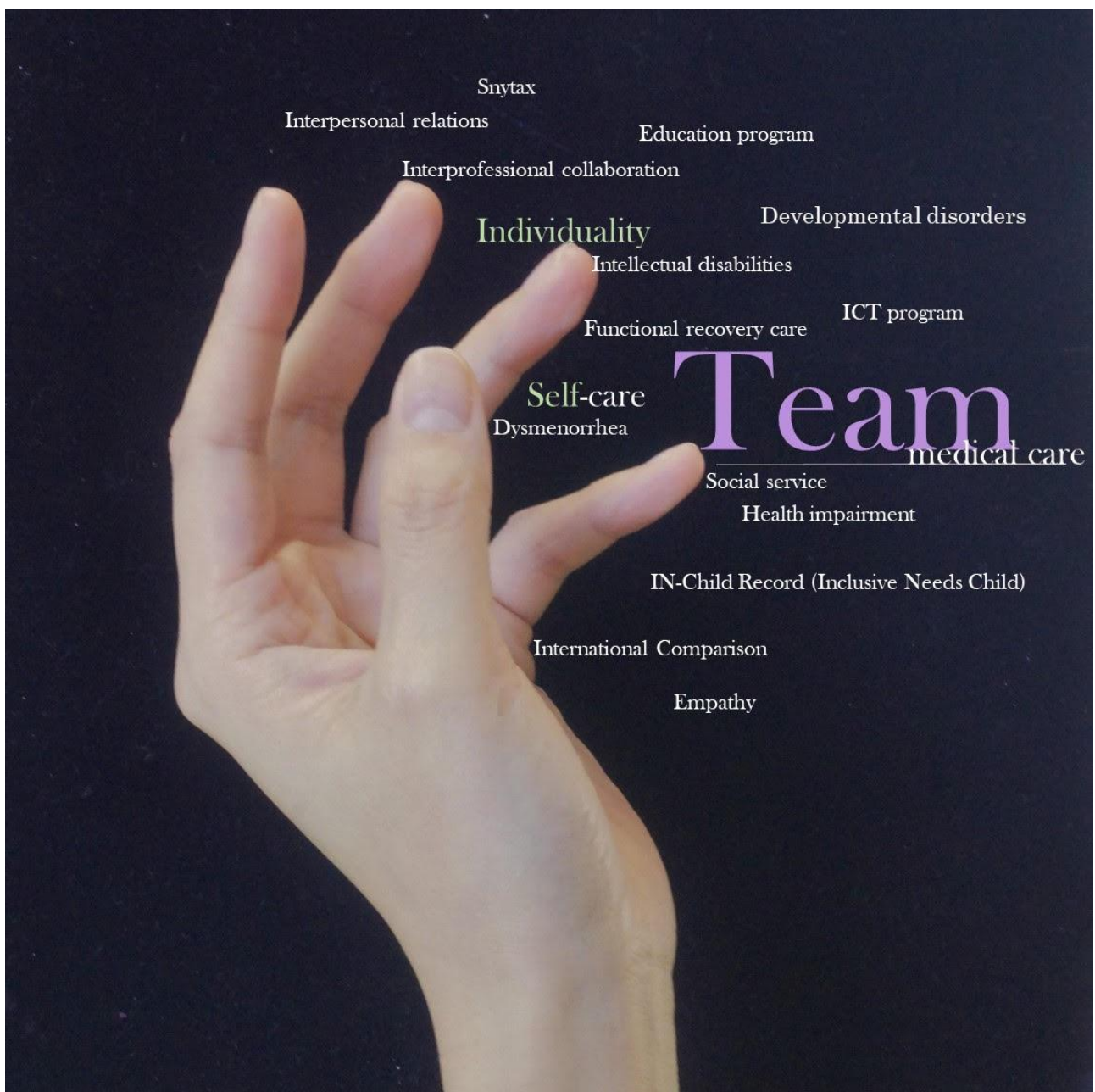


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ORIGINAL ARTICLE

Interprofessional Cooperation ICT Program Development Aimed at “Nutrition Improvement”

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ABSTRACT

To promote care planning that prevents the progression of care dependency among care service users by improving their nutritional conditions, we examined the status of ICT use for such planning and contents of care plans, involving 714 care managers throughout Japan. Based on the results, we propose an ICT program to prevent the progression of care dependency among care service users by improving their nutritional conditions through interprofessional collaboration, adopting the following approaches: 1) standardizing assessment to create care plans that facilitate nutrition improvement, and organically reflecting challenges of such improvement on care plans, actively and effectively using ICT; 2) encouraging communities to share their care planning systems to promote the sharing of care plans for nutritional improvement with service providers; and 3) promoting interprofessional collaboration by sharing the systems.

