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Abstract
This position paper prepared by the Japanese Working Group on Integrated Nutrition for Dysphagic People (JWIND) aims to summarize the need for nutritional management in adult patients with dysphagia, the issues that nutrition professionals should address, and the promising approaches as well as to propose a vision for the future of nutritional care for adult patients with dysphagia. JWIND is a joint certification system recognized by the Japan Dietetic Association and the Japanese Society of Dysphagia Rehabilitation; its members are mostly experts known as “Certified Specialist of Registered Dietitian for Dysphagia Rehabilitation.” Malnutrition and dysphagia are associated with each other. Therefore, malnutrition detection and intervention are essential for patients with dysphagia. However, evidence on the usefulness nutritional assessment and intervention to ensure appropriate nutritional care remains insufficient. Here, we present current knowledge of the relationship between primary diseases causing dysphagia and malnutrition, the indicators used for nutritional assessment, and nutritional interventions such as texture-modified diet (TMD) quality improvement, oral nutritional supplementation, and comprehensive intervention. We also discuss the current status and issues in nutritional care for adult patients with dysphagia. Furthermore, we have proposed measures that nutrition professionals should consider based on 3 perspectives: nutritional assessment, TMD, and nutritional intervention. Individualized and specialized nutritional management by registered dietitians (RDs) through appropriate assessment of the nutritional status of adult patients with dysphagia is needed. To maintain and improve swallowing function and nutritional status, RDs should intervene from the state of risk or early dysphagia onset, providing individualized care per their expertise as part of a multidisciplinary team. However, systematic clinical practice and research regarding the association of nutrition with dysphagia are needed.
Nutritional Status and Nutritional Management Issues for Patients With Dysphagia

Dysphagia is a disorder characterized by difficulty in chewing or swallowing food or drinking due to a disease, aging, or other causes. As the population ages, the proportion of people experiencing dysphagia increases. Apart from aging, other causes of dysphagia include cerebrovascular disease, neuromuscular disease, cognitive dysfunction, cancer, and sarcopenia. Dysphagia leads to poor prognosis with the increased risk of malnutrition, dehydration, choking and aspiration pneumonia, rehospitalization rates, and mortality. Malnutrition is a critical concern because it frequently occurs in patients with dysphagia and worsens their quality of life (QOL).

Malnutrition and dysphagia are closely related. Malnutrition induces dysphagia, and dysphagia also induces malnutrition and vice versa. Approximately 3% to 29% of patients suffer from both malnutrition and dysphagia. Malnutrition leads to a decrease in systemic skeletal muscle mass and strength and atrophy of swallowing-related muscles, and it is a factor of dysphagia induction in sarcopenia. Texture-modified diets (TMDs) have lower nutrient content than regular diets. Energy and protein intake was lower in patients receiving a TMD than that in patients receiving a regular diet. Therefore, a TMD may lead to inadequate energy and protein intake, resulting in malnutrition and loss of muscle mass. Several cross-sectional and retrospective observational studies have reported malnutrition and muscle mass loss in patients on TMDs.10–13

Despite the importance of malnutrition detection and intervention, the gold standard for nutritional assessment indicators for adult patients with dysphagia remains unknown. Therefore, determining malnutrition prevalence in adult patients with dysphagia and developing and comparing effective nutritional intervention methods remain difficult. The methods and effectiveness of interventions focused on optimizing nutritional intake have been preliminarily studied; these interventions include nutrient fortification through the addition of nutrients such as fortification diets, nutritional supplement intake, and food texture modification. Therefore, consolidating evidence on nutritional assessment and intervention methods in adult patients with dysphagia is needed.

In this position paper, JWIND aimed to summarize the need for nutrition management in adult patients with dysphagia and the challenges and prevailing approaches that nutrition professionals need to address, and make recommendations, including future perspectives on nutrition care for such adult patients, to help inform and motivate colleagues in clinical practice (Box 1).

