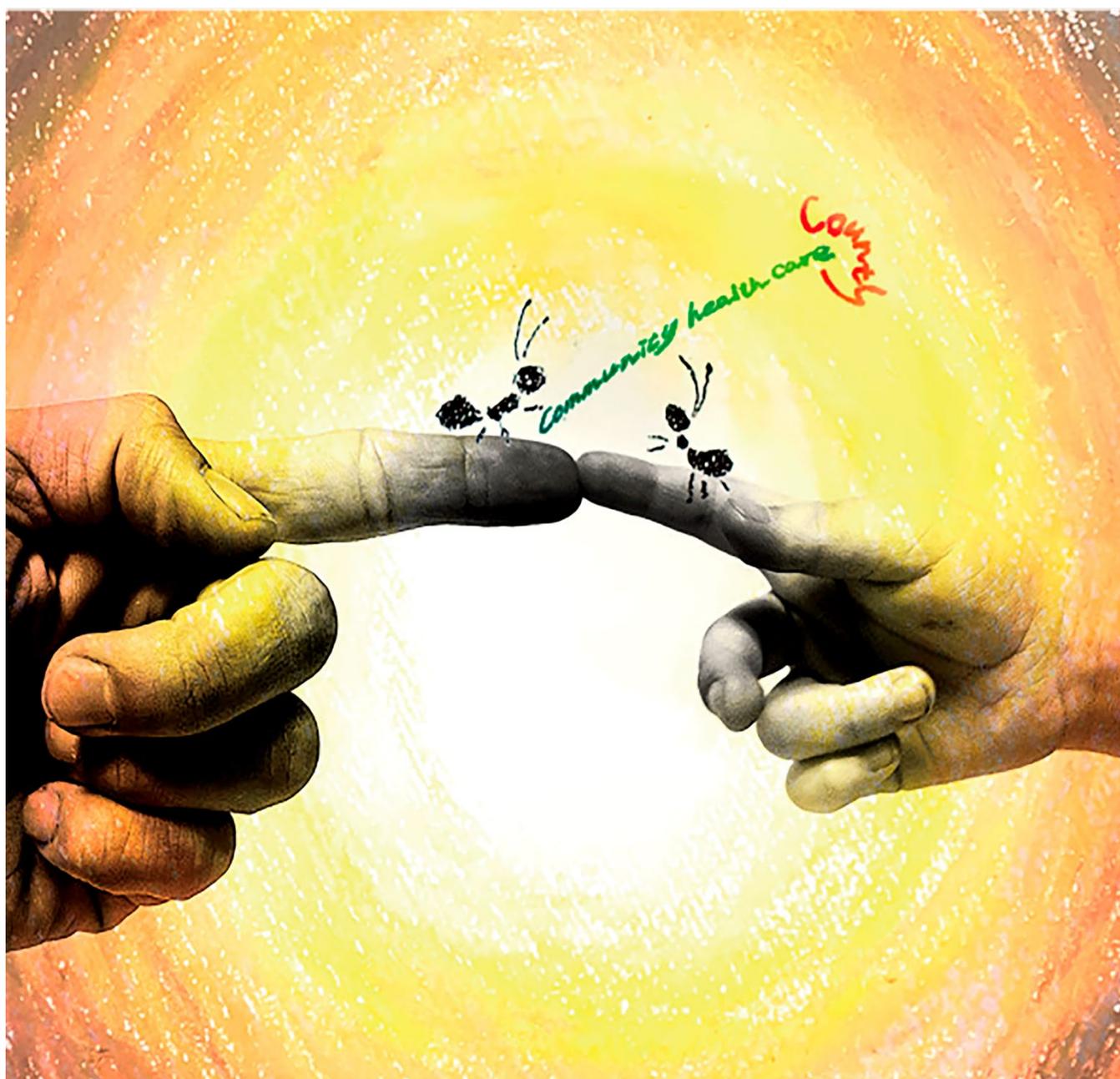


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ORIGINAL ARTICLE

## Structure of Nutrition Improvement Approaches for Care-dependent Older People and Related Challenges in Community-based Integrated Care

Yuko FUJIO <sup>1)</sup> Yoshiko ENOMOTO <sup>1)</sup> Noriko OGAWA <sup>1)</sup>  
Kazutoshi FURUKAWA <sup>2)</sup> Megumi KODAIRA <sup>3)</sup> Yukie ENOMOTO <sup>4)</sup>

- 1) Faculty of Health Science and Nursing, Juntendo University, Japan
- 2) Faculty of Human Life Design, Toyo University, Japan
- 3) International University of Health and Welfare Graduate School, Japan
- 4) Faculty of Health Science, Kyorin University, Japan