<Key-words>

interprofessional collaboration, ICT program, nutrition improvement, prevention of the progression of care dependency

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I. Introduction

Malnutrition is the factor for older people to require care. The revision of the Long-Term Care Insurance Act in 2006 included care prevention and preventing the level of care need from becoming higher, and nutrition management was introduced as the mainstay of the revision. However, according to the “Research on Comprehensive Evaluation and Analysis regarding the Effects of Care Prevention Programs” in 2008, among particular older people or those requiring support who may continue requiring care after the initiation of care prevention programs, individuals requiring nutrition improvement account for approximately 30% of the older people. (Tsuji, Ueda, Okubo, et al., 2009) In addition, according to the “Survey Report about Understanding the Eating Condition and Nutritional conditions of Patients Receiving Home-Based Care” in 2012, approximately 30% of the older people receiving home-based care suffer malnutrition based on the MNA-SF (Mini Nutritional Assessment-Short Form) and BMI values (Body Mass Index) [National Center for Geriatrics and Gerontology, 2012]. Thus, as issues regarding: 1) older people starting to require care and 2) the level of care need becoming higher, malnutrition has yet to be resolved.

This may be attributable to the absence of systems whereby identifying the risk of malnutrition among care service users (analysis) leads to care approaches that facilitate nutrition improvement (problem-solving). Regarding the identification of such a risk, in 2014, researchers conducted an awareness survey concerning the nutritional conditions of older people requiring care involving nursing care insurance service workers, and revealed that both home-based and facility workers were hardly aware of the BMI values and Alb levels, which are indices of nutritional conditions. (Fujio & Kodaira, 2014) These results suggested that information-gathering and -sharing for identifying the risk of malnutrition were not standardized. In 2015, a survey was conducted to assess the nutritional conditions and mental/physical function of facility service users and at-home older people requiring care who utilized nursing care insurance services. As a result, correlations were noted between Alb levels and the following 4 factors: the BMI values, dietary habits, dietary intake, and locomotion ability. This indicated that these 4 factors may be predictors of Alb levels. (Fujio, Ogawa, Inoue, et al., 2016) In 2016, a survey was conducted to assess the nutritional conditions and mental/physical function of older housing facility service users, which were not covered by nursing care insurance. In another survey conducted in the same year, we focused on the contents of information collected when creating care plans for nutrition improvement in long-term care insurance services. Alb levels were the least frequently collected content of information, followed by BMI and nutritional index values. The frequency of collecting nutritional index values was correlated with the number of service users, type of service, type of profession (basic qualifications), and experience of receiving nutrition education. The results indicated the necessity of considering the type of service, type of profession, and experience of receiving

nutrition education as a challenge in creating care plans to improve older people's nutritional conditions (Fujio, Kurokawa, Furukawa, et al., 2018).

Under these circumstances, the present study examined the link between assessment and care planning and the use of information and communication technology (ICT) to share information, with the aim of promoting care planning that facilitates systematized nutrition improvement beyond the types of service and profession. Concerning ICT-based systems, Japan's Ministry of Health, Labour, and Welfare promotes the active and effective use of this technology as a tool to address health, medical, and care issues. However, according to a report published by it in 2014, entitled: [Promotion of the Use of ICT in Health, Medical, and Care Services], many ICT-based systems are not being effectively operated to disseminate and promote information-sharing networks (Ministry of Health, Labour, and Welfare, 2014). The objective of the present study was to provide useful insights for active and effective ICT use by examining care managers' status of using this technology for care planning and contents of care plans created by them, in order to promote care planning that prevents the progression of care dependency among care service users by improving their nutritional conditions.

II. Subjects and Methods

1. Study and Procedures

1) Study Design

A quantitative, descriptive study (anonymous self-completed questionnaire survey)

2) Study Period

Between November 1, 2016 and December 1, 2016. (2 months)

3) Subjects

Care managers providing nursing-care insurance services

4) Study Items

Basic attributes: type of service, Care Grade, type of profession (medical profession or welfare profession), years of experience, number of charges.

Care planning: using/not using ICT, linked/not linked with assessment, shared/not shared with service providers.

