

CONSENSUS

Chinese expert consensus on prevention and intervention for the elderly with malnutrition (2022)

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Abstract

Malnutrition is a state of altered body composition and body cell mass due to inadequate intake or utilization of energy or nutrients, leading to physical and mental dysfunction and impaired clinical outcomes. As one of the most common geriatric syndromes, malnutrition in the elderly is a significant risk factor for poor clinical outcomes, causing a massive burden on medical resources and society. The risk factors for malnutrition in the elderly are diverse and include demographics, chronic diseases, and psychosocial factors. Presently, recommendations for the prevention and intervention of malnutrition in the elderly are not clear or consistent in China. This consensus is based on the latest global evidence and multiregional clinical experience in China, which aims to standardize the prevention and intervention of malnutrition in the elderly in China and improve the efficacy of clinical practice and the prognosis of elderly patients.

KEYWORDS

elderly, expert consensus, intervention, malnutrition, prevention

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[†]See [Appendix A](#) for the members of the expert group of the Chinese Expert Consensus on Prevention and Intervention for the Elderly with Malnutrition.

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Malnutrition is a common geriatric syndrome that has been the focus of recent studies. Studies have shown that the prevalence of malnutrition and nutritional risk in elderly patients in hospitals and nursing homes is almost 50%.^{1,2} Malnutrition significantly affects the elderly and is closely associated with poor clinical outcomes. Malnutrition in the elderly is a significant risk factor for geriatric syndromes, including activities of daily living (ADL) dependency, sarcopenia, and frailty. This leads to increased hospitalization, infection, mortality rates, hospitalization length, and cost, causing a great burden on medical resources. Malnutrition can be prevented and managed in clinical practice. Timely and appropriate nutritional intervention is critical in maintaining and improving the nutritional and functional status and the quality of life of elderly patients. In the *National Nutrition Plan (2017–2030)*³ issued by the State Council of China in 2017, the “Nutrition Improvement Action for the Elderly population” was specifically proposed as a major action. To standardize the intervention and management of malnutrition in elderly patients and improve their nutritional status, a panel of multidisciplinary experts on clinical nutrition in the elderly was organized to solicit wide opinions on the subject. After several rounds of discussion and refinement, we formulated a Chinese expert consensus on prevention and intervention for malnutrition among the elderly in China (2022) (abbreviated as “the consensus”). The consensus was based on the latest geriatric nutrition guidelines and consensus in China and worldwide, combined with the latest research findings, evidence-based research, and clinical experiences from various regions in China, following the principles of practicality, simplicity, and advancement to guide doctors, nurses, and caregivers in geriatric practice.

1 | DEFINITION

Presently, there is no universally accepted definition for malnutrition; however, in China it is defined as a deficiency in energy or nutrients due to inadequate intake or utilization, which results in changes in the body composition, decreased physical and mental functions, and consequent adverse clinical outcomes. In clinical practice, malnutrition is mostly seen as a state of nutritional deficiency, whereas for hospitalized elderly patients, most are disease-related malnutrition (DRM). In 2019, the Global Leadership Initiative on Malnutrition (GLIM) listed five criteria for the diagnosis of malnutrition, including three phenotypic criteria (nonvolitional weight loss, low BMI, and reduced muscle mass) and two etiologic criteria (reduced food intake or assimilation and inflammation or disease burden).^{4–6} The diagnosis of malnutrition requires at least one phenotypic criterion and one etiologic criterion, as well as a positive nutritional screening [Nutritional Risk Screening 2002 (NRS2002) or mini-Nutrition Assessment Short Form (MNA-SF)]. In the *Chinese Disease classification and codes*, the code for malnutrition is E46.x00, and the code for severe protein-energy malnutrition is E43.x00.

2 | EPIDEMIOLOGY

The prevalence of malnutrition among the elderly is high, and the diagnosis and treatment of malnutrition are global problems. Epidemiological studies have shown that approximately a quarter of the elderly population aged 65 years and older in Europe is at a high risk of malnutrition.^{7–9} Additionally, the prevalence of malnutrition in the elderly differs depending on the environment. The prevalence in the general community is the lowest (8.5%), whereas the prevalence in hospitals or nursing homes is relatively high (28.0% and 17.5%, respectively).⁸