### ABSTRACT

To structure nutrition improvement approaches for care-dependent older people and related challenges, this study examined 12 medical and welfare professionals engaged in community-based integrated care services using the semi-structured interview method. **[Devising measures for nutrition improvement and related collaboration]** and **[organizing nutrition improvement approaches]** represented the approaches actually provided by these professionals to improve the nutritional status of care-dependent older people in community-based integrated care, and this indicates that all of these professionals engaged in community-based integrated care services were aware of the **[correlation between the nutritional status and environmental factors]** and **[correlation between the nutritional status and mental/physical functions]** in these people. On the other hand, they faced various challenges such as **[difficulty in collaborating with other professionals/institutions for nutrition improvement]**, **[a lack of nutrition education and its necessity]**, and **[non-implementation of nutritional assessment and its necessity]**. The results clarified a structure, where **[difficulty in collaborating with other professionals/institutions for nutrition improvement]** is the major challenge in **[devising measures for nutrition improvement and related collaboration]** and **[organizing nutrition improvement approaches]**, suggesting the necessity of opportunities for interprofessional education (IPE) and interprofessional work (IPW) beyond occupations and institutions to improve the nutritional status of care-dependent older people in community-based integrated care.

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yfujio@juntendo.ac.jp (Yuko FUJIO; Japan)

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## I. Introduction

The share of older people aged 65 or over in the total global population (aging rate) increased from 5.1% in 1950 to 8.3% in 2015, and it is estimated to reach 18.1% in 2060. The World Health Organization (WHO) published the WHO Guideline on Integrated Care for Older People (ICOPE)<sup>1)</sup> in 2017, defining “mobility loss”, “malnutrition”, “visual impairment”, “hearing loss”, “cognitive impairment”, “depressive symptoms”, “urinary incontinence”, “risk of falls”, and “caregiver support” as 9 elements of integrated care for older people.

In 2005, when the Long-term Care Insurance Act was initially revised, Japan’s care system became more prevention-focused, placing importance on improvements in motor function, nutrition, and oral function. However, reports on the outcomes of the new prevention-focused care system<sup>2,3)</sup> revealed that older people requiring nutritional improvement still account for 30%, and malnutrition among these people remains unsolved.

The effectiveness and reliability of nutritional assessment using a simple inventory (Mini Nutritional Assessment Short-Form: MNA-SF), including nutritional intervention and nutrition education, were confirmed in a previous study<sup>4)</sup>, but methods for nutritional improvement have yet to be established<sup>5)</sup>. On examining the causes, the principal investigator and co-investigators identified various challenges, including poor awareness of nutritional improvement among long-term care insurance service providers<sup>6)</sup>, an association between a poor nutritional status and mental/physical dysfunction in care-dependent older people<sup>7)</sup>, and lack of nutrition education for care managers<sup>8)</sup>. They also reported the necessity of organic collaboration based on standardized assessment and ICT use for more effective nutritional improvement<sup>9)</sup>.

The present study aimed to clarify the structure of nutrition improvement approaches for care-dependent older people and related challenges by analyzing the narratives of medical and welfare professionals of facilities providing community-based integrated care that requires community-wide collaboration such as medical institutions, long-term care insurance-covered facilities, and home care service facilities. Japan’s government aims to establish a system to provide integrated support/care services in each community (community-based integrated care system) by 2025, in order to support older people to maintain their dignity and independence by helping them continue their personal lives in their communities, if possible, until their last days<sup>10)</sup>. In the present study, “nutritional improvement” was defined as “restoring the nutritional status while preventing declines in it”.

## II. Subjects and Methods

### 1. Study and Procedures

#### 1) Study Design

A qualitative descriptive study design (semi-structured interview-based survey).

#### 2) Study Period

Between July 1, 2019, and September 30, 2019

#### 3) Subjects

Medical and welfare professionals working in medical institutions, long-term care insurance-covered facilities, or home care services.

#### 4) Study Items

In addition to basic attributes, such as the sex, age, occupation, length of experience, type of facility, and relevant department, the following items were examined through interviews: the correlation between older people's nutritional status and levels of mental and physical independence, usefulness of assessing the nutritional status and assessment scales, practical methods for nutritional improvement and collaborating professionals, information-sharing with other facilities and service offices, and nutrition education. For these interviews, the interview guide shown in Table 1 was used.

<Table 1> Interview Guide

- 
1. Have you ever noted a correlation between older peoples' nutritional status and levels of mental/physical functional independence? If you have, please describe the circumstances in detail.
  2. How do you assess the nutritional status of care-dependent older people? What are your opinions about the usefulness of the assessment tools actually used and related challenges.
  3. What are your approaches to improve the nutritional status of care-dependent older people? What occupations are you collaborating with?
  4. How do you share information about nutritional improvement approaches for care-dependent older people with other community-based facilities and service offices? What challenges do you face in sharing such information?
  5. Have you ever received education or training on nutritional improvement approaches for care-dependent older people? Please describe the details of the education needed, including teaching methods.
-

### 5) Ethical Considerations

The study facilities and subjects were previously provided with written and oral explanations of the study objective, methods, voluntary cooperation, participants' right to withdraw at any time, and measures to ensure anonymity to obtain their consent. The study was approved by the Ethics Committee of the Faculty of Health Science and Nursing, Juntendo University (approval number: 1-02).

