Received: 21 October 2021 | Accepted: 24 October 2021

DOI: 10.1002/jgf2.509

Journal of General and Family Medicine Open Access WILEY

SPECIAL ARTICLE

# Goal setting for nutrition and body weight in rehabilitation nutrition: position paper by the Japanese Association of Rehabilitation Nutrition (secondary publication)

Hidetaka Wakabayashi MD, PhD[1] | Yoshihiro Yoshimura[2] | Keisuke Maeda[3] | Dai Fujiwara[4] | Shinta Nishioka[5] | Ayano Nagano[6]

[1]Department of Rehabilitation Medicine, Tokyo Women's Medical University Hospital, Tokyo, Japan

[2]Center for Sarcopenia and Malnutrition Research, Kumamoto Rehabilitation Hospital, Kumamoto, Japan

[3]Department of Geriatric Medicine, National Center for Geriatrics and Gerontology, Obu, Japan

[4]Department of Rehabilitation Medicine, Saka General Hospital, Shiogama, Japan

[5]Department of Clinical Nutrition and Food Services, Nagasaki Rehabilitation Hospital, Nagasaki, Japan

[6]Department of Nursing, Nishinomiya Kyoritsu Neurosurgical Hospital, Nishinomiya, Japan

**Correspondence**
Hidetaka Wakabayashi, MD, PhD, Department of Rehabilitation Medicine, Tokyo Women's Medical University Hospital, 8-1, Kawada-cho, Shinjuku-ku, Tokyo 162-0054, Japan.
Email: noventurenoglory@gmail.com

**Funding information**
JSPS KAKENHI, Grant/Award Number: 19H03979

## Abstract

The most important nutrition goals in rehabilitation nutrition are improving function and quality of life, and they are useful to set body weight goals to further improve these aspects. In this paper, we clarified our position, as the Japanese Association of Rehabilitation Nutrition, on body weight goal setting. Body weight goals should be SMART (Specific, Measurable, Achievable, Realistic/Relevant, and Timed). The standard amount of energy accumulation/deficit needed to gain/lose 1 kg body weight is 7500 kcal. In other words, if the nutrition goal is set at 1 kg body weight gain per month, daily energy accumulation can be calculated as approximately 250 kcal. It is necessary to reconcile the rehabilitation goal setting, the content, quantity, and quality of physical activity and exercise therapy, and the patient's general condition and intentions to set nutrition goals. Body weight goal setting is more variable than rehabilitation goal setting, and it is important to confirm the degree of achievement through rehabilitation nutrition monitoring.

**KEYWORDS**
energy accumulation, rehabilitation nutrition, SMART, weight gain, weight loss

## 1 | INTRODUCTION: WHAT IS A NUTRITION GOAL?

Rehabilitation nutritional care involves setting rehabilitation nutrition goals,[1–3] including both rehabilitation and nutrition goals. Rehabilitation goals often encompass improvements in functions including body function and structure, activity, and participation. Nutrition goals, on the contrary, include improvements in not only body weight, muscle mass, and body fat but also muscle strength, physical function, swallowing function, activities of daily living (ADL), quality of life (QOL), and participation. The most important of these nutrition goals are improving function and QOL. However, at present, setting nutrition goals by body weight makes it easier to calculate daily energy requirements. Therefore, in this position paper, we clarified our position, as the Japanese Association of Rehabilitation Nutrition, on the existing knowledge of how to set body weight goals.

## 2 | WHY IS BODY WEIGHT GOAL SETTING NECESSARY?

Rehabilitation nutrition aims to maximize functions such as body function and structure, activity, participation, and QOL. Undernutrition and sarcopenia are factors that contribute to worsening function and QOL.[4,5] Therefore, if undernutrition and sarcopenia can be improved, function can be further improved.[6–9] The clinical practice guidelines for rehabilitation nutrition also propose enhanced nutritional care for four conditions: cerebrovascular disease, hip fracture, adult cancer, and acute disease.[10] Enhanced nutritional care encompasses all nutritional therapies including standard nutritional therapies such as hospital and institutional diets and habitual diets. For example, nutritional education, nutritional counseling, oral nutritional supplements, enteral nutrition, and parenteral nutrition are forms of enhanced nutritional care.[10] On the contrary, in some obese patients, body weight loss leads to better function.[11,12] Sarcopenic obesity is associated with ADL limitations.[13,14] However, there are reports that ADL performance is improved more in obese individuals than in those with a standard body weight[15,16]; therefore, it is not always desirable to reduce body weight in obese patients.