Box 1. Call to Actions for People With Dysphagia

<table>
<thead>
<tr>
<th>Nutritional assessment and diagnosis</th>
</tr>
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<tbody>
<tr>
<td>• Assess the nutritional status of all patients with dysphagia</td>
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<tr>
<td>• Perform a multidisciplinary assessment of swallowing function and nutritional status</td>
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<tr>
<td>• Diagnose malnutrition according to the GLIM criteria when necessary</td>
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<td>Texture-modified diet</td>
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<td>• Nutritional management using standardized food form classification</td>
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<td>• Food nutritional fortification and appearance improvement</td>
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<td>Nutritional goal setting and intervention</td>
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<tr>
<td>• Provide personalized and specialized nutritional intervention</td>
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<td>• Use of nutrient-dense, texture-modified diets</td>
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<tr>
<td>• Intervene with ONS of suitable textures</td>
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</table>

GLIM, Global Leadership Initiative on Malnutrition; ONS, oral nutritional supplement.

Association of Nutritional Status With Diseases and Aging that Cause Dysphagia

The relevance of nutritional status to typical diseases and aging that cause dysphagia is discussed in the following paragraphs.

Stroke

Dysphagia is present and frequent in 30% to 70% of patients with stroke, whereas malnutrition is found in up to 62%. Stroke is associated with increased mortality, hospitalization costs, and increased risk for complications such as pneumonia and gastrointestinal bleeding. Dysphagia is one of the causes of malnutrition. Sarcoopenia prevalence in patients with stroke is also high (42%), indicating an increased need for nutritional intervention. The association between dysphagia and malnutrition in patients with stroke is more pronounced in the recovery phase than in the acute phase. Anorexia is also a major multifactorial problem in nutritional management, and TMD diets may contribute to anorexia. Anorexia is more prevalent in rehabilitation patients, including stroke patients, on TMDs compared with the prevalence of anorexia in rehabilitation patients on regular diets. Therefore, registered dietitians (RDs) need to provide specialized nutritional care to improve appetite and prevent decreased food intake.

Neuromuscular Disease

The characteristics of dysphagia in neuromuscular diseases vary according to the background disease. For example, patients with Parkinson’s disease (PD) have progressive dysphagia throughout the disease, and those with amyotrophic lateral sclerosis (ALS) with spastic paralysis have a rapid onset of dysphagia. In myasthenia gravis (MG), dysphagia worsens during activity and improves at rest, and dysphagia may not be present when patients wake up. Weight loss occurs in 52% of patients with PD, whereas chronic inadequate energy intake is common in patients with ALS. Oral or nasogastric feeds or a temporary PEG should be made in a professional and repeated multidisciplinary discussion, considering the risks and
benefits, respecting the patient's wishes and those of the family and carers. Malnutrition and decreased body mass index (BMI) are prognostic factors, especially in patients with ALS. Meanwhile, sarcopenia and obesity that lead to adverse outcomes are observed in patients with MG. Additionally, nutritional management should be based on the specific characteristics of each disease in neuromuscular diseases.

Dementia

The incidence of dysphagia in patients with dementia is very high, ranging from 50% to 87%, and dysphagia is associated with increased functional impairment, malnutrition, respiratory infections, and mortality. Nutritional intervention is needed in older patients with dementia, considering that the incidence of behavioral eating disorders and aspiration pneumonia are 33.0% and 54.9%, respectively, in patients with advanced dementia with a Reisberg Global Deterioration Scale score of ≥7. The severity of dysphagia is not significantly associated with the severity of cognitive dysfunction. Thus, a nutritional care regimen should be established according to the patient's feeding and swallowing function. Although modification of food or fluid consistency or both is a common management strategy for patients with dementia, its effectiveness remains unclear.

Cancer

The association between cancer and dysphagia varies widely, depending on the type of cancer and treatment. Cancer types such as head and neck cancer, esophageal cancer, gastric cancer, and other gastrointestinal cancers mostly cause dysphagia due to compression or obstructive lesions. Anticancer therapy may cause paralysis of nerves related to feeding and swallowing functions and difficulty in chewing and swallowing, resulting in dysphagia. Weight loss and poorer nutritional status are more common in patients with cancer with dysphagia than in those without dysphagia. Malnutrition in patients with cancer is associated with poor QOL and prognosis. Therefore, complex nutritional interventions including early nutritional screening and regular assessment of nutritional intake, weight changes, and BMI for individual patients are essential.

Sarcopenia

Sarcopenia is an independent risk factor for dysphagia in older adults. It is interdependent with dysphagia, aging, and malnutrition. Sarcopenic dysphagia, which is a recent focus of attention, is associated with dysphagia caused by systemic sarcopenia and swallowing-related muscles, with low BMI, malnutrition, and poor physical function. Nonetheless, combining exercise and nutritional therapy can improve weight gain, nutritional status, physical function, and swallowing function. Therefore, sarcopenic dysphagia also requires a comprehensive intervention with exercise and nutritional therapy.