### 2. Data Collection

Candidate facilities were selected using the opportunistic sampling method. One acute care hospital, 1 post-acute rehabilitation hospital, 1 home-visit nursing service office, 1 special nursing home for older people, and 1 day care service office, a total of 5 facilities, were involved, asking their managers to introduce professionals playing a core role in the facility.

### 3. Data Analysis

The interview data were organized as narrative records, which were carefully read and divided into minimum paragraphs with semantic contents as units for analysis. These units were encoded, focusing on nutrition improvement approaches for care-dependent older people and related challenges, and classified into categories based on similarities with enhanced abstractness after careful deliberation on the data and codes to determine the characteristics and names of these categories. To enhance their validity, repeated discussions were held between the principal investigator and co-investigators. Additionally, word frequency analysis and correspondence analysis based on bubble charts were performed using Text Mining Studio Ver. 6.1 to confirm the relationships among attributes, categories, and words. Furthermore, the relationships among the categories were explored by comparing similarities and differences to structure them.

## III. Results

### 1. Basic Attributes (Table 2)

The interviews were conducted with the following medical and welfare professionals working in an acute care hospital, post-acute rehabilitation hospital, special nursing home for older people, day care service office, or home-visit nursing service office: 7 nurses (58.3%), 2 physical therapists (16.7%), 2 care workers (16.7%), and 1 social worker (8.3%), a total of 12 professionals. Their mean age was  $46.08 \pm 11.91$ . There were 4 males (33.3%) and 8 females (66.7%). The mean length of professional experience was  $18.83 \pm 11.92$  years, ranging from 4 to 5 years. The number of those working in each facility was as follows: acute care hospital: 2 (16.7%), post-acute rehabilitation hospital: 3 (25.0%), special nursing home for older people: 3 (25.0%), home-visit nursing service

office: 2 (16.7%), and day care service office: 2 (16.7%). The mean duration of interview was 17.92±7.90 minutes. The medical/welfare professionals' basic attributes are summarized in Table 2.

<Table 2> Basic Attributes

	Type of profession	Age	Sex	Years of experience	Institution	Interview time (sec)
1	Care worker	42	Male	10	Nursing home	1,510
2	Care worker	43	Male	15	Nursing home	795
3	Social worker	54	Male	17	Day service facility	915
4	Nurse	57	Female	19	Day service facility	1,460
5	Physical therapist	43	Male	5	Nursing home	183
6	Physical therapist	43	Female	5	Rehabilitation hospital	1,065
7	Ward nurse	42	Female	21	Rehabilitation hospital	1,699
8	Discharge support nurse	48	Female	27	Rehabilitation hospital	1,784
9	Ward nurse	42	Female	20	Acute hospital	1,181
10	Ward nurse	29	Female	8	Acute hospital	961
11	Visiting nurse	65	Female	44	Home-visit nursing station	740
12	Visiting nurse	62	Female	35	Home-visit nursing station	616
	Ave.	46.08±11.91		18.83±11.92		17.92±7.90 min

## 2. Categorization of the interview data (Table 3)

The interview data were classified into 425 codes ({}), 21 sub-categories (< >), and 7 categories ([ ]). In the following paragraphs, categories/sub-categories are listed from those with a larger number of codes. There were no characteristic differences among the occupations or facilities. The categories are also listed in Table 3.

### [Devising measures for nutrition improvement and related collaboration (152)]

{Having an established system for nutrition assessment} and {making a meal round and conducting nutritional assessment through interprofessional collaboration each

month} were classified into <assessing users' nutritional status using a system and through interprofessional/-institutional collaboration (54)>. {Using supplementary foods for users with malnutrition} and {ordering lunches to provide well-balanced meals for users living alone} were classified into <devising measures for nutrition improvement (38)>. {Discussing each user's nutritional status at admission and discharge conferences} and {describing users' nutritional status in summaries and liaison pathways and giving special notes on their favorite foods} were classified into <sharing information effectively using tools and promoting face-to-face communication (35)>. {Having an established interprofessional collaboration system for nutrition management within the facility} and {collaborating with a multidisciplinary nutrition support team} were classified into <sharing information through interprofessional collaboration within the facility (25)>. These sub-categories were finally summarized into **[devising measures for nutrition improvement and related collaboration]**, consisting of 152 codes, which was the largest number.

#### **[Correlation between the nutritional status and mental/physical functions (68)]**

{Feeling that the nutritional status is correlated with mental/physical functions} and {having realized the correlation between the nutritional status and mental/physical functions in some cases} were classified into <realizing the correlation between the nutritional status and mental/physical functions (30)>. {Having experienced a successful case of nutritional improvement for recovery from a bedridden condition} and {having encountered an end-stage user requiring full assistance for eating, who became able to eat normal foods after eating a sponge cake} were classified into <increasing users' levels of mental/physical functional independence by improving their nutritional status (17)>. {Feeling that a reduced food intake leads to a marked physical decline} and {finding it difficult to provide rehabilitation for users with a poor nutritional status} were classified into <noting an association between a worsened nutritional status and decreased level of mental/physical functional independence (14)>. {Being thanked by a family for the maintenance of oral food intake until the end} and {defining users' true independence as their ability to swallow until the last moment of life} were classified into <correlation between the maintenance of eating ability until the end of life and level of independence (5)>. {Having encountered many cases, where swallowing dysfunction led to eating difficulty, resulting in a rapid functional decline} and {observing that swallowing dysfunction accelerates physical decline} were classified into <correlation between the swallowing function and nutritional status (2)>. These sub-categories were finally summarized into **[correlation between the nutritional status and mental/physical functions]**, consisting of 68 codes.