Contents of care plans: meeting/not meeting nutrition-related needs, addressing/not addressing challenges identified through assessment, exchange of nutrition-related information with other types of profession, improvements in service users' levels of independence, satisfaction with care planning systems

Free descriptions: points of improvement of care planning systems

5) Ethical Considerations

This study was conducted with the approval of the Ethics Committee of the Faculty of Health Science and Nursing, Juntendo University (approval number: 28-06). The following were explained to the subjects: Participation in the questionnaire survey must be based on their own free will. As the survey was anonymous, individuals could not be identified. Obtained data would be coded, analyzed, and used only for the present study. Only people who had consented to the study participated in it, and the completion of the questionnaire form was regarded as the consent.

2. Data Collection

Concerning data collection, 2,000 facilities were randomly extracted from the Welfare and Medical Service Network System (WAM NET) of all 47 prefectures in Japan.

3. Statistics Analysis

After simple tabulation for each item, we conducted the Mann-Whitney U-test and chi-square test. We examined significant differences by analyzing adjusted, standardized residuals, setting the significance level at $p < .05$ and calculating phi- and Cramer's V coefficients. For all statistical processes, we used SPSS Statistics Ver. 23.0. We also categorized free descriptions regarding points of improvement of care planning systems based on similarities, and analyzed their contents.

III. Results

A total number of 780 (response rate: 38.0%) completed questionnaires were collected, and 714 (effective response rate: 35.7%) subjects provided effective answers.

1. Basic Attributes (Table.1)

Regarding the type of service, 263 (36.8%) of facility and 451 (63.2%) at-home care managers, respectively. The average Care Grade was 2.80 ± 2.02 . The most common fundamental qualification was certified care worker ($n=478$ [66.9%]), followed by nurse ($n=78$ [10.9%]). The average duration of experience was 7.35 ± 4.68 (Min: 0.2, Max: 21.0) years, and the average number of people of whom each subject was in charge was 38.13 ± 23.40 (Min: 1, Max: 150).

<Table.1> Basic attributes (%) n=714

Type of service	Facilities	263(36.8)
	In-home	451(63.2)
Care Grade		2.80±2.02
Basic qualification	Doctor	0(0.0)
	Nurse	78(10.9)
	Physical therapist	1(0.1)
	Occupational therapist	3(0.4)
	Nutritionist	52(7.3)
	Dental hygienist	10(1.4)
	Care worker	478(66.9)
	Social worker	48(6.7)
	Other	44(6.2)
Years of experience		7.35±4.68
Number of service users		38.13±23.40

2. Care planning (Table.2)

For care planning, 559 (78.3%) care managers used ICT, whereas 155 (21.7%) did not. The link between assessment and care planning was as follows: entirely linked: 336 (47.1%), partially linked: 307 (43.0%), and not linked at all: 71 (9.9%). Care planning was shared with service providers entirely (497; 69.6%) or partially (195; 27.3%), or it was not shared at all (22; 3.1%).

<Table.2> Care planning (n=714)

		Frequency (%)
ICT use	Using	559(78.3)
	Not using	155(21.7)
Link with assessment	Entirely linked	336(47.1)
	Partially linked	307(43.0)
	Not linked at all	71(9.9)
Sharing with service providers	Entirely shared	497(69.6)
	Partially shared	195(27.3)
	Not shared at all	22(3.1)

3. Contents of care plans (Table.3)

Care plans fully (94; 13.2%), partially (525; 73.5%), or rarely (87; 12.2%) met nutrition-related needs, or they did not meet such needs at all (8; 1.1%). They addressed all (228; 31.9%), some (468; 65.5%), or few (16; 2.2%) challenges identified through assessment, or they did not address such challenges at all (2; 0.3%). Nutrition-related information was exchanged with other types of profession in all cases (151; 21.1%), only when necessary (502; 70.3%), rarely (41; 5.7%), or never (20; 2.8%). Service users' levels of independence markedly (64; 9.0%), partially (566; 79.3%), hardly (81; 11.3%) improved, or there had been no improvements (3; 0.4%). The care planning system was satisfactory (51; 7.1%), relatively satisfactory (458; 64.1%), relatively unsatisfactory (157; 22.0%), or unsatisfactory (48; 6.7%).