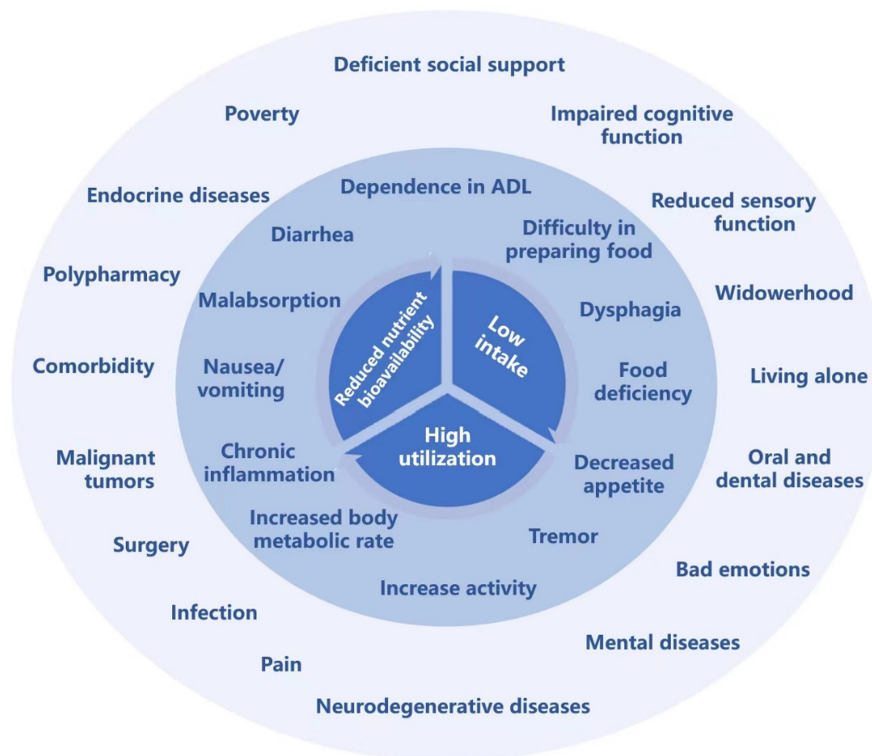
In China, a similar tendency has been observed in epidemiological studies: the incidence rate of malnutrition and nutritional risk is relatively high in the elderly, and nearly half of the elderly population nationwide have poor nutritional status.¹⁰ A large cohort study showed that the prevalence of malnutrition among the elderly in the community is relatively low but still above 10%,¹¹ and a multicenter clinical study of hospitalized patients showed that 14.7% of elderly patients suffered from malnutrition and 35% were at risk of malnutrition.² The Geriatric Nutrition Support Group of the Society of Parenteral and Enteral Nutrition of the Chinese Medical Association initiated a dynamic study on the nutritional status of Chinese inpatients in 34 tertiary hospitals in 18 major cities in China (MOMENT study), which showed that the prevalence of nutritional risk in inpatients exceeded 40%. Remarkably, 58% of patients at nutritional risk did not receive any form of nutritional therapy; most of them were elderly.¹² In addition, the prevalence of malnutrition or nutritional risk in the elderly did not improve significantly at discharge compared to admission to a hospital. In fact, it increased slightly,¹³ which highlights the need to improve the prevention and intervention for malnutrition in the elderly.

Recommendation 1: The prevalence of malnutrition in the elderly population is high. The prevalence of malnutrition in hospitals and nursing homes is higher than in the general community.

3 | PATHOGENESIS AND RISK FACTORS

Low intake, high utilization, and reduced nutrient bioavailability are the core pathogenic mechanisms of malnutrition in the elderly population.¹⁴ Multiple risk factors increase the risk of malnutrition in the elderly population via these three mechanisms (Figure 1). First, they are at risk due to low intake, which arises from decreased appetite, dysphagia, food deficiency, dependence, reduced function in ADL, and difficulty in preparing or making food. Second, many high utilization states including chronic inflammation, increased activity, tremor, and increased body metabolic rate result in high requirements. Third, they are at risk of reduced nutrient utilization due to diarrhea, nausea, vomiting, and disorder of digestion and absorption. In addition, many other risk factors can indirectly contribute to the above core pathogenic mechanisms, including aging,

FIGURE 1 Pathogenesis and risk factors for malnutrition in the elderly.



disease-related factors neurodegenerative diseases,^{15,16} endocrine diseases, digestive diseases, oral and dental diseases,^{17,18} malignant tumors,¹⁹ infection,²⁰ comorbidity,²¹ vision and hearing decline, polypharmacy,²² surgery²³, psychological-related factors (anxiety,¹ depression,²⁴ emotional problems, mental diseases), and sociological factors²⁵ (poverty, widowerhood, living alone, deficient social support).^{14,26–29} Identifying and managing underlying risk factors is important for preventing and intervening in malnutrition in the elderly population.