**[Organizing nutrition improvement approaches (64)]**

{Having a well-functioning multidisciplinary nutrition support team} and {providing nutritional improvement approaches through collaboration among multiple professionals, including physical therapists for positioning during meals and dentists to address poor dentures, in addition to nurses and nutritionists} were classified into <providing nutritional approaches through the nutrition support team and interprofessional collaboration (33)>. {Regularly holding training seminars led by the nutrition support team within the facility} and {increasingly discussing methods for nutritional improvement at conferences} were classified into <raising awareness of nutritional improvement among facility workers (21)>. {Starting rehabilitation from approaches to become able to eat regular foods} and {progressing nutritional improvement approaches by charging additional fees for the maintenance of oral food intake when calculating additional fees related to nutrition} were classified into <calculating additional fees for nutritional management and providing approaches to become able to eat regular foods as part of nutritional improvement (10)>. These sub-categories were finally summarized into **[organizing nutrition improvement approaches]**, consisting of 64 codes.

**[Difficulty in collaborating with other professionals/institutions for nutrition improvement (61)]**

{Not realizing that the facility is collaborating with other institutions for nutritional improvement} and {not having the facility systematically connected with other institutions} were classified into <having difficulty in collaborating with other institutions for nutrition improvement (38)>. {Realizing occupational differences in the level of collaboration for nutritional improvement} and {having a limited number of nurses creating nutrition information due to differences in the length of experience among facility workers} were classified into <difficulty in collaborating for nutrition improvement due to occupational differences and insufficient personal capacities (13)>. {Requiring sharable assessment tools to more actively collaborate with other professionals} and {recognizing the necessity of systems to share nutrition information with other community-based facilities and service offices} were classified into <difficulties due to the unavailability of collaboration tools (10)>. These sub-categories were finally summarized into **[difficulty in collaborating with other professionals/institutions for nutrition improvement]**, consisting of 61 codes.

**[A lack of nutrition education and its necessity (47)]**

{Having insufficient knowledge of nutrition due to a lack of experience of learning practical methods for nutritional improvement} and {lacking sufficient knowledge for nutritional improvement} were classified into <a lack of nutrition education (24)>. {Seeking more opportunities for training with other professionals and institutions} and {desiring to receive nutrition education and recognizing its necessity} were classified into

<necessity of interprofessional nutrition education (23)>. These sub-categories were finally summarized into **[a lack of nutrition education and its necessity]**, consisting of 47 codes.

#### **[Correlation between the nutritional status and environmental factors (17)]**

{Noting a tendency of users living alone to rapidly and markedly lose weight due to difficulty in going for shopping and maintaining a sufficient food intake} and {feeling that hospitals worsen patients' nutritional status} were classified into <correlation between the living environment and nutritional status (14)>. {Observing that the physical conditions of users cared by aged family caregivers or sons tend to be poor, as they only eat rice balls bought at convenience stores day and night} and {realizing the difficulty of proceeding with nutritional improvement approaches without cooperation from families} were classified into <correlation between the family situation and nutritional status (3)>. These sub-categories were finally summarized into **[correlation between the nutritional status and environmental factors]**, consisting of 17 codes.

#### **[Non-implementation of nutritional assessment and its necessity (16)]**

{Finding it unnecessary to conduct nutritional assessment for users with eating ability} and {not having nutrition assessment tools available} were classified into <unavailability of assessment tools and non-implementation of nutritional assessment (14)>. {Hoping that tools for nutritional assessment will become available} and {hoping that parameters for assessment based on the body type and age will become available} were classified into <necessity of nutritional assessment tools (2)>. These sub-categories were finally summarized into **[non-implementation of nutritional assessment and its necessity]**, consisting of 16 codes.