Whether the goal is body weight gain in undernourished patients or body weight loss in obese patients, setting a goal for body weight will allow more appropriate rehabilitation nutrition intervention and rehabilitation nutrition monitoring. In conventional nutritional care management, the daily energy expenditure is calculated and then defined as the daily energy requirement. In other words, daily energy expenditure is equal to daily energy requirement, and the goal of nutritional care management is to maintain the current nutritional status. On the contrary, it is more likely that body weight gain in undernourished patients or body weight loss in obese patients can be obtained by expending less or more energy than the daily requirement. In fact, obese patients undergoing cardiac rehabilitation who set a weight goal lost more weight than those who did not.[17] Prediabetic patients lost more body weight when nurses provided goal-setting interventions.[18] In addition, body weight is usually used as a parameter for nutrition monitoring. In such cases, if a body weight goal is set, it can be clearly determined whether it has been achieved or not. Based on the above, it is necessary to set a body weight goal to achieve high-quality rehabilitation nutrition.

## 3 | HOW TO SET BODY WEIGHT GOALS?

### 3.1 | SMART goal setting

The concept of SMART (Specific, Measurable, Achievable, Realistic/Relevant, and Timed) goal setting has been used in the field of rehabilitation for a long time.[19] For example, improved nutritional status is not a SMART goal. Body weight gain is a specific and measurable item, yet not achievable, realistic/relevant, or timed. On the contrary, a weight gain of 2 kg in 1 month or a weight loss of 5% in 3 months is a relatively SMART goal. When patients with chronic kidney disease set their own SMART goals for dietary intake, their dietary intake improved more than those who did not set SMART goals.[20] Only 41% of stroke rehabilitation patients set SMART rehabilitation goals.[21] In a quality assessment report of whether pediatric rehabilitation goals were SMART, 25% of measurable goals were inadequate, and 20% of achievable goals were not reached, while 100% of specific, relevant, and timed goals were reached.[22]

### 3.2 | The concept of energy accumulation

Aggressive nutritional therapy is a method of nutritional care management in which the daily energy requirement is calculated by summing the daily energy accumulation and daily energy expenditure. In aggressive nutritional therapy, the daily energy requirement is calculated as this sum or as kcal/kg ideal body weight/day. A position paper by four professional organizations on sarcopenia and dysphagia recommended 35 kcal/kg ideal body weight/day for nutritional therapy.[23] In patients with sarcopenia and dysphagia, 30 kcal/kg ideal body weight/day or higher results in a greater improvement in swallowing function.[24] However, the use of kcal/kg ideal body weight/day renders it difficult to calculate the daily energy requirement when setting nutrition goals, compared with the use of the sum of daily energy expenditure and daily energy accumulation. For this reason, we discuss energy accumulation here.

In aggressive nutritional therapy for undernutrition and sarcopenia, the standard energy needed to gain 1 kg body weight is 7500 kcal.[25] In other words, if the weight goal is set at 1 kg weight gain per month, the daily energy accumulation can be calculated as approximately 250 kcal. On the contrary, the amount of energy needed to gain 1 kg body weight in a patient with anorexia nervosa is approximately 5000–10,000 kcal, with an average of approximately 7500 kcal.[26] However, this requirement may be only 4000 kcal if physical activity is low but up to 12,000 kcal if physical activity is high. In a patient with anorexia nervosa who is not at risk of refeeding syndrome, the initial daily energy requirement should be set at 30 kcal/kg current body weight/day plus 500 kcal. However, if body weight gain is no longer observed, this figure may be increased by 10 kcal/kg current body weight/day every 5–7 days until reaching 70–100 kcal/kg current body weight/day.[26] As body weight increases, basal energy expenditure and energy expenditure from physical activity increase, rendering it more difficult to gain body weight gradually. Therefore, if the body weight goal is set at 3 kg body weight gain/month, the daily energy accumulation is calculated as approximately 750 kcal; however, in reality it is difficult to gain 3 kg body weight. In older people, 8800–22,600 kcal is needed to gain 1 kg body weight.[27] It is important to note that the 7500 kcal needed to gain 1 kg body weight is only an approximation and may not be applicable in many cases.

Even in nutritional therapy aimed at body weight loss in obese patients, the standard amount of negative energy accumulation (deficit) needed to lose 1 kg body weight is 7500 kcal. In other words, if the body weight goal is loss of 3 kg per month, the energy

deficit per day can be calculated as approximately −750 kcal. In fact, in nutritional therapy aimed at weight loss, it is not uncommon to reduce daily energy intake by 500–750 kcal.[28–30] Compared with a hypocaloric diet with a daily energy requirement of 1000–1500 kcal, a very low energy diet with a daily requirement of less than 800 kcal results in greater body weight loss in the short term but no significant difference in the long term.[31]

### 3.3 | A note on energy accumulation

If a high body weight goal is set for undernourished or obese patients, the energy accumulation or deficit will be large. However, setting a goal that is too aggressive can lead to metabolic complications. Aggressive nutritional therapy for undernutrition may lead to complications such as hyperglycemia,[32] liver damage,[33] fatty liver,[34] renal damage, and electrolyte abnormalities, whereas aggressive nutritional therapy for obesity may cause various nutritional deficiency symptoms because of inadequate intake of vitamins, minerals, and trace elements, and muscle mass loss because of inadequate protein intake. Therefore, when energy accumulation goals are changed in aggressive nutritional therapy, nutrition monitoring should be performed via weekly blood tests. It is also desirable to monitor nutritional status based on body composition, such as muscle mass and body fat, and based on body weight measurements at least once a week. Until healthcare professionals become proficient in aggressive nutritional therapy, it is desirable to keep the upper limit of energy accumulation/deficit at approximately 750 kcal for both malnutrition and obesity, although there is no clear evidence to support this. This is because the greater the energy accumulation (deficit) is, the more likely the metabolic complications will occur, and in nutritional therapy aimed at weight loss, the daily energy expenditure is often limited to −750 kcal.