Recommendation 2: The pathogenesis and risk factors of malnutrition in the elderly are complex. Identifying and managing underlying risk factors is the focus of prevention and intervention for malnutrition in the elderly.

4 | NUTRITIONAL SCREENING AND ASSESSMENT

4.1 | Nutritional screening

Nutritional screening is the first step in nutritional care to rapidly identify patients needing nutritional intervention through simple methods.³⁰ Malnutrition or nutritional risk is closely related to clinical outcomes. Therefore, timely and effective nutritional screening is crucial for early nutritional intervention.³⁰ All elderly inpatients aged ≥ 65 years with an estimated survival of >3 months should be routinely screened for malnutrition and its risks. Elderly individuals with stable conditions in nursing homes should be screened every 3 months, and those living in communities or homes should be screened at least every 6 months.³¹

At present, the most common nutritional screening tools include the MNA-SF, NRS2002, malnutrition universal screening tool (MUST), geriatric nutrition risk index (GNRI), and malnutrition screening tool (MST).³¹ Different screening tools have varying sensitivities and specificities in different settings. The MNA-SF and NRS2002 are recommended by the Chinese Society of Parenteral and Enteral Nutrition. NRS2002 is recommended for elderly inpatients,^{31,32} and the MNA-SF is more widely applicable in clinical practice, including in hospitals, long-term institutions, communities, and homes.³³

4.2 | Nutritional assessment

A more sophisticated nutritional assessment should be applied if malnutrition or nutritional risk is identified from the first screening. Nutritional assessment is a comprehensive evaluation of patients' nutritional and metabolic status and body function to confirm a nutritional diagnosis, evaluate potential adverse effects, and assist in the development of further nutritional care plans.³⁴

At present, globally, there is lack of a standard and universal path or method for nutritional assessment, although the content of the nutritional assessment is relatively uniform, including: (A), anthropometric measurements; (B), biochemical analysis; (C), clinical evaluation; (D), dietary assessment; and (E), environment evaluation—"ABCDE" assessment.³¹ The main contents are listed in Table 1.

Recommendation 3: Adopt appropriate screening tools for standardized nutritional screening and conduct a comprehensive nutritional assessment of patients with malnutrition or nutritional risk to formulate individualized nutritional care.

Assessment category	Content
A. Anthropometric measurements	<ol style="list-style-type: none"> 1. height, weight, BMI, recent weight changes 2. abdominal circumference, calf circumference, arm circumference 3. skinfold thickness 4. body composition: BIA, DEXA, CT, MRI.
B. Biochemical analysis	<ol style="list-style-type: none"> 1. routine blood test: hemoglobin, leukocyte count, lymphocyte count 2. liver function: prealbumin, albumin, bilirubin, transaminase 3. renal function: creatinine, urea nitrogen 4. retinol-binding protein and transferrin 5. inflammation marker: C-reactive protein 6. electrolytes: sodium, potassium, phosphorus, magnesium, calcium 7. micronutrients: water-soluble vitamins, fat-soluble vitamins, microelement
C. Clinical evaluation	<ol style="list-style-type: none"> 1. age, sex 2. diseases: malignant tumors, infections, digestive diseases, diabetes, thyroid diseases, psychological diseases 3. physical examination: edema, skin, hair, mouth, teeth, vision, muscle strength, nervous reflex 4. functional assessment: ADL, walking speed, grip strength, cognitive status 5. drugs: adverse drug effects that may cause changes in taste, nausea, and absorption disorders
D. Dietary assessment	<ol style="list-style-type: none"> 1. recent changes in food intake 2. long-term preferred dietary pattern, appetite, cooking method, type of food and beverage 3. allergy or intolerance of food
E. Environment	<ol style="list-style-type: none"> 1. education level or learning ability 2. family support environment 3. personal financial/economic status

Abbreviations: ADL, activities of daily living; BIA, bioelectrical impedance analysis; BMI, body mass index; CT, computed tomography; DEXA, dual-energy x-ray absorption method; MRI, magnetic resonance imaging.