<Table 3> Nutrition Improvement Approaches for Care-dependent Older People in Community-based Integrated Care (n=425)

Category	Sub-category	Number
Devising measures for nutrition improvement and related collaboration (152)	Assessing users' nutritional status using a system and through interprofessional/-institutional collaboration	54
	Devising measures for nutrition improvement	38
	Sharing information effectively using tools and promoting face-to-face communication	35
	Sharing information through interprofessional collaboration within the facility	25
Correlation between the nutritional status and mental/physical functions (68)	Realizing the correlation between the nutritional status and mental/physical functions	30
	Increasing users' levels of mental/physical functional independence by improving their nutritional status	17
	Noting an association between a worsened nutritional status and decreased level of mental/physical functional independence	14
	Correlation between the maintenance of eating ability until the end of life and level of independence	5
Organizing nutrition improvement approaches (64)	Correlation between the swallowing function and nutritional status	2
	Providing nutritional approaches through the nutrition support team and interprofessional collaboration	33
	Raising awareness of nutritional improvement among facility workers	21
Difficulty in collaborating with other professionals/institutions for nutrition improvement (61)	Calculating additional fees for nutritional management and providing approaches to become able to eat regular foods as part of nutritional improvement	10
	Having difficulty in collaborating with other institutions for nutrition improvement	38
	Difficulties due to the unavailability of collaborate on tools	10
A lack of nutrition education and its necessity (47)	Difficulty in collaborating for nutrition improvement due to occupational differences and insufficient personal capacities	13
	A lack of nutrition education	24
Correlation between the nutritional status and environmental factors (17)	Necessity of interprofessional nutrition education	23
	Correlation between the living environment and nutritional status	14
Non-implementation of nutritional assessment and its necessity (16)	Correlation between the family situation and nutritional status	3
	Unavailability of assessment tools and non-implementation of nutritional assessment	14
	Necessity of nutritional assessment tools	2

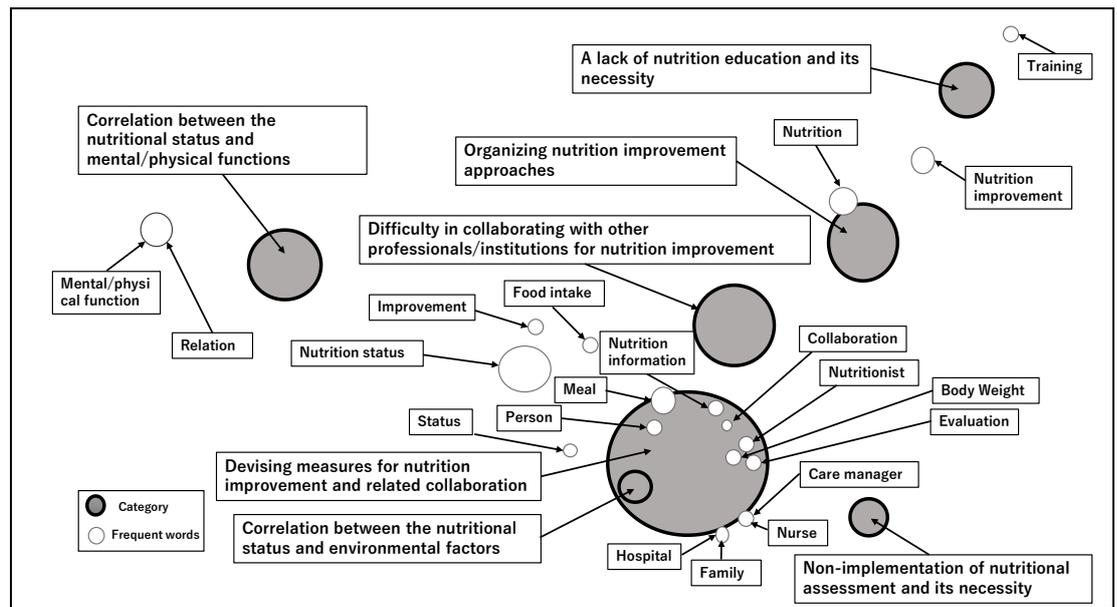
### 3. Analysis of the relationships among the categories and between them and frequent words (Figure 1)

The medical/welfare professionals' narratives were analyzed using Text Mining Studio Ver. 6.1 to examine the relationships among attributes and the categories and between them and relevant words. First, each word (morpheme)'s frequency of appearing was confirmed. The following words ranked among the top 20 through word frequency analysis: "nutritional status", "meal", "food intake", "nutrition", "correlation", "mental/physical functions", "nutritional improvement", "improvement", "nutrition information", "person", "nutritionist", "assessment", "hospital", "body weight", "nurse", "status", "collaboration", "training", "care manager", and "family". These frequent words were included in fragmented codes.

Subsequently, the levels of correlation among attributes and the created categories and between these categories and the frequent words were confirmed using bubble charts for correspondence analysis. These charts examine correlations based on the distances between mapped attributes and words. There were no characteristic differences in the relationship between the occupation/type of facility and frequent words. On analyzing the relationships among the categories created from the interview data, with attributes converted into categories, the most frequent categories [**devising measures for nutrition improvement and related collaboration**] and [**correlation between the nutritional status and environmental factors**] were close to and strongly correlated with each other. [**Correlation between the nutritional status and mental/physical functions**] was distant and alone, but it was close to [**devising measures for nutrition improvement and related collaboration**] and [**difficulty in collaborating with other professionals/institutions for nutrition improvement**], suggesting correlations with these categories. [**Difficulty in collaborating with other professionals/institutions for nutrition improvement**] was found between the 2 categories representing approaches to improve the nutritional status of care-dependent older people, [**devising measures for nutrition improvement and related collaboration**] and [**organizing nutrition improvement approaches**], explaining that this is a challenge faced by these professionals when providing such approaches in community-based integrated care. As other challenges in this area, [**organizing nutrition improvement approaches**] and [**a lack of nutrition education and its necessity**], as well as [**devising measures for nutrition improvement and related collaboration**] and [**non-implementation of nutritional assessment and its necessity**], were also close to and strongly correlated with each other.