In the case of aggressive nutritional therapy for undernutrition, the daily energy expenditure is met by oral intake, but the daily energy requirement, which takes into account energy accumulation, may not be met by oral intake. In such cases, tube feeding or parenteral nutrition should not be used to meet the energy requirement. On the contrary, if the daily energy expenditure is not met by oral intake alone, then tube feeding or parenteral nutrition should be considered.

If daily energy intake is less than daily energy expenditure, the first goal should be to increase daily energy intake until it meets daily energy expenditure. In particular, in patients at risk of refeeding syndrome, the daily energy intake should be increased carefully. On the contrary, if daily energy intake is higher than daily energy expenditure, the goal is to meet the daily energy requirement, which is calculated by taking into account energy accumulation.

### 3.4 | Reconciliation with rehabilitation goal setting

In rehabilitation nutrition, the goal setting of rehabilitation and that of body weight affect each other. For example, if the clinical condition of a patient with a severe consciousness disorder with a Japan Coma Scale score of three digits (not aroused by stimulation) is not expected to improve in the future, the goals of rehabilitation are to provide full assistance with ADL, prevent secondary complications, and reduce the burden of nursing care. If the patient is obese, a body weight goal, such as losing 1 kg body weight in 1 month, should be set to reduce the burden of care by improving obesity. On the contrary, if the patient is undernourished, there are several options for setting a body weight goal. If the patient has bone protrusion and a high risk of developing pressure ulcers, it is advisable to set a goal to improve nutrition, such as gaining 1 kg body weight in 1 month to prevent pressure ulcers. On the contrary, if the patient does not want to increase the burden of care because of body weight gain, a goal to maintain current body weight should be set.

It is also important to consider the content, quantity, and quality of physical activity and exercise therapy. For example, under the current nutritional status, independence with ADL cannot be set as a rehabilitation goal unless nutrition is improved; a body weight goal should be set to allow the patient to achieve ADL independence. However, to achieve ADL independence, it is necessary to increase the quantity and quality of physical activity and exercise therapy, which are likely to increase daily energy consumption. The content, quantity, and quality of current or anticipated physical activity and exercise therapy should also be taken into consideration when matching rehabilitation goal setting. For specific examples of goal setting, please refer to the "Body weight goal setting in practice" section below.

### 3.5 | Reconciliation with the patient's general condition and intentions

There are cases in which aggressive nutritional therapy should not or cannot be implemented depending on the patient's general condition and intentions. It is recommended to avoid aggressive nutritional therapy in cases of terminal-stage diseases such as advanced cancer, severe invasion because of acute inflammation, and refeeding syndrome and its risks. In addition, the patients themselves may not want to improve their undernourished or obese status for certain reasons. Both rehabilitation and nutritional therapies should be implemented after considering the intentions of the patient. Therefore, it is difficult to provide aggressive nutritional therapy to undernourished patients or to implement energy restriction to obese patients who do not want to improve their nutritional status even after sufficient information and discussion.

## 4 | BODY WEIGHT GOAL SETTING IN PRACTICE

### 4.1 | Case 1

A 76-year-old woman was presented with a postoperative hip fracture and postaspiration pneumonia. Before the fracture, she was physically frail and capable of performing ADLs independently and

living alone. After suffering a hip fracture, she was admitted to an acute care hospital and underwent bipolar hip arthroplasty on the second day of hospitalization. On the fifth day, she was diagnosed with aspiration pneumonia. On the 28th day, she was transferred to a convalescent rehabilitation hospital. Her height, weight, and BMI were 153 cm, 34 kg (usual weight 43 kg), and 14.5 kg/m$^2$, respectively; she had a Japan Coma Scale score of 0 (clear consciousness) and mild dysphagia. She could take pureed food by herself and required a wheelchair with moderate assistance with transfer.

The following items regarding this case were addressed by six qualified rehabilitation nutrition instructors certified by the Japanese Association of Rehabilitation Nutrition: short-term (2 weeks or 1 month) and long-term (3 months) body weight goals; daily energy accumulation and daily energy requirement (using a formula) at the time of admission to a convalescent rehabilitation hospital; and short-term (2 weeks or 1 month) and long-term (3 months) rehabilitation goals. The results are shown in Table 1.

There were large variations in the short-term body weight goal, from 0 to 3 kg weight gain in 1 month, and in the long-term goal, from 2 to 9 kg weight gain in 3 months. The long-term goal for eating patterns was to consume regular food for all qualified rehabilitation nutrition instructors; the daily energy accumulation varied greatly from 0 to 750 kcal, and the daily energy requirement varied from 1200 to 2300 kcal. On the contrary, there was no significant variation in the short-term or long-term goals of rehabilitation.