TABLE 1 main contents of nutritional assessment

5 | PREVENTION AND INTERVENTION FOR MALNUTRITION IN THE ELDERLY (FIGURE 2)

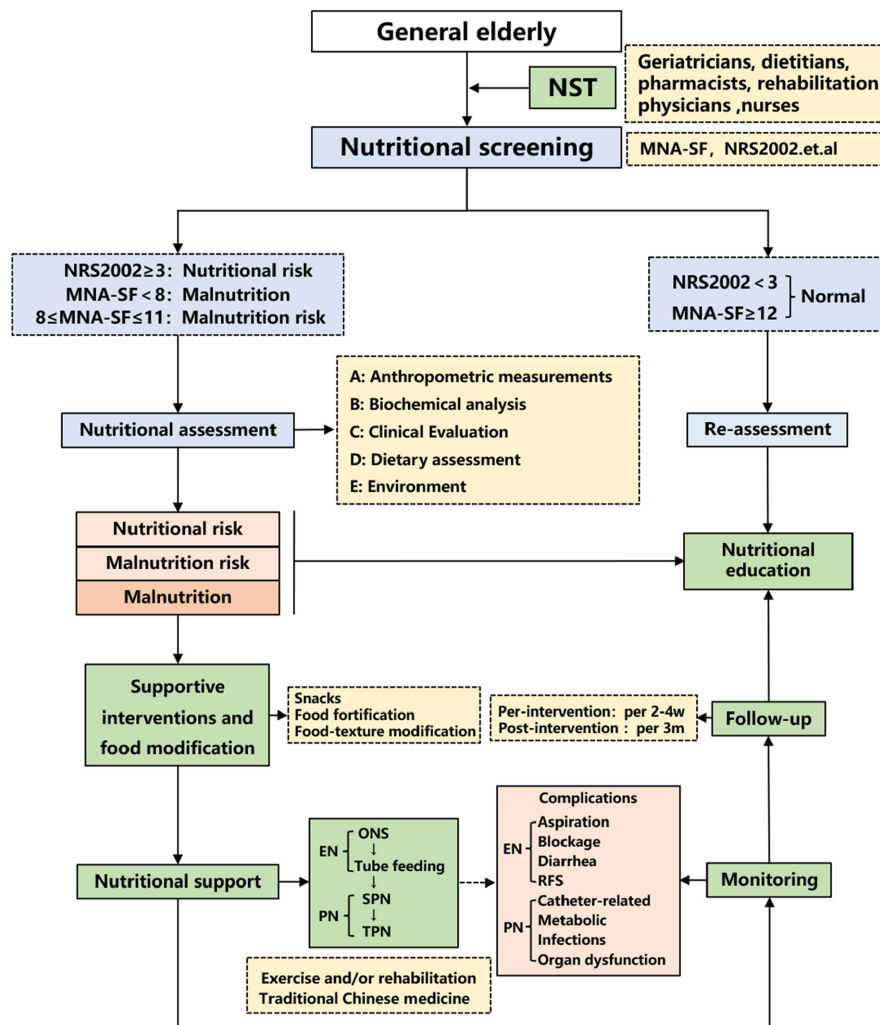
5.1 | Nutritional education

The burden of malnutrition on the elderly in China is heavy, and the awareness of nutritional knowledge, including nutritional risk, dietary nutrition, and nutritional support, remains limited. According to epidemiological surveys, less than half of the elderly population in the community are aware of the “diet pagoda for Chinese residents” and only a quarter of residents received information about “balanced diet guidelines for Chinese residents.”^{35–38} Nutritional education can help improve awareness of nutritional knowledge,

facilitate adequate dietary intake, and further improve long-term prognosis and quality of life.^{39–43} There is an urgent need to develop and implement nutrition education programs for older adults in different settings and environments. The *National Nutrition Plan (2017–2030)* specifically proposed that “the awareness rate of residents’ nutrition and health knowledge should be increased by 10% above the present rate” as one of the main goals. In the future, nutritional education and information transference should be strengthened in the elderly, especially in patients with chronic diseases, to improve public health and nutritional care in China.³³

Various approaches are available for implementing nutritional education; the “knowledge-attitude-behavior” model is an effective method.⁴⁴ In hospitals and institutions, with information from routine nutritional screening and assessment, standardized and personalized nutritional education and dietary recommendations can be offered by a dedicated nutrition support team. In families or

FIGURE 2 Flow diagram for prevention and intervention. EN, enteral nutrition; MNA-SF, mini nutritional assessment – short form; NRS 2002, nutrition risk screening; NST, nutritional support team; ONS, oral nutritional supplements; PN, parenteral nutrition; RFS, refeeding syndrome; SPN, supplementary parenteral nutrition; TPN, total parenteral nutrition



communities, nutritional education and information transfer should focus on elderly patients with multiple comorbidities. Different forms of nutritional education can be applied according to the characteristics of the elderly and the environment in which they live, including various kinds of presentations (such as on-the-spot presentation, food model demonstration, distribution of advertising materials of nutritional knowledge, and writing songs), regular follow-up, and home visits by nutritionists.^{33,41-43} In addition, nutritional education and intervention strategies should be tailored according to specific comorbidities, such as explaining diabetes-related nutritional knowledge and dietary management recommendations for the elderly with diabetes, explaining the Dietary Approaches to Stop Hypertension (DASH) diet for the elderly with hypertension, and suggesting exercise and vitamin D supplementation for the elderly with osteoporosis.