As for the relationships between the categories and frequent words, "meal", "nutrition information", "person", "collaboration", "nutritionist", "assessment", "body weight", "care manager", "nurse", "family", and "hospital" belonged to the major category [**devising measures for nutrition improvement and related collaboration**], and "nutritional status", "food intake", "improvement", and "status" were close to and strongly correlated with it. These words were included in the following codes, comprising [**devising measures for**

**nutrition improvement and related collaboration**]: {adopting measures, such as conducting “assessment” based on the pattern of daily “meal” consumption and “food intake” representing the “nutritional status”, and sharing “nutrition information” through “collaboration”}, {conducting “assessment”, focusing on a loss of “body weight” that indicates a poor “nutritional status”}, {having the “nutritionist” attend all conferences with the “care manager” to discuss together}, {devising measures for each user to take meals through “collaboration” with his/her “family”, in addition to professionals}, {recommending food delivery services for each “person” (user) with difficulty going for shopping}, {collecting information by asking the “hospital” “nurse” in charge to interview the user, when “collaboration” to obtain “nutrition information” is difficult}, {asking the “hospital” “nurse” in charge about the user’s “food intake” and feasible measures for “improvement”}, and {asking the user’s “family” about his/her “meal” “status”}. “Mental/physical functions” and “correlation” were close to and strongly correlated with **[correlation between the nutritional status and mental/physical functions]**. These words were included in the following codes, comprising this category: {having encountered many cases, where nutritional improvement paved the way for the recovery of “mental/physical functions”}, {realizing the “correlation” between the nutritional status and level of mental/physical independence}, and {realizing the “correlation” between a decrease in oral food intake and physical decline due to a loss of vitality}. “Nutrition” belonged to **[organizing nutrition improvement approaches]**, and “nutritional improvement” was close to and strongly correlated with it. These words were included in the following codes, comprising this category: {progressing “nutritional improvement” approaches by charging additional fees for the maintenance of oral food intake when calculating additional fees related to “nutrition”}, {noting that facility workers are increasingly devising measures to promote “nutrition” while increasing activity levels}, {having a committee for “nutritional improvement” as an institutional approach of the facility}, and {actively managing “nutrition” with a certified nurse in dysphagia nursing on the ward}. “Training” and “nutritional improvement” were close to and strongly correlated with **[a lack of nutrition education and its necessity]**. These words were included in the following codes, comprising this category: {not participating in “training” for “nutritional improvement” outside the facility}, {lacking opportunities to receive education for “nutritional improvement”}, {seeking “training” to develop insight into “nutritional improvement” approaches to be provided in an acute care hospital}, and {expecting that such “training” will provide a basis for career development in the aspect of “nutritional improvement”}. Most of the top 20 words were strongly correlated with **[devising measures for nutrition improvement and related collaboration]**. Figure 1 shows the results of correspondence analysis using bubble charts to analyze the relationships between the categories and words.

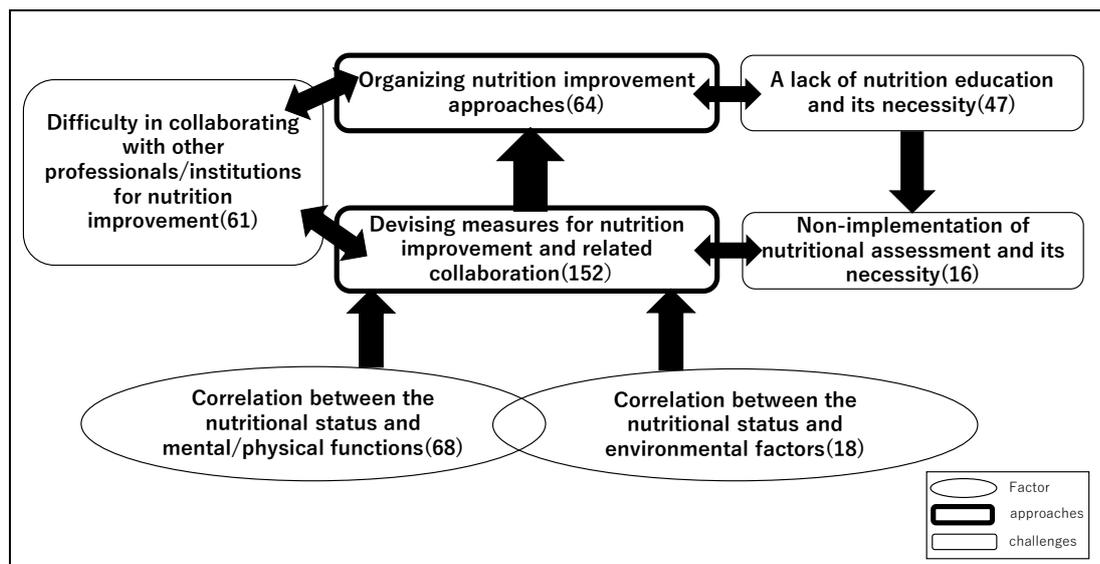


<Figure 1> Correspondence between categories and frequent words Bubble analysis results