### 4.2 | Case 2

A 60-year-old man underwent postcraniotomy hematoma removal for right putaminal hemorrhage. Before disease onset, he was living alone and performed ADL independently. He was admitted to an acute care hospital for right putaminal hemorrhage (including the posterior limb of internal capsule). The patient underwent craniotomy on the day of admission. On the 20th day of hospitalization, he was transferred to a convalescent rehabilitation hospital. His height, weight, and BMI were 170 cm, 94 kg (usual weight 99 kg), and 32.5, respectively; he had a Japan Coma Scale score of 1 (consciousness is not exactly clear), left hemiplegia (Brunnstrom stage 2–2–3), and severe sensory impairment. Attention deficit and left hemispatial neglect were present. He was in a wheelchair and required maximal assistance with transfers.

The same six items as detailed for case 1 were again addressed by six qualified rehabilitation nutrition instructors: short-term (2 weeks or 1 month) and long-term (3 or 6 months) body weight goals; daily energy deficit and daily energy requirement (using a formula) at the time of admission to a convalescent rehabilitation hospital; and short-term (2 weeks or 1 month) and long-term (3 or 6 months) rehabilitation goals. The results are presented in Table 2.

The short-term goal for body weight loss was 1.5–4 kg in 1 month, and there were wide ranges in the long-term weight loss goals: 5–10 kg at 3 months and 10–22 kg at 6 months. The daily energy deficit varied from −400 to −1000 kcal and the daily energy requirement from 900 to 2400 kcal. On the contrary, there was little variation in the short- and long-term rehabilitation goals.

## 5 | THE DIFFICULTY OF SETTING A BODY WEIGHT GOAL

Goal setting for body weight is difficult. In both case 1, in which the goal was weight gain, and case 2, in which the goal was weight loss, large variations were observed in the goals set for body weight, daily energy accumulation, and daily energy requirement. On the contrary, there was little variation in the goal set for rehabilitation. Therefore, there seems to be a consensus on the goals for rehabilitation and prognosis prediction even if some difference is allowed. However, there is no consensus on setting a body weight goal. Although it depends on body composition, a body weight gain of 2–9 kg at 3 months for case 1 and a body weight loss of 5–10 kg at 3 months for case 2 are both considered appropriate goals. Anything outside of this range may also be appropriate. However, rehabilitation nutrition interventions aimed at body weight gain in case 1 and body weight loss in case 2 are more likely to improve function and QOL. By using hypothesis thinking of body weight goal setting, intervention, and monitoring in a large number of patients, the body weight goal to improve function and QOL may become clearer, and variability in the goals among experts may be reduced.

## 6 | MEAL PROVISION IN REHABILITATION HOSPITALS AND FACILITIES

Rehabilitation hospitals and facilities should establish a system to provide meals that can accommodate a variety of body weight goals. In case 2, the daily energy requirement ranged from 900 to 2400 kcal. Therefore, rehabilitation hospitals and facilities are required to provide meals with at least 900–2400 kcal of daily energy or meals plus oral nutritional supplements. However, some rehabilitation hospitals/facilities do not provide oral nutritional supplements, meals consisting of <1200 kcal, or meals consisting of >2000 kcal. Rehabilitation hospitals and facilities should provide a wide range of meals and oral nutritional supplements to maximize function and QOL.

## 7 | CONCLUSION

There is no consensus on goal setting for body weight. A competent physiatrist, physical therapist, occupational therapist, or speech-language pathologist can set relatively accurate rehabilitation goals from the beginning. On the contrary, body weight goals are more difficult to set than rehabilitation goals because the goals vary according to the individual. Therefore, we tend to conduct nutritional therapy without setting a goal for body weight; however, a body weight goal is necessary to maximize function and QOL. A repeat