Recommendation 4: Nutritional education should be widely communicated across the state, and the “knowledge-attitude-behavior” model should be adopted as an effective practical method. Elderly individuals with multiple comorbidities should be the focus of nutritional education. Different nutritional education and intervention strategies should be tailored according to the comorbidities in the elderly.

5.2 | Food modification

Adequate dietary intake is the basis for maintaining the nutritional status of the elderly population.⁴⁵ Due to declining body function, the ability to chew and swallow and the capacity to prepare and consume food independently decreases; mealtime becomes prolonged, with oral intake gradually reducing, leading to malnutrition in the long term. Although oral nutritional supplements can be convenient, with comprehensive and balanced nutrients, taste and texture are different from real food and are often more costly. For long-term nutritional therapy, improvement of the daily diet quality should be regularly attempted to improve compliance and quality of life.

Abundant food variety, decent flavor, mealtime sharing, adequate mealtime, a home-like dining environment, and appropriate mealtime assistance (e.g., assistance in placing plates and cutting food) could help ensure adequate dietary intake.⁴⁶⁻⁴⁸ Additional snacks and/or finger food between meals can also help increase energy and protein intake and improve nutritional status. Food fortification refers to the use of natural foods or specific nutrient preparations to increase the energy and protein densities of meals and beverages, thereby increasing the intake of nutrients with similar amounts of food. Natural foods include egg, cream, butter, milk, yogurt, juice, and puree, while nutrient

preparations include lactalbumin powder and enteral nutrition (EN) preparation. Studies have shown that food fortification can increase the energy and protein density of food and improve the nutritional status of patients, making it an effective nutritional support intervention.^{49,50} In addition, for the elderly with malnutrition or nutritional risk accompanied by chewing disorders or dysphagia, food texture modification should be offered as a compensatory approach to support adequate dietary intake, such as breaking up solid foods into a paste or puree, adjusting soups and beverages into paste by using thickening agents, or adjusting the cooking method. For example, eggs can be boiled, poached, scrambled, steamed, or converted to other forms according to the patients' needs.⁵¹

Recommendation 5: Supportive interventions and food modification should be emphasized to improve the quality of dietary intake. Food fortification is an effective approach to nutritional support. The food texture should be modified according to patient characteristics.

5.3 | Nutritional support

5.3.1 | Nutritional support team

With the development of nutritional support, a nutritional support team (NST) was established. The NST is a well-communicated multidisciplinary team that provides a more comprehensive and integrated nutritional support plan, avoids unnecessary treatment and complications, monitors clinical outcomes, and ultimately improves the quality of nutritional support. Research has shown that NST and multidisciplinary family nutrition management teams could improve the application rate of EN and parenteral nutrition (PN), reduce potential complications that may arise from nutritional support, reduce mortality and hospital costs, and shorten the length of hospitalization.^{52–55} However, the current level of evidence is relatively low, and the conclusions need to be validated by further high-quality clinical studies.⁵³

In clinical practice, NST should be led by geriatricians, with geriatric dietitians, clinical pharmacists, rehabilitation physicians, and nurses as the team's main members. Clinical specialists in gastroenterology, endocrinology, stomatology, neurology, and psychology should be introduced to provide professional support for the team when conditions permit.⁵⁶ The main tasks of NST include: developing a standardized nutritional support process; preventing, recognizing, and managing malnutrition or malnutrition risks; providing safe, rational, and effective nutritional support; reducing or avoiding complications; monitoring and evaluating the effects of nutritional support; applying quality control of nutritional support; working as a unit for nutritional education, training, and research; conducting follow-up.⁵⁷

Recommendation 6: Establish a multidisciplinary nutritional support team or working group led by geriatric experts to provide comprehensive nutritional support and improve the quality of prevention and intervention for malnutrition and nutritional risk.