#### 4. Structure of nutrition improvement approaches for care-dependent older people in community-based integrated care and related challenges (Figure 2)

Based on the created categories, nutrition improvement approaches for care-dependent older people in community-based integrated care and related challenges were structured.

**[Devising measures for nutrition improvement and related collaboration]** and **[organizing nutrition improvement approaches]** represented the approaches actually provided to improve the nutritional status of care-dependent older people in community-based integrated care, and this indicates that all of the medical/welfare professionals engaged in community-based integrated care services were aware of the **[correlation between the nutritional status and environmental factors]** and **[correlation between the nutritional status and mental/physical functions]** in these older people. On the other hand, they faced various challenges such as **[difficulty in collaborating with other professionals/institutions for nutrition improvement]**, **[a lack of nutrition education and its necessity]**, and **[non-implementation of nutritional assessment and its necessity]**. The results clarified a structure where **[difficulty in collaborating with other professionals/institutions for nutrition improvement]** is the major challenge in **[devising measures for nutrition improvement and related collaboration]** and **[organizing nutrition improvement approaches]**. Table 2 shows the structure of nutrition improvement approaches for care-dependent older people in community-based integrated care and related challenges.



<Figure 2> Structure of the approaches and challenges of “nutrition improvement” for care-dependent older people in community-based integrated care

#### IV. Discussion

The interviewees were 12 medical and welfare professionals with a mean age of 40-49 and mean length of professional experience longer than 18 years. They were engaged in community-based integrated care services, playing a core role in each institution. Although the occupation and type of facility varied among them, the results clarified their overall tendencies regarding nutrition improvement approaches for care-dependent older people in community-based integrated care and related challenges.

The major category was **[devising measures for nutrition improvement and related collaboration]**, consisting of 152 codes. Most of the top 20 words extracted through correspondence analysis using bubble charts were strongly correlated with this category, clearly reflecting the medical/welfare professionals’ awareness. The category represents the approaches actually provided by them to improve the nutritional status of care-dependent older people. Background factors associated with the category may be explained in connection with other categories. For example, another category strongly correlated with **[devising measures for nutrition improvement and related collaboration]** was **[correlation between the nutritional status and environmental factors]**, and this category consisted of the following codes: {suspecting malnutrition in most older people staying at hospitals}, {attributing a loss of appetite in many patients with dementia and older people to environmental changes caused by hospitalization}, {noting a tendency of users living alone to rapidly and markedly lose weight due to difficulty in maintaining a sufficient food intake}, and {noting a tendency of users living in special nursing homes for older people to have a reduced appetite}. Thus, the medical/welfare professionals noted

care-dependent older people's poor nutritional status in each field of community-based integrated care. At the same time, the realization of the **[correlation between the nutritional status and environmental factors]** may have motivated them to adopt the representative approach, **[devising measures for nutrition improvement and related collaboration]**. Mizuno described motivation as follows: "Motivation is a mechanism to induce the drive to work. It is not forcibly executed by a third person, but it promotes individuals' spontaneous actions. Human beings adopt spontaneous actions from some motives"<sup>11)</sup>. The major category **[devising measures for nutrition improvement and related collaboration]** represents the medical/welfare professionals' spontaneous actions, revealing that nutrition improvement approaches for care-dependent older people are spontaneously provided in the current community-based integrated care system. Another motive may have been the **[correlation between the nutritional status and mental/physical functions]**. The codes comprising this category include: {observing that eating stimulates even people with no response}, {having encountered cases, where nutritional improvement markedly promoted speech} (effects of nutritional improvement), {mentioning cases, where fracture caused pneumonia, eating difficulty, and consequent malnutrition, resulting in a bedridden condition}, and {noting a correlation between a decrease in oral food intake and loss of vitality, leading to a bedridden condition} (risk of malnutrition). Thus, the realization of these effects and risk may have spontaneously led to **[devising measures for nutrition improvement and related collaboration]**. In a previous study conducted by the principal investigator, a correlation between the nutritional status and mental/physical functions of care-dependent older people living in residences for the elderly was also suggested<sup>12)</sup>. Another representative approach actually provided was **[organizing nutrition improvement approaches]**, mainly consisting of the following codes: {providing approaches for users with markedly low albumin levels through nutrition support team intervention}, {holding training seminars led by the Nutrition Management Section and nutrition support team within the facility}, and {having been continuously providing nutritional improvement approaches in the facility, and becoming entitled to charge additional fees for nutritional management}. These codes explain that each institution begins to address this issue on an organization-wide basis. Tada noted, "Motivation for work requires reviews from an organizational perspective, and it places importance on the sharing of goals and information"<sup>13)</sup>. When focusing on the sharing of goals and information, the following codes, comprising **[organizing nutrition improvement approaches]**, are suggestive: {improving users' nutritional status through collaboration between nutritionists and nurses}, {collaborating with the Department of Dentistry in the facility to examine users' oral conditions and adjust their dentures}, {finding interventions provided by physical therapists indirect, but effective}, and {collaborating with helpers to provide appropriate meals for each user}. Thus, when **[organizing nutrition improvement approaches]**, the sharing of goals and information may have promoted interprofessional collaboration. These approaches indicate that