**TABLE 1** Responses regarding Case 1

| Qualified rehabilitation nutrition instructors | Short-term nutrition goal (2 weeks or 1 month) | Long-term nutrition goal (3 months) | Daily energy accumulation at the time of hospitalization | Daily energy requirement (using a formula) at the time of hospitalization | Short-term rehabilitation goal (2 weeks or 1 month) | Long-term rehabilitation goal (3 months) |
|---|---|---|---|---|---|---|
| A | 1 month: body weight gain of 3 kg. | Body weight gain of 9 kg in 3 months. | 750 kcal | 907 (basal metabolism) * 1.7 (activity coefficient) * 1.0 (stress coefficient) + 750 (accumulation) = 2292 kcal, with the goal of gradually increasing to 2300 kcal after assessing whether the patient is at risk of refeeding syndrome or not. | 1 month: the patient was able to transfer independently, and toilet movements become supervision. | Ability to walk on the floor in the house and in the ward, take a bath, and perform some instrumental activities of daily living (IADL). Discharged home after introducing human social resources such as helpers. |
| B | 2 weeks: actual nutrient intake reaches the nutrient intake set as the goal (e.g., energy intake: 1800 kcal/day, protein intake: 60 g/day). | Return to usual body weight after 3 months. Independence with the ADL necessary for living alone (Barthel Index 100, able to cook, grip strength >12 kg). However, since usual body weight is BMI < 18.5, the longer-term goal (after 1 year) is to achieve a body weight of 48 kg (if patient desires). | 750 kcal | First, assume that the average energy expenditure during the period is REE * activity = BEE * 1.4, yielding 1270 kcal/day. Add 750 kcal/day energy accumulation (aiming for 9 kg body weight gain in 3 months). Thus, 1270 + 750 = 2020 kcal/day. | 1 month: independent transfer, improved modified diets (International Dysphagia Diet Standardisation Initiative level 6; soft and bite-size food). | No need for food modification, Barthel Index 100. |
| C | 2 weeks: meet energy requirements through oral intake; weight increase (or at least no decrease: no numerical goal set). | (1) Meet energy requirements through oral intake, (2) body weight gain of at least 3 kg (at least 1 kg/month), and (3) grip strength gain of at least 5 kg. | 200 kcal | Daily energy requirement at the time of hospitalization: 1400 kcal/day (34 kg body weight at the time of hospitalization * 35 kcal/kg/day + 200 kcal accumulated). | 2 weeks: fully independence with eating and dressing, partial assistance with changing clothes and toileting, and full assistance with bathing; able to walk more than one round trip in the parallel bars. | Partial assistance with bathing and independence with eating, grooming, dressing, and toileting. Independent mobility outdoors using a T-cane. |
| D | 2 weeks: if no development of refeeding syndrome, start at 350 kcal/day until meeting energy needs at 2 weeks. | Weight gain of 2 kg; able to consume regular food independently. | 0 kcal | Basal metabolic rate 907 kcal * 1.2 (activity coefficient bedside rehabilitation level) = 1200 kcal. | 1 month: able to transfer to a wheelchair with minimum assistance. | Ability to walk independently indoors using handrails or a walker; discharged home. |

(Continues)

TABLE 1 (Continued)

| Qualified rehabilitation nutrition instructors | Short-term nutrition goal (2 weeks or 1 month) | Long-term nutrition goal (3 months) | Daily energy accumulation at the time of hospitalization | Daily energy requirement (using a formula) at the time of hospitalization | Short-term rehabilitation goal (2 weeks or 1 month) | Long-term rehabilitation goal (3 months) |
|---|---|---|---|---|---|---|
| E | 1 month: weight gain of 2 kg/month with full intake of soft food. | Reaching her body weight goal (40 kg) with full intake of regular food, and resolution of her concerns about food and nutrition after discharge. | 500 kcal | Basal metabolism 907 kcal * 1.5 (activity coefficient) * 1.0 (stress coefficient) + 500 kcal accumulated = 1860 kcal. | Able to walk with a cane in the training room with supervision and to consume all of her meals (soft diet). | Discharged home with independence in all ADLs, ability to walk with a cane outdoors and to consume regular food independently. |
| F | 2 weeks: gain of 1 kg weight (35 kg); able to consume the full amount of the swallowing modified diet level 3 (Japanese Society of Dysphagia Rehabilitation Classification Code 3) and oral nutritional supplements. | 6 kg body weight gain (40 kg body weight); able to consume the full amount of energy required via regular food intake. | 500 kcal | Basal metabolism 907 * 1.3 (activity coefficient) * 1.0 (stress coefficient) + 500 kcal accumulated = 1679.1 kcal.<br>**Gradually increase the activity coefficient as the activity level increases.<br>Adjust energy accumulation according to the degree of body weight gain. | 2 weeks: independence with basic activities in bed; supervision with wheelchair transfers (Functional Independence Measure [FIM] 5 points); minimum assistance with toileting (FIM 4 points); moderate assistance with walking (FIM 3 points). | Independence with walking with a T-cane or on foot indoors, assistance with walking with a T-cane outdoors.<br>Independence with basic ADLs except for ascending and descending stairs and bathing (partial assistance with bathing by helpers, etc.).<br>Return to living alone.<br>Independence with housework.<br>Able to go shopping in the neighborhood.<br>Participation in day-care rehabilitation. |