Aging

Aging is often accompanied by a slight decline in swallowing function, known as presbyphagia. Additionally, cognitive, oral, and physical functions decline and depression is observed, leading to a frailty situation. Sarcopenia is another geriatric syndrome that can lead to dysphagia. Polypharmacy and changes in taste and smell also occur, which can lead to decreased appetite and oral intake. These complex interactions can lead to dysphagia and malnutrition in the older population. Therefore, older people should be actively assessed for swallowing function and nutritional status.

Nutritional Assessment and Diagnosis

Assessing and diagnosing the nutritional status of all patients with dysphagia is recommended, but the gold standard for assessment items remains unknown. Nutritional assessment involves collecting more detailed information through physical examination and nutrition-related tests on cases with identified nutritional problems using the Short Nutritional Assessment Questionnaire and the Mini Nutritional Assessment Short Form (MNA-SF), which is a simple questionnaire, to determine the presence or absence of actual nutritional problems, identify problems, and recognize the severity of nutritional disorders. It should include information that provides a nutritional diagnosis and helps in appropriately tracking patients after nutrition therapy. A scoping review of nutritional assessment indicators used in adult patients with dysphagia identified the following nutrition screening indicators: MNA-SF, anthropometric measurements (eg, BMI, body weight, upper arm circumference, and mid-upper arm muscle circumference), body composition (eg, skeletal muscle mass, body fat percentage), and lean body mass (using the bioelectrical impedance analysis method), dietary assessment parameters (eg, eating pattern, nothing-by-mouth duration, food intake, energy intake, and food frequency survey), and blood biomarkers focusing on serum visceral proteins. These indicators were included in the risk screening and diagnostic assessment of the Global Leadership Initiative on Malnutrition (GLIM) criteria proposed by several global clinical nutrition societies in 2018. Another report examined the nutritional characteristics of patients with dysphagia in acute and chronic conditions and found malnutrition and sarcopenia in both acute and chronic conditions. However, the acute phase has more severe inflammatory effects and extremely lower levels of serum visceral protein and muscle mass than the chronic phase. In the chronic phase, visceral and muscle protein and fat compartments, weight loss, muscle weakness, and intracellular water content are reduced. Therefore, weight loss, body composition, food intake, and degree of inflammation should be evaluated in patients with dysphagia. We believe that, at the baseline, the nutrition of patients with dysphagia should be assessed according to the items included in the diagnostic assessment of the Global Leadership Initiative on Malnutrition criteria. RDs conduct a detailed assessment at the bedside after the nutritional assessment of the ability of patients to safely ingest, including eating movements, eating patterns, oral function, respiratory status, and endurance. A simple bedside assessment of swallowing function, consisting of a swallow test with sips of water, is helpful in this context. When necessary, specialists were consulted for imaging tests, such as videofluoroscopy, when necessary. Interventions are then focused on optimizing nutritional intake.

Multidisciplinary Assessment and Diagnosis Are Essential in Older Patients

In addition to the nutritional assessment items listed above, muscle strength and physical function, cognitive function, appetite, oral function, polypharmacy, and socioeconomic issues should be assessed in older adults. Sarcopenia and cognitive dysfunction are common in this age group and affect their swallowing function. A systematic review involving nursing home patients found that physical dysfunction, dementia, swallowing/chewing difficulties, and poor oral intake influenced malnutrition. Reduction of food intake with aging, known as anorexia of aging, and poor oral health, such as oral frailty, and socioeconomic issues also lead to malnutrition and dysphagia. Furthermore, polypharmacy reportedly affects swallowing function and nutritional status negatively.
multidisciplinary, multimodal assessment of swallowing function and nutritional status is desirable in older patients with dysphagia.