nutrition improvement approaches for care-dependent older people in community-based integrated care proceed from **[devising measures for nutrition improvement and related collaboration]** as a spontaneous action to **[organizing nutrition improvement approaches]**.

On the other hand, the results of correspondence analysis using bubble charts revealed various challenges. **[Difficulty in collaborating with other professionals/institutions for nutrition improvement]** was found between **[devising measures for nutrition improvement and related collaboration]** and **[organizing nutrition improvement approaches]**. **[Difficulty in collaborating with other professionals/institutions for nutrition improvement]** consisted of various codes, revealing insufficient collaboration with other institutions for nutritional improvement such as {not sharing information about nutritional improvement approaches for older people with other service offices}, {not actively collaborating with other institutions to improve users' nutritional status}, and {not obtaining information about users' past conditions, but starting their management by assessing their status on admission}. **[A lack of nutrition education and its necessity]** and **[non-implementation of nutritional assessment and its necessity]** are also challenges that have yet to be addressed. **[A lack of nutrition education and its necessity]** mainly consisted of {having not received formal nutrition education} and {hoping that sharable nutrition education will be provided to promote interprofessional collaboration}, while **[non-implementation of nutritional assessment and its necessity]** were represented by {not regularly conducting nutrition assessment for all users} and {hoping that tools for nutritional assessment will become available}. These challenges are similar to those reported by the principal investigator in a previous study involving care managers, who provided care management based on Japan's long-term care insurance system: [the importance of performing nutritional management through collaboration with other professionals and services], [insufficient nutrition education], and [difficulty in accurately assessing the nutritional status]<sup>14</sup>. Thus, the present study additionally clarified challenges in improving the nutritional status of care-dependent older people in community-based integrated care.

**[Devising measures for nutrition improvement and related collaboration]** and **[organizing nutrition improvement approaches]** represented the approaches actually provided by the medical/welfare professionals for such a purpose, and this indicates that all of these professionals engaged in community-based integrated care services were aware of the **[correlation between the nutritional and status environmental factors]** and **[correlation between the nutritional status and mental/physical functions]** in these people. On the other hand, they faced various challenges such as **[difficulty in collaborating with other professionals/institutions for nutrition improvement]**, **[a lack of nutrition education and its necessity]**, and **[non-implementation of nutritional assessment and its necessity]**. The results clarified a structure, where **[difficulty in collaborating with other professionals/institutions for nutrition improvement]** is the major challenge in **[devising measures for nutrition improvement and related**

**collaboration]** and **[organizing nutrition improvement approaches]**, suggesting the necessity of opportunities for interprofessional education (IPE) and interprofessional work (IPW) beyond occupations and institutions to improve the nutritional status of care-dependent older people in community-based integrated care. Yoshimoto defines IPW as “collaborative work to achieve common goals with professionals from different specialty areas according to their skills and roles”<sup>15)</sup>. Based on this, it may also be necessary to promote IPW or collaboration among multiple professionals toward the common goal of improving the nutritional status of care-dependent older people in community-based integrated care. Regarding this, Kohno reported as follows: “The promotion of teamwork has the most marked impact on interprofessional collaboration in the community-based integrated care system, and IPW has the most marked impact on the promotion of teamwork”<sup>16)</sup>. Moreover, Hugh Barr of the Center for the Advancement of Interprofessional Education (CAIPE) in the United Kingdom described IPW as “a collaborative relationship based on interactive learning among multiple professionals”<sup>17)</sup>. WHO also advocates IPE as an indispensable step for the development of medical human resources<sup>18)</sup>. However, IPE is not a required subject in Japan’s curricula to educate and train health, medical, and welfare professionals, and there is no occupation that should be educated and trained based on legally designated rules specifying IPE in Japan<sup>19)</sup>. This may be a factor associated with the challenges identified in the present study, **[difficulty in collaborating with other professionals/institutions for nutrition improvement]**, **[a lack of nutrition education and its necessity]**, and **[non-implementation of nutritional assessment and its necessity]**. Although IPE is increasingly being recognized in actual educational settings<sup>20)</sup>, the results of the present study indicate the necessity of IPE and IPW to promptly address these challenges, and improve the nutritional status of care-dependent older people in community-based integrated care.

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E-mail: ash201091@gmail.com

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E-mail: ash201091@gmail.com

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