**TABLE 2** Responses regarding Case 2

| Qualified rehabilitation nutrition instructors | Short-term nutrition goal (2 weeks or 1 month) | Long-term nutrition goal (3 or 6 months) | Daily energy deficit at the time of hospitalization | Daily energy requirement (using a formula) at the time of hospitalization | Short-term rehabilitation goal (2 weeks or 1 month) | Long-term rehabilitation goal (3 or 6 months) |
|---|---|---|---|---|---|---|
| A | 1 month: body weight loss of 4 kg. | 6 months: body weight loss of 22 kg (goal of 72 kg for BMI 25). | −1000 kcal | 1584 (basal metabolism) * 1.2 (activity coefficient) * 1.0 (stress coefficient) − 1000 (accumulation) = 900 kcal. | 1 month: minimum assistance with transfer movements. | 6 months: able to walk independently on level ground in the house and in the ward (using a cane and a left short leg brace), supervision with bathing, and partially independence with instrumental activities of daily living (IADL). Discharged to home with the introduction of human social resources such as helpers, or transferred to a rehabilitation facility to continue social rehabilitation. |
| B | 2 weeks: actual nutrient intake reaches the goal nutrient intake (e.g., energy intake: 2000 kcal/day; protein intake 80 g/day). | 3 months: BMI 29 (between current BMI and final BMI goal of 25) = weight 83.8 kg (approx. 10 kg loss); increase in handgrip strength on the nonparalyzed side by 5 kg; maintenance of skeletal muscle index. | −800 kcal | The amount of energy needed to maintain current body weight was estimated to be the current weight * 30 kcal = 2820 kcal. By subtracting 800 kcal as the energy deficit, 2020 kcal/day was calculated as the required energy intake. | 1 month: improvement in eating pattern level (International Dysphagia Diet Standardisation Initiative [IDDSI] level 5, minced), minimum assistance with transfers. | 3 months: improvement in eating a regular diet (IDDSI level 7 normal), walking with a cane. |
| C | 2 weeks: meet energy requirements through oral intake; body weight loss trend (or at least no weight gain; no numerical goal set). | 3 months: meeting energy requirements via oral intake; body weight loss of at least 5 kg (at least 5% of body weight at admission); and increase in handgrip strength on healthy side by at least 10 kg | Calculate the daily energy requirement collectively, without taking into account the energy deficit at the time of hospitalization. | Daily energy requirement at the time of hospitalization: 2400 kcal/day (99 kg body weight * 25 kcal/kg/day). | 2 weeks: independence with eating, partial assistance with dressing, and full assistance with dressing, toileting, and bathing. Patient is able to walk more than one round trip in the parallel bars using a long leg brace. | 6 months: 1) partial assistance with bathing, independence in other areas. 2) Mobility is independent outdoors using a plastic short leg brace and a T-cane; highly dependent on improvement of impaired attention. |

(Continues)

TABLE 2 (Continued)

| Qualified rehabilitation nutrition instructors | Short-term nutrition goal (2 weeks or 1 month) | Long-term nutrition goal (3 or 6 months) | Daily energy deficit at the time of hospitalization | Daily energy requirement (using a formula) at the time of hospitalization | Short-term rehabilitation goal (2 weeks or 1 month) | Long-term rehabilitation goal (3 or 6 months) |
|---|---|---|---|---|---|---|
| D | 1 month: body weight loss of 1.5 kg. | 3 months: body weight loss of 5 kg; ability to maintain muscle mass and to consume regular diet independently. | −400 kcal | 1584 kcal (basal energy expenditure) * 1.4 (activity coefficient) −400 kcal = 1800 kcal. | 1 month: able to transfer to a wheelchair with moderate assistance. | 3 months: able to walk with a cane and orthosis. |
| E | 1 month: 2 kg/month body weight loss by consuming all soft food. | 6 months: achieve goal body weight (84 kg) by consuming regular diet independently and creating an environment to continue desirable eating habits after discharge. | −500 kcal | 1584 (basal energy expenditure) * 1. 2 (activity coefficient) * 1.0 (stress coefficient) −500 = 1400 kcal. | Able to walk with assistance wearing a long leg brace in the gymnasium and consume soft food on his own (1 month) | 6 months: discharged to home or a facility after gaining ability to walk with a quad cane indoors with a short leg brace and to eat regular diet independently. |
| F | 1 month: body weight loss of 3 kg (body weight 91 kg); able to consume the full amount of the swallowing modified diet level 4 (Japanese Society of Dysphagia Rehabilitation classification code 4). | 6 months; body weight loss of at least 14 kg (body weight less than 80 kg); ability to consume the full amount of energy required via a regular diet. | −750 kcal | 1584 * 1.2 (activity coefficient) * 1.0 (stress coefficient) −750 = 1150 kcal.<br>(without accounting for energy deficit).<br>63.58 kg (standard body weight) * 20 = 1271.6 kcal.<br>Gradually increase the activity coefficient as the amount of activity increases. Adjust the energy deficit according to the degree of body weight loss. | 1 month: supervision of basic movements on the bed; minimum assistance with transferring (Functional Independence Measure [FIM] 4 points for transferring); toileting with moderate assistance (FIM 3 points);<br>minimum assistance with walking in parallel bars with long leg braces. | 6 months: independence with indoor walking using a T-cane and short leg brace and supervision with outdoor walking.<br>Independence with basic ADLs except for bathing (performed with partial assistance by helpers or using a day-care center).<br>Return to living alone.<br>Able to perform household chores with partial assistance.<br>Maintenance of physical function, activity, and participation by using visiting and day-care services. |

cycle of setting a goal for weight, checking the degree of achievement by rehabilitation nutrition monitoring, and revising the set goals should be performed. However, body weight is not the most important nutrition goal in rehabilitation nutrition but rather function and QOL. This is the secondary English version of the original Japanese manuscript for "Goal setting for nutrition and body weight in rehabilitation nutrition: position paper by the Japanese Association of Rehabilitation Nutrition". [35]

## ACKNOWLEDGEMENTS

We solicited public comments from members of the Japanese Association of Rehabilitation Nutrition from July 21 to August 3, 2021. Three people provided valuable comments that we incorporated into the manuscript. We would like to express our deepest gratitude to all those who provided public comments. Hidetaka Wakabayashi received grants from JSPS KAKENHI Grant Number 19H03979 during the conduct of this study.