5.3.2 | Artificial nutritional support

Artificial nutritional support can increase the intake and absorption of nutrients in elderly individuals with poor nutrition to maintain or improve their nutritional status, clinical outcomes, functional status, and quality of life. Before providing nutritional support, the function and prognosis of patients should be thoroughly evaluated, and individualized nutritional support programs should be formulated. An appropriate feeding method should be chosen based on the age, nutritional status, dysphagia, aspiration risk, dietary intake, and comorbidity of patients. Nutritional support is a medical treatment rather than a basic care, and the benefits and risks to patients should always be evaluated. Elderly patients in the terminal phase of illness may hardly derive benefit from nutritional support; therefore, ensuring comfortable feeding may be more appropriate. From the viewpoint of palliative and comfort care, it is recommended to comprehensively consider the ethical merits and family choices and carefully provide nutritional support.^{58,59}

Nutritional support encompasses EN and PN. EN includes oral nutritional supplements (ONS) and tube feeding, while PN includes supplementary PN (SPN) and total PN (TPN).⁶⁰ (1) Estimating nutritional requirements: The recommended level of nutritional support has been established from previous metabolic research; the recommended energy or protein intake helps to improve the nutritional status and prognosis. However, nutrient needs vary greatly among individuals owing to different specific conditions. In clinical practice, nutritional support should be tailored individually, according to the nutritional assessment results. The requirement for each nutrient may vary according to nutritional status, comorbidity, organ function, metabolic status, drug use, and treatment course.⁶¹ Energy intake should be sufficient for basal energy expenditure and a certain level of physical activity to maintain normal BMI. Basal energy expenditure can change under different conditions, and an indirect calorimetric instrument can be used to measure specific energy requirements. However, the high price and complicated operating procedures restrict the application of the device in clinical practice. The guiding value for energy intake in the general elderly population is recommended to be 20–30 kcal/kg. For elderly patients with malnutrition, low body weight, and stress state, it can be increased to 30–40 kcal/kg⁵⁹; 20%–30% of the total energy intake should be supplied by fat and 50%–65% by carbohydrates.^{59,62,63} The recommended daily intake of protein is at least 1 g/kg, which can be raised according to nutritional status, physical activity level, disease status, and tolerance. The recommended daily protein intake for elderly patients with acute/chronic diseases or sarcopenia is 1.2–1.5 g/kg.⁶⁴ Elderly patients with severe malnutrition or critical diseases can increase to 2 g kg⁻¹ d⁻¹.⁶⁵ To prevent dehydration, 2 L of fluid should be offered daily to elderly men and 1.6 L to elderly women unless there is a clinical requirement for fluid restriction.⁶² (2) EN: EN is an important means of nutritional support for the elderly. EN should be the first choice for elderly patients with malnutrition or nutritional risk and with normal or basically

normal gastrointestinal function. The indications and contraindications for EN in the elderly are similar to those in adults. EN can be divided into ONS and tube feeding according to different access routes. ① ONS: ONS is given orally and is defined as food for special medical purposes, which can supplement the daily diet. Clinical studies have shown that ONS can increase the energy and protein intake of the elderly, correct weight loss, improve nutrition and functional status, and reduce complications and mortality. Therefore, this is an important measure to prevent and treat malnutrition in the elderly.⁶⁶⁻⁶⁸ ONS is recommended when the daily dietary intake fails to meet 60% of the body's requirement after supportive interventions and food modification. The dosage forms of ONS are mainly powder, semi-solid, or liquid; however, their final form is generally liquid. The standard polymeric formula is usually suitable for most elderly patients. Currently, the ONS preparation on the market has a variety of tastes, forms, types, and energy densities, which can be selected according to the patient's dietary habits and preferences. ONS is recommended to be taken orally multiple times between meals, but it should also be adjusted according to the patient's tolerance. ONS should be administered step by step, starting from a small dose and low density. Other methods can also be used, such as sipping, dividing multiple times, and adding ONS to the daily diet. ONS should provide at least 400 kcal/day, including ≥ 30 g of protein/day, and the course of ONS should last for at least 1 month. The efficacy of ONS should be assessed once a month.^{59,62} ② Tube feeding: Elderly patients with reasonable prognosis should be provided EN when dietary intake and ONS can only provide less than 60% of the target requirement.⁶⁹ Clinical studies have shown that EN can effectively increase nutritional intake and improve nutritional status, functional prognosis, and quality of life.^{70,71} Before EN is initiated, the expected benefits and potential risks should be evaluated individually and regularly reassessed when the clinical condition changes.⁶² The nasogastric tube is most commonly used for tube feeding and is suitable for elderly patients who receive EN, presumably for a short time (2-3 weeks). Percutaneous gastrostomy (PEG) is indicated for patients who are expected to receive EN for more than 4 weeks or do not tolerate nasogastric tube feeding.⁷²⁻⁷⁴ For patients with a high risk of aspiration pneumonia, jejunal catheterization should be considered, such as nose-jejenum tube, jejunostomy, or percutaneous endoscopic jejunostomy (PEJ).^{61,75,76} The feeding preparations include a homogenate diet and EN preparation. The homogenate diet is prepared by high-speed grinding of normal food. EN preparation consists of two basic categories: standard (whole protein formulas) and elemental (amino acid or peptide-based formulas). Standard formulas are suitable for most elderly patients with normal gastrointestinal function, while elemental formulas can be directly absorbed without digestion, which is suitable for elderly patients with gastrointestinal dysfunction (such as severe pancreatitis).⁷⁷ In addition, there are specialized formulas for certain diseases, such as diabetes, cancer, pulmonary disease, and immune modulation. For example, diabetes-specific formula helps control

