) and nutritional status (body weight and composition). The general aim is to enable energy and nutrient intake to meet the patient's needs and improve the patient's nutritional status or prevent deterioration, thereby supporting organ function, activity, and independence in daily life; strengthening the patient's individual resources; and increasing resistance to disease and complications.

GUIDANCE FOR NUTRITIONAL INTAKE

Energy intake of 30 kcal per kilogram of body weight per day is the target in older adults,⁵² but because of the enormous individual variability in energy requirements, this very rough estimate must be adjusted according to the patient's current and target nutritional status, physical activity level, disease status, and dietary tolerance (i.e., the ability to eat the necessary diet and the acceptability of the side effects of diet or supplements). The adequacy of intake should be assessed with close monitoring of body weight (taking into account fluid retention and losses) and the intake adjusted accordingly.

The exact protein requirements of older adults are still being debated,⁶⁴ but there is broad agreement that they should be higher than those of younger adults. An intake of at least 1.0 gram of protein per kilogram per day should be the goal

for older adults, particularly in those who are at risk for malnutrition, such as persons who are frail or have more than one illness or whose intake is often far below this level. Increased nutritional requirements (for muscle growth, tissue regeneration in malnutrition or wound healing, or increased metabolic requirements in illness) should be met by appropriately increased intakes.^{65,66} In the case of patients with renal insufficiency of stage 4 or 5 (out of 5 stages, with higher stages indicating worse kidney function), the benefits and risks of restricting protein intake need to be carefully considered.⁶⁷

In addition to energy and protein, all essential nutrients are necessary in adequate amounts. There are no known major differences in the nutritional requirements of younger adults and older adults, so there are no specific recommendations for older adults. A varied diet can generally meet the needs of an older adult. However, diets that deliver less than 1500 kcal per day present a risk of mineral and micronutrient deficiencies, so these substances may need to be supplemented directly or incorporated into oral nutritional products. Vitamin D deficiency is common in older adults and must be corrected if present. A recent consensus suggests that supplemental vitamin D at a dose of 1000 IU daily should be recommended in patients at increased risk for vitamin D deficiency.⁶⁸

GENERAL PRINCIPLES OF NUTRITIONAL CARE — PREVENTIVE, INDIVIDUALIZED, AND COMPREHENSIVE

Prevention of malnutrition is increasingly important as people age, because the condition develops more rapidly and is more difficult to treat in older adults than in younger adults. Early and rapid intervention is key to successfully addressing emerging nutritional problems. Therefore, older adults should undergo routine screening tests for malnutrition at regular intervals so that those at risk can be identified early.

Nutritional interventions should be individualized and take into account patient preferences and resources as well as the broad heterogeneity of older adults and of the causes of malnutrition. Strong evidence for an individualized approach comes from the EFFORT trial.⁶⁹ Although adult internal medicine patients of all ages were included in that trial, the mean age of the more than 2000 participants was 76 years, and only 17.5% were younger than 65 years of age.⁶⁹ Indi-

vidualized nutritional care by qualified nutritionists using protocol-guided interventions to achieve individual energy and protein intake targets led to a significant reduction in adverse clinical events within 30 days (the composite primary end point of death, transfer to intensive care, unplanned readmission, major complication, or decline in functional status), as well as lower 30-day mortality and improved functional status and quality of life. In a subgroup of 881 vulnerable patients, defined by advanced age (≥ 80 years), frailty, or cognitive impairment, the risk reduction for death within 30 days was even more pronounced. In line with the main study, the reduction in 180-day mortality and improvements in the Barthel Index score and quality-of-life scores were significant.⁷⁰

In addition, according to general geriatric principles, nutritional interventions must be comprehensive and take into account all relevant factors. All interventions should be embedded in the overall care plan and based on multiprofessional collaboration and communication among patients, relatives, caregivers, physicians, nutritionists, and therapists.⁷¹

ETIOLOGIC AND SUPPORTIVE INTERVENTIONS

Interventions to maintain or improve the nutritional status in older adults go well beyond purely nutritional measures and should address the specific causes of malnutrition in each patient (e.g., medication review to minimize adverse drug effects on food intake; dental or dysphagia treatment; appropriate aids for independent eating; home help; home-delivered meals, such as Meals on Wheels⁷² and similar programs; and meal companionship). In addition, a range of supportive interventions — from nursing support to physical activity — and individual nutrition counseling can help to improve an older adult's nutritional status (Table 2).