## CONFLICT OF INTEREST

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

## ORCID

*Hidetaka Wakabayashi* https://orcid.org/0000-0002-0364-0818
*Keisuke Maeda* https://orcid.org/0000-0001-7132-7818

## REFERENCES

1. Wakabayashi H. Rehabilitation nutrition in general and family medicine. J Gen Fam Med. 2017;18:153–4.
2. Nagano A, Nishioka S, Wakabayashi H. Rehabilitation nutrition for iatrogenic sarcopenia and sarcopenic dysphagia. J Nutr Health Aging. 2019;23:256–65.
3. Kakehi S, Wakabayashi H, Inuma H, Inose T, Shioya M, Aoyama Y, *et al*. Rehabilitation nutrition and exercise therapy for sarcopenia. World J Mens Health. 2021;39. doi:https://doi.org/10.5534/wjmh.200190
4. Marshall S, Bauer J, Isenring E. The consequences of malnutrition following discharge from rehabilitation to the community: a systematic review of current evidence in older adults. J Hum Nutr Diet. 2014;27:133–41.
5. Yoshimura Y, Wakabayashi H, Bise T, Nagano F, Shimazu S, Shiraishi AI, *et al*. Sarcopenia is associated with worse recovery of physical function and dysphagia and a lower rate of home discharge in Japanese hospitalized adults undergoing convalescent rehabilitation. Nutrition. 2019;61:111–8.
6. Nii M, Maeda K, Wakabayashi H, Nishioka S, Tanaka A. Nutritional improvement and energy intake are associated with functional recovery in patients after cerebrovascular disorders. J Stroke Cerebrovasc Dis. 2016;25:57–62.
7. Nishioka S, Wakabayashi H, Momosaki R. Nutritional status changes and activities of daily living after hip fracture in convalescent rehabilitation units: a Retrospective Observational Cohort Study from the Japan Rehabilitation Nutrition Database. J Acad Nutr Diet. 2018;118:1270–6.
8. Uno C, Maeda K, Wakabayashi H, Nishioka S, Ogawa N, Okamoto T, *et al*. Nutritional status change and activities of daily living in elderly pneumonia patients admitted to acute care hospital: a retrospective cohort study from the Japan Rehabilitation Nutrition Database. Nutrition. 2020;71:110613.
9. Matsushita T, Nishioka S, Taguchi S, Yamanouchi A, Okazaki Y, Oishi K, *et al*. Effect of improvement in sarcopenia on functional and discharge outcomes in stroke rehabilitation patients. Nutrients. 2021;13:2192.
10. Nishioka S, Aragane H, Suzuki N, Yoshimura Y, Fujiwara D, Mori T, *et al*. Clinical practice guidelines for rehabilitation nutrition in cerebrovascular disease, hip fracture, cancer, and acute illness: 2020 update. Clin Nutr ESPEN. 2021;43:90–103.
11. Budui S, Bigolin F, Giordano F, Leoni S, Berteotti M, Sartori E, *et al*. Effects of an intensive inpatient rehabilitation program in elderly patients with obesity. Obes Facts. 2019;12:199–210.
12. Forhan M. Weight loss interventions for rehabilitation patients with obesity. Curr Obes Rep. 2014;3:330–5.
13. Matsushita T, Nishioka S, Taguchi S, Yamanouchi A, Nakashima R, Wakabayashi H. Sarcopenic obesity and activities of daily living in stroke rehabilitation patients: a cross-sectional study. Healthcare. 2020;8:255.
14. Yoshimura Y, Wakabayashi H, Nagano F, Bise T, Shimazu S, Kudo M, *et al*. Sarcopenic obesity is associated with activities of daily living and home discharge in post-acute rehabilitation. J Am Med Dir Assoc. 2020;21:1475–80.
15. Nishioka S, Wakabayashi H, Yoshida T, Mori N, Watanabe R, Nishioka E. Obese Japanese patients with stroke have higher functional recovery in convalescent rehabilitation wards: a retrospective cohort study. J Stroke Cerebrovasc Dis. 2016;25:26–33.
16. Wakabayashi H, Maeda K, Nishioka S, Shamoto H, Momosaki R. Impact of body mass index on activities of daily living in inpatients with acute heart failure. J Nutr Health Aging. 2019;23:151–6.
17. Barrett KV, Savage PD, Ades PA. Effects of behavioral weight loss and weight loss goal setting in cardiac rehabilitation. J Cardiopulm Rehabil Prev. 2020;40:383–7.
18. Whitehead L, Glass CC, Abel SL, Sharp K, Coppell KJ. Exploring the role of goal setting in weight loss for adults recently diagnosed with pre-diabetes. BMC Nurs. 2020;19:67.
19. Bovend'Eerdt TJ, Botell RE, Wade DT. Writing SMART rehabilitation goals and achieving goal attainment scaling: a practical guide. Clin Rehabil. 2009;23:352–61.
20. Chan CH, Conley M, Reeves MM, Campbell KL, Kelly JT. Evaluating the impact of goal setting on improving diet quality in chronic kidney disease. Front Nutr. 2021;8:627753.
21. Plant S, Tyson SF. A multicentre study of how goal-setting is practised during inpatient stroke rehabilitation. Clin Rehabil. 2018;32:263–72.
22. Bexelius A, Carlberg EB, Löwing K. Quality of goal setting in pediatric rehabilitation – a SMART approach. Child Care Health Dev. 2018;44:850–6.
23. Fujishima I, Fujiu-Kurachi M, Arai H, Hyodo M, Kagaya H, Maeda K, *et al*. Sarcopenia and dysphagia: Position paper by four professional organizations. Geriatr Gerontol Int. 2019;19:91–7.
24. Shimizu A, Fujishima I, Maeda K, Wakabayashi H, Nishioka S, Ohno T, *et al*. Nutritional management enhances the recovery of swallowing ability in older patients with sarcopenic dysphagia. Nutrients. 2021;13:596.
25. Nakahara S, Takasaki M, Abe S, Kakitani C, Nishioka S, Wakabayashi H, *et al*. Aggressive nutrition therapy in malnutrition and sarcopenia. Nutrition. 2021;84:111109.
26. Marzola E, Nasser JA, Hashim SA, Shih PA, Kaye WH. Nutritional rehabilitation in anorexia nervosa: review of the literature and implications for treatment. BMC Psychiatry. 2013;13:290.
27. Hébuterne X, Bermon S, Schneider SM. Ageing and muscle: the effects of malnutrition, re-nutrition, and physical exercise. Curr Opin Clin Nutr Metab Care. 2001;4:295–300.
28. American College of Cardiology/American Heart Association Task Force on Practice Guidelines, Obesity Expert Panel, 2013.Executive summary: Guidelines (2013) for the management of overweight and obesity in adults: a report of the American College of Cardiology/