**TMD**

**Nutritional Management Using a Standardized Food Form Classification Is Essential**

TMD and thickened liquid (TL) administration are important interventions that help patients with dysphagia swallow safely and effectively. However, the number of names and levels of TMD varies nationally and internationally. Uniform terminology for TMD and TL is needed to allow consistent communication among health professionals, care providers, researchers, industry partners, and nutritional assessment items. In Japan, the Japanese Society for Dysphagia Rehabilitation proposed the Japanese Dysphagia Diet (JDD) framework in 2013, and in 2021, the JDD was updated. The proposed JDD2021 framework is widely used in Japan. It has 7 types of TMD (excluding regular diets) that categorizes into 5 levels: code 0t (thickened), code 0j (jelly), code 1j, code 2-1 and 2-2 (pureed), code 3 (solid foods that can be crushed without teeth), and code 4 (foods that are difficult to crush between the tongue and palate and require chewing) (Figure 1). The classification of TL is divided into 3 levels: Extremely, Moderately, and Mildly. Globally, the International Dysphagia Diet Standardization Initiative (IDDSI) framework was proposed in 2017 to define the names of TMD and TL. Currently, the IDDSI framework is implemented in countries such as New Zealand, the United Kingdom, Australia, Canada, the United States, Israel, and Ireland. The IDDSI framework has 5 meal types (regular/easy-to-chew, soft and bite-sized, minced and moist, pureed, and liquidized) and 5 TLs (Extremely, Moderately, Mildly, Slightly, and Thin) (Figure 1). In this framework, Japanese jellies are considered as transitional foods, whose physical properties change with heating and humidification. Offering purées adjusted with a gelling agent may reduce aspiration risk in patients with moderate or severe dysphagia. JDD2021 considers the characteristics of jelly and proposes the selective use of either thickened jelly (code 0t) or jelly (codes 0j and 1j) for patients with severe feeding and swallowing difficulties. Although the 2 frameworks have similar dietary forms (eg, pureed and code 2-1 and 2-2), their methods of classifying meal forms are different. The IDDSI framework also proposes fork-and-spoon tests to classify meal forms. Moreover, 2 frameworks use the syringe flow test to classify TLs. Understanding the differences between the 2 frameworks before using the food form classification, is important. However, evidence on organizing these meal forms and thickening liquids remains insufficient. Hence, development of methods and accumulation of evidence for classifying meal forms and thickening liquids regardless of region, setting, and framework are needed.

**TMDs May Lead to Inadequate Nutrient Intake and Reduced QOL**

Many health professionals are aware of the benefits of providing a TMD or TL to patients with dysphagia. However, several issues must be considered when providing a TMD. First, patients on a TMD consume less energy than those on a regular diet. One of the causes may be the influence of appetite. Recent findings indicate that patients on a TMD have a higher incidence of anorexia than those on a regular diet. Second, TMD recipients have more malnutrition and muscle mass loss than those on a regular diet. Malnutrition inhibits dysphagia improvement. Therefore, the reduced nutrient density of TMD should be taken into consideration. Finally, modifying the form of the meal or the viscosity of the liquid may reduce the QOL of patients or residents and others. Adjusting the bolus form is generally believed to be associated with decreased QOL.

Health professionals and care providers should always remember that the meal form or liquid that prevents choking or aspiration may not be the meal or liquid desired by the patient, resident, or others. Avoiding unnecessary dietary restrictions and improving the food’s appearance and flavors may be effective to improve anorexia and QOL.

**Nutritional Goal Setting and Intervention**

**Patients With Dysphagia Require Individualized and Specialized Nutritional Intervention**

RDs should provide individualized and specialized nutritional interventions for individuals with dysphagia. Individualized and specialized nutritional intervention aimed to achieve favorable or patient-desired outcomes for patients with dysphagia. RDs have reported increased nutritional intake, improved body composition, and other improvements in older patients with dysphagia through individualized nutritional care and educational interventions. Furthermore, the certification system for Certified Specialist of Registered Dietitian for Dysphagia Rehabilitation in Japan reflects the need for specialized nutritional intervention for patients with dysphagia.

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**Fig. 1.** A and B refer to the Japanese Dysphagia Diet 2021 (JDD2021) framework and the International Dysphagia Diet Standardization Initiative framework, respectively. JDD2021 has 7 types of TMD (excluding regular diets) that categorizes into 5 levels as follows: code 0t (thickened), code 0j (jelly), code 1j, code 2-1 and 2-2 (pureed), code 3 (solid foods that can be crushed without teeth), and code 4 (foods that are difficult to crush between the tongue and palate and require chewing).
Nutritional goal setting is necessary for appropriate nutritional intervention. According to the nutritional assessment and diagnosis, nutritional goal setting and nutritional interventions are implemented by selecting and combining appropriate intervention methods. The types of nutritional interventions for patients with dysphagia can be broadly classified into 4 categories: (1) modification of diet form and liquid viscosity, (2) increased nutrient density in the diet, (3) oral nutritional supplement (ONS) intervention, and (4) comprehensive interventions. The following is a detailed description of each category.