NUTRITIONAL INTERVENTIONS

The initial focus of direct nutritional interventions should be on oral nutrition. The usual diet may be deficient and provide opportunities for improvement — for example, by fortification of meals with nutrient-rich foods (e.g., eggs, cream, nuts, and vegetable oils) or with nutrient concentrates (e.g., protein powder and maltodextrin).

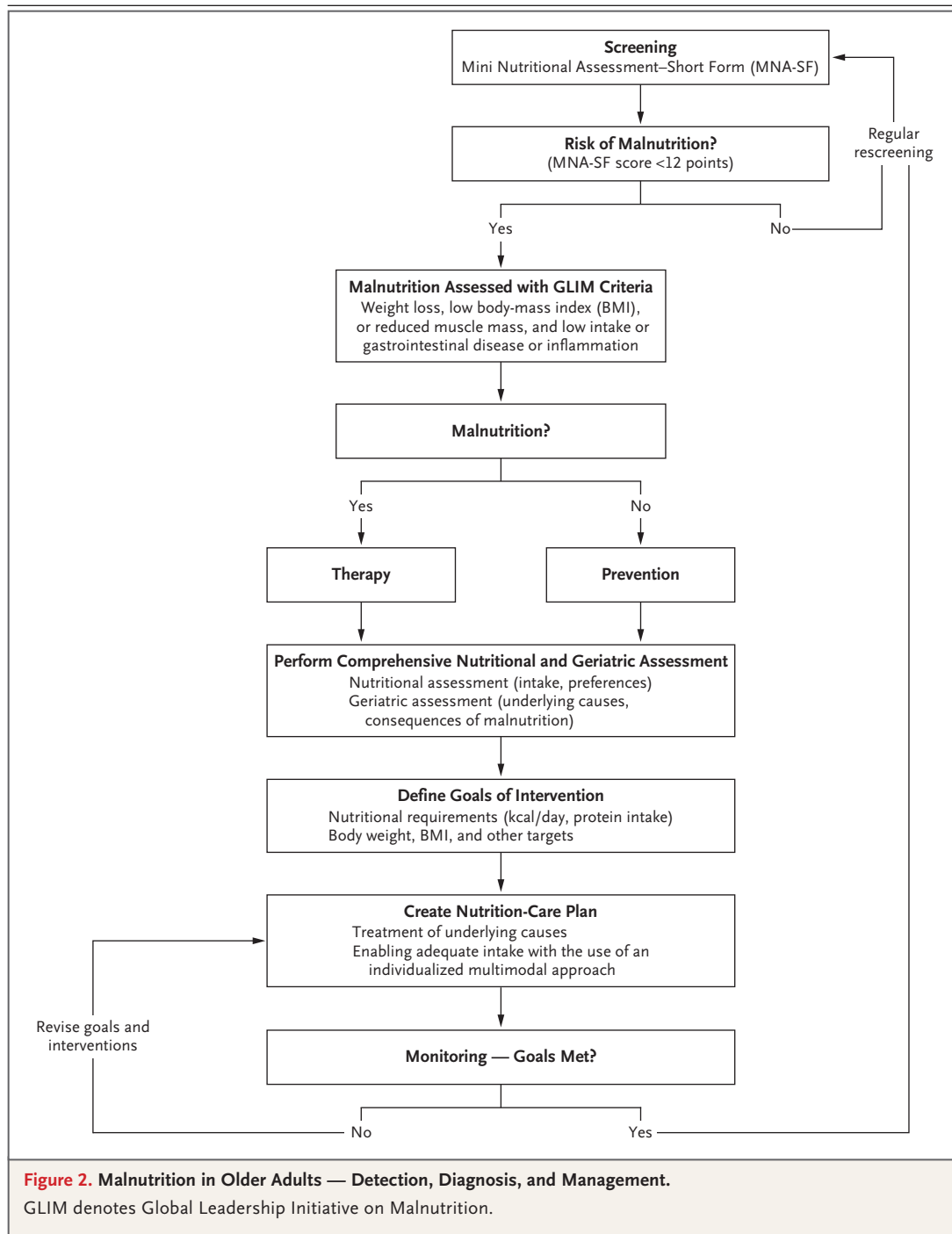
Oral nutritional supplements can also substantially increase energy and nutrient intake. Many