American Heart Association Task Force on Practice Guidelines and the Obesity Society published by the Obesity Society and American College of Cardiology/American Heart Association Task Force on Practice Guidelines. Based on a systematic review from the The Obesity Expert Panel, 2013. Obesity. 2014;22(Suppl 2):S5-39.
29. Capodaglio P, Ilieva E, Oral A, Kiekens C, Negrini S, Varela Donoso E, *et al*. Evidence-based position paper on Physical and Rehabilitation Medicine (PRM) professional practice for people with obesity and related comorbidities. The European PRM position (UEMS PRM Section). Eur J Phys Rehabil Med. 2017;53:611–24.
30. Seo MH, Lee W-Y, Kim SS, Kang J-H, Kang J-H, Kim KK, *et al*. 2018 Korean Society for the Study of Obesity Guideline for the Management of Obesity in Korea. J Obes Metab Syndr. 2019;28:40–5.
31. Tsai AG, Wadden TA. The evolution of very-low-calorie diets: an update and meta-analysis. Obesity. 2006;14:1283–93.
32. McCowen KC, Malhotra A, Bistrian BR. Stress-induced hyperglycemia. Crit Care Clin. 2001;17:107–24.
33. Cavicchi M, Beau P, Crenn P, Degott C, Messing B. Prevalence of liver disease and contributing factors in patients receiving home parenteral nutrition for permanent intestinal failure. Ann Intern Med. 2000;132:525–32.
34. Mollard RC, Senechal M, MacIntosh AC, Hay J, Wicklow BA, Wittmeier KD, *et al*. Dietary determinants of hepatic steatosis and visceral adiposity in overweight and obese youth at risk of type 2 diabetes. Am J Clin Nutr. 2014;99:804–12.
35. Wakabayashi H, Yoshimura Y, Maeda K, Fujiwara D, Nishioka S. Nagano: a goal setting for nutrition and body weight in rehabilitation nutrition: position paper by the Japanese Association of Rehabilitation Nutrition. J Jpn Assoc Rehabil Nutr. 2021;5:235–43. (in Japanese).

**How to cite this article:** Wakabayashi H, Yoshimura Y, Maeda K, Fujiwara D, Nishioka S, Nagano A. Goal setting for nutrition and body weight in rehabilitation nutrition: position paper by the Japanese Association of Rehabilitation Nutrition (secondary publication). J Gen Fam Med. 2022;23:77–86. https://doi.org/10.1002/jgf2.509