Modification of Diet Form and Liquid Viscosity

Modification of diet form and liquid viscosity improves the safety and efficacy of swallowing. Modifying the form of diets can reduce dysphagia-associated nutritional complications, whereas modifying the viscosity of liquids can reduce the risk for aspiration. Unfortunately, liquid viscosity modification has led to intake dissatisfaction and decreased adherence. Nonetheless, through educational interventions by trained nurses, patients’ adherence regarding food texture and thickener use improved. Therefore, diet form and liquid viscosity modification combined with educational interventions by health care providers is recommended. The RDs should regularly assess the swallowing function and aim to make a regular diet for patients if a TMD is possibly unnecessary.

Increased Nutrient Density in the Diet

Increased nutrient density is a highly feasible means of food fortification. Increasing nutrient density does not affect hunger, satiety, or appetite and could be an effective intervention. TMDs have a low nutritional value; thus, more food intake is needed to reach patients’ nutritional goals. However, consuming large amounts of food can be difficult because of poor swallowing function or disease. Increasing nutrient density can enhance satisfaction with swallowing-adjusted diets, increase nutrient intake, and improve nutritional status, especially when medium-chain triglyceride oil, protein powders, and nutritious foods are added.

ONS Intervention

As discussed previously, patients with dysphagia who require TMDs are at high risk of malnutrition. Intervention with ONS is an effective strategy to optimize nutritional intake. Early provision of ONS to patients at risk for malnutrition is also expected to be cost-effective. However, a 2020 systematic review demonstrated that ONS increased protein intake and serum albumin levels in older rehabilitation patients; however, the functional outcome improvements, which were reported in only a few studies, were uncertain. Therefore, supporting evidence for the use of ONS in patients with dysphagia is needed.

Comprehensive Intervention

In this paragraph, multifaceted interventions to increase nutritional intake are referred to as comprehensive interventions. First, providing snacks may be an effective intervention. The European Society for Clinical Nutrition and Metabolism (ESPEN) guideline on clinical nutrition and hydration in geriatrics recommends providing snacks to increase nutritional intake. Some reports claimed that older adults with dysphagia prefer nutritious snacks, suggesting the benefits of snack intake. Second, mealtime interventions have the potential to increase nutritional intake. In older hospitalized patients, a combination of physical support, including slicing of food and bringing it closer to the mouth, and social support, including dialog, encouragement, and emotional support, improved their mealtime satisfaction. Additionally, improving the eating environment, providing snacks and nutritional supplements, and mealtime assistance and verbal prompting were associated with increased nutritional intake among older adults. However, studies focusing on patients with dysphagia are scarce, and their effects on improving nutritional status are inconsistent. Further clinical practice and clinical research, including the verification of effectiveness through intervention studies, are needed. Finally, concomitant artificial nutrition should be considered when oral intake alone is insufficient to reach patient nutritional goals. Weight gain, nutritional status, physical function, and swallowing improved in patients...
with sarcopenic dysphagia who received adequate oral or enteral nutrition and exercise. Therefore, we recommend the use of nasogastric tubes and gastrostomy as a means of meeting nutritional requirements to improve the QOL by promoting oral intake in patients with dysphagia. However, artificial nutrition, including enteral nutrition, requires invasive procedures; hence, medical indications and patient and family wishes must be considered when deciding to undergo such procedures. Artificial nutrition decisions should be shared by the health care provider, patient, and family, considering both the benefits and burdens.

Implications for Practice and Research
This position paper provided insights necessary for the nutritional care of adult patients with feeding and swallowing disorders (Figure 2). RDs need to provide individualized and specialized nutritional management through appropriate assessment of the nutritional characteristics of adult patients with dysphagia. To maintain and improve swallowing function and nutritional status, RDs should intervene from the risk or early onset of dysphagia, providing individualized care according to their expertise as part of a multidisciplinary team. However, systematized clinical practice and research on the relation between nutrition and feeding and swallowing disorders remain inadequate. Further clinical practice and evidence building on nutritional management for adult patients with dysphagia, including the verification of the efficacy on nutritional support through intervention studies, are needed.

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