trials and several systematic reviews have documented positive effects on nutritional status and clinical and functional outcomes in patients during hospitalization and after discharge, although these results have not been entirely consistent.⁵² Adherence to the use of oral nutritional supplements must be promoted by appropriate measures, such as adapting the flavor, texture, and timing of the offer of supplement to the patient's preferences and eating ability, and should be monitored regularly. Oral nutritional supplements with specific formulations are available for persons with relevant coexisting conditions (e.g., diabetes mellitus, sarcopenia, and gastrointestinal problems).

There are also situations in which enteral or parenteral nutrition is justified, and old age itself is not a contraindication to either. The principles of enteral and parenteral nutrition in older adults are the same as those that apply in younger adults.⁵ Enteral tube feeding or parenteral nutrition may be indicated in older adults with an expected benefit of a reasonable prognosis when oral or enteral intake is expected to be impossible for more than 3 days or is expected to provide less than half the energy needed for more than 1 week, despite interventions to ensure adequate oral intake. However, the use of these more invasive interventions entails careful, individualized decision making with input from all persons involved in the patient's care. Because oral nutritional supplements are medical treatments rather than basic care, they should be used only when there is a realistic chance of improving or maintaining the patient's condition and quality of life. They are no longer indicated in the final stages of life, including the last stages of dementia, when so-called comfort feeding should be the priority.⁷³ If enteral nutrition is indicated, it should be started immediately and gradually increased over the first 3 days in order to avoid the refeeding syndrome. Older adults who are receiving tube feedings should be encouraged to maintain oral intake to the extent that it is safely possible. An outline of the diagnostic and management process is shown in Figure 2.

AREAS OF UNCERTAINTY

Nutrition research has been hampered by the lack of consensus on diagnostic criteria. The GLIM criteria were published in 2019, so in most of the



studies on malnutrition before then, heterogeneous approaches were used to define the condition. The study populations varied in terms of nutritional status and risk factors, and this diversity partly explains the heterogeneity of results from nutrition interventions. In addition, several factors have led to slow progress in re-

search on nutritional interventions: the lack of agreement on what are relevant outcomes of nutrition interventions (i.e., changes in weight or BMI vs. changes in mortality, function, or clinical course),⁷⁴ weak methodologic approaches (very few randomized trials have been conducted in this area, and blinding of interventions is particularly

complex), the fact that — unlike medications — usual nutrition is a confounding factor for nutrition interventions, and the heterogeneity of clinical situations. The role of different etiopathogenic pathways — especially that of chronic inflammation — needs to be elucidated. Blinded, randomized, placebo-controlled trials that enroll well-defined populations in a variety of clinical settings are needed to better understand the role of different nutrition interventions (including, but not limited to, oral nutritional supplements and supplementary tube feeding or parenteral nutrition). However, the heterogeneity of the older-adult population suggests that only individualized, comprehensive approaches will be successful, as is the case with other geriatric syndromes.

Additional challenges associated with malnutrition in older adults, as well as with younger patients, are the lack of implementation of nutritional knowledge in clinical practice, the lack of

adequate funding, and the lack of dietitians in many settings. Most physicians do not receive training in nutrition in medical schools and are unaware of the relevance of incorporating nutritional intervention into the management of most common chronic diseases. Malnutrition in older adults is underdiagnosed and undertreated. There is a need to raise awareness among health care professionals and the general public on the importance of the nutrition aspects of health and disease. Information technology may help track patient's nutritional changes over time and detect malnutrition.⁷⁵

Disclosure forms provided by the authors are available with the full text of this article at NEJM.org.

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