blood glucose levels and reduce the risk of related complications.⁷⁸ Common complications of EN include tube blockage, diarrhea, aspiration, upper gastrointestinal hemorrhage, and refeeding syndrome.^{79,80} EN should be applied step by step, starting small and slow, and gradually increasing to the target amount. Before feeding, the patient should be appropriately positioned (30-45°, semi-reclining) and then the gastric residuals should be checked to determine the feeding volume. During feeding, the concentration and temperature of the EN preparation should be checked and the appropriate feeding speed should be set. After feeding, warm boiled water is injected to seal the tube and the feeding position is maintained for at least 30 min before lying down.^{69,81} (3) PN: EN should always be the first choice for elderly patients with normal gastrointestinal function. PN is indicated when EN is contraindicated or poorly tolerated, as the nutrition provided by EN cannot meet 60% of the patient's nutritional requirements. SPN provides adequate nutrients and preserves the intestinal mucosal barrier function through EN. Clinical research has shown that PN promotes protein synthesis, reduces complications, and improves the nutritional status and prognosis.^{82,83} During SPN, EN or oral intake should be increased; eventually, SPN can be gradually discontinued. TPN is recommended when elderly patients have severe gastrointestinal dysfunction or when EN is contraindicated (such as gastrointestinal hemorrhage, acute pancreatitis, gastrointestinal obstruction, and post-major gastrointestinal surgery).⁸⁴ The peripheral vein is the preferred choice for short-term PN, and the osmotic pressure of the nutrient solution should be < 900 mOsm/L. Central intravenous infusion is recommended for elderly patients who require hyperosmolarity (> 900 mOsm/L) or long-term PN (> 14 d).⁸⁵ Elderly patients in need of long-term or lifelong dependence on PN can consider home PN when the patient's condition is stable, the patients and caregivers can fully cooperate, and the family or nearby primary medical institutions can provide PN solutions.⁸⁶ Common complications of PN include catheter-related complications (such as catheter dislocation/displacement, and thrombophlebitis), metabolic complications (such as sugar and lipid metabolic disorders, electrolyte imbalance, overfeeding, and refeeding syndrome), infections, and organ dysfunction (such as liver injury, and biliary tract diseases).^{87,88} Certain measures should be taken to avoid complications, including proficient mastering of the puncture procedure, strict aseptic operation, daily catheter care, regular monitoring of electrolytes, cardiac function, and nutrition-related biochemical indicators. In addition, in the case of long-term PN, the possibility of gut-derived infections caused by intestinal mucosal barrier dysfunction and secondary intestinal flora translocation should be considered.⁵⁹

Recommendation 7: The preparation formula, nutritional support methods, and target amount should be selected appropriately according to a comprehensive assessment of the nutritional status, body function, and comorbidities of patients. The recommended daily energy intake for the general elderly population is 20-30 kcal/kg, and the daily protein intake is at least 1.0 g/kg.

Recommendation 8: EN is the first choice for the general elderly population in need of nutritional support. Appropriate feeding routes and enteral formulas should be selected according to patient characteristics. Complications should be closely monitored and prevented during EN.

Recommendation 9: PN is indicated when EN cannot meet 60% of a patient's nutritional requirements. Appropriate PN method and venous access should be selected according to patient characteristics. Therefore, complications should be closely monitored and prevented.

5.4 | Exercise and rehabilitation

Exercise and rehabilitation help to maintain or improve muscle mass and function. Research has shown that, compared with nutritional support alone, exercise and rehabilitation combined with nutritional support are more efficient in improving the nutritional status, muscle mass, and physical function of the elderly.^{89–91} Elderly individuals with malnutrition or nutritional risk should be encouraged to perform physical exercise or rehabilitation based on adequate nutritional support.

Before exercise or rehabilitation, the patient's health and physical condition should be evaluated; exercise training contraindications should be eliminated; appropriate training type, intensity, and starting level should be determined; and the exercise type and intensity should be gradually adjusted according to the patient's capability. Since elderly patients usually have multiple comorbidities (such as cardiovascular, respiratory, and neurological diseases), exercise-related variables, such as frequency, duration, intensity, repetition, and training type, should be considered when formulating exercise and/or rehabilitation prescriptions.⁹² A professional physical therapist should formulate an exercise and/or rehabilitation prescription under the guidance of a geriatrician.

The exercise and/or rehabilitation prescription for elderly patients with malnutrition or nutritional risk can be formulated according to the following aspects^{92–97}: (1) Frequency: 2–3 times/week is recommended. The total duration of aerobic endurance exercise is recommended to be greater than 150min/week. Balance, flexibility, and strength training can be performed 2–3 times/week. (2) Intensity: Moderate-intensity exercise training is recommended; a Borg6–20 rate of perceived exertion (RPE) is preferred. The moderate-intensity ranges from 11 to 14 and refers to a level of exertion that is light to somewhat hard. The maximum weight that a patient can lift in one repetition (1RM) is an index used to evaluate muscle strength during training. Exercise training can start from low intensity (55% 1RM) and multiple repetitions (12–15 times), gradually increasing the intensity in the first 2–3 weeks and gradually reaching higher intensity (80% 1RM) and fewer repetitions (4–6 times). (3) Duration: The total duration of each training is recommended to be 30–45 min. (4) Exercise types: Exercise training types include balance and flexibility training (e.g., Baduanjin exercise and Tai Chi), resistance training (self-weight

training, dumbbells, and elastic bands), and aerobic sports (walking, jogging, and cycling). This type of rehabilitation training can be selected in combination with a comprehensive evaluation of the elderly.

Recommendation 10: On the premise of comprehensively evaluating the patient's health and physical condition, exercise and/or rehabilitation should be encouraged based on adequate nutritional support and formulated personalized sport programs.

5.5 | Traditional Chinese medicine

Traditional Chinese medicine is a treasure of Chinese civilization. It has broad application prospects, but there is still a lack of nutritional evaluation and intervention methods based on traditional Chinese medicine theory. Research has shown that traditional Chinese medicine and medicated diets may improve the nutritional status of elderly patients.^{98–100} “Qian Jin Fang” said: “anyone who wants to cure a disease, must first treat it with food.” Traditional Chinese medicine believes that a good diet plays a very important role in disease treatment, similar to the current western medicine theory. Traditional Chinese medicine diet refers to a special diet prepared by cooking and processing food and medicinal materials in a certain proportion and applying traditional Chinese medicine theories, such as “the same origin of medicine and food” and “the same reason for diet and medicine.” Medicated diet is nonirritating with decent color, aroma, and taste and is more easily and happily accepted by the elderly in China. Research has shown that medicated diet therapy can improve the frailty and nutritional status of the elderly in the community.¹⁰¹ Acupuncture and moxibustion therapy are also important components of traditional Chinese medicine, with benefits including dredging meridians, supporting righteousness, dispelling evil, and harmonizing Yin and Yang. Studies have shown that acupuncture and moxibustion therapy can help regulate the digestive system and gastrointestinal tract, promote appetite, improve diarrhea/constipation, and regulate nutrient absorption and gastrointestinal peristalsis.¹⁰² The quality of research evidence on the impact of traditional Chinese medicine therapy is still limited and needs to be further investigated in high-quality clinical research.

Recommendation 11: Traditional Chinese medicine can be considered to improve the nutritional status of the elderly, including medicated diet, acupuncture, and moxibustion.

AUTHOR CONTRIBUTIONS

Initiate and organization this consensus: Jinhui Wu. Writing the initial draft (including substantive translation): Gongxiang Liu, Yao Yu, YongJun Mao. Preparation and presentation of the published work: YongJun Mao, Jianqing Wu, Bo Chen, Jia Liu. Critical review and revision: Jianye Wang, Pulin Yu, Cuntai Zhang, Geriatrics Branch, Chinese Medical Association, and the expert group of the Chinese Expert Consensus on Prevention and Intervention for the Elderly with Malnutrition.

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CONFLICT OF INTEREST

Jianye Wang, Pulin Yu, and Cuntai Zhang are the Editorial Board members of *Aging Medicine* and co-authors of this article. To minimize bias, they were excluded from all editorial decision-making related to the acceptance of this article for publication. Other authors have nothing to disclose.

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APPENDIX

A.1 | Members of the expert group

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