<Table 3> Contents of care plans (n=714)

		Frequency (%)
Meeting/not meeting nutrition-related needs	Fully meeting	94(13.2)
	Partially meeting	525(73.5)
	Rarely meeting	87(12.2)
	Not meeting at all	8(1.1)
Addressing/not addressing challenges identified through assessment	Addressing all challenges	228(31.9)
	Addressing some challenges	468(65.5)
	Addressing few challenges	16(2.2)
	Not addressing at all	2(0.3)
Exchange of nutrition-related information with other types of profession	Exchanged in all cases	151(21.1)
	Exchanged only when necessary	502(70.3)
	Rarely exchanged	41(5.7)
	Never exchanged	20(2.8)
Improvements in service users' levels of independence	Markedly improved	64(9.0)
	Partially improved	566(79.3)
	Hardly improved	81(11.3)
	No improvements	3(0.4)
Satisfaction with care planning systems	Satisfactory	51(7.1)
	Relatively satisfactory	458(64.1)
	Relatively unsatisfactory	157(22.0)
	Unsatisfactory	48(6.7)

4. Correlations among ICT use for care planning, the type of service, link with assessment, and sharing with service providers (Table.4)

On comparing various types of service, the ICT use rate was significantly higher in home care compared with facility services ($p < .05$). When ICT was not used, the rates of linking assessment and care planning and sharing the latter with service providers were significantly lower ($p < .05$ in both cases).

<Table.4> Correlations among ICT use for care planning, the type of service, link with assessment, and sharing with service providers (n=714)

		ICT use		X ²	df	p value
		Using (%)	Not using (%)			
Type of service	Facility(n=263)	183(69.6)	80(30.4)	18.583	1	.000***
	Adjusted residual	-4.3	4.3			
	Home care(n=451)	376(83.4)	75(16.6)			
	Adjusted residual	4.3	-4.3			
Link with assessment	Entirely linked	271(80.7)	65(19.3)	19.583	2	.000***
	Adjusted residual	1.4	-1.4			
	Partially linked	247(80.5)	60(19.5)			
	Adjusted residual	1.2	-1.2			
Sharing with service providers	Not linked at all	41(57.7)	30(42.3)	7.723	2	.021*
	Adjusted residual	-4.4	4.4			
	Entirely shared	395(79.5)	102(20.5)			
	Adjusted residual	1.2	-1.2			
Sharing with service providers	Partially shared	152(77.9)	43(22.1)	7.723	2	.021*
	Adjusted residual	-0.1	0.1			
	Not shared at all	12(54.5)	10(45.5)			
	Adjusted residual	-2.7	2.7			

Pearson's chi-square test *** $p < .001$, * $p < .05$

5. Correlations among ICT use for care planning, the number of service users, mean Care Grade, and years of experience (Table.5)

Service users' mean Care Grade was 2.80 (median: 2.5) when ICT was used, and 2.82 (3) when it was not used for care planning; the level of care dependency was significantly lower in the former ($p < .05$). Neither the number of service users nor years of experience showed significant differences ($p > .05$).

<Table.5> Correlations among ICT use for care planning, the number of service users, mean Care Grade, and years of experience (n=714)

		Frequency	Mean	Median	p value
Number of service users	Using ICT	559	67.59	50	.083
	Not using ICT	155	71.78	57	
Mean Care Grade	Using ICT	504	2.80	2.5	.037*
	Not using ICT	139	2.82	3	
Years of experience	Using ICT	551	7.36	7	.458
	Not using ICT	154	7.35	7	

Mann-Whitney's U-test * $p < .05$

6. Correlation between ICT use for care planning and the contents of care plans

On examining the contents of care plans (meeting/not meeting nutrition-related needs, addressing/not addressing challenges identified through assessment, exchange of nutrition-related information with other types of profession, improvements in service users' levels of independence, and satisfaction with care planning systems) to clarify their correlations with ICT use for care planning, no significant differences were observed in any case ($p > .05$).

7. Correlation between the care planning-assessment link and contents of care plans (Table.6)

When the care planning process was entirely linked with assessment, the contents of care plans fully met nutrition-related needs (61; 64.9%), and when it was not, such needs were not met at all (3; 37.5%), revealing significant differences ($p < .05$) in both cases. When the planning process was entirely linked with assessment, the contents of care plans addressed all challenges identified through assessment (131; 57.5%), but when it was linked only partially, they addressed only some (222; 47.4%) or few (11; 68.8%) challenges, revealing significant differences in all cases ($p < .05$). Furthermore, when the care planning process was entirely linked with assessment, the care planning system was relatively satisfactory (238; 52.0%), when it was linked only partially, the system was relatively unsatisfactory (84; 53.5%), and when it was not linked at all, the system was unsatisfactory (11; 22.9%), revealing significant differences in all cases ($p < .05$). On examining the correlations among the care planning-assessment link, exchange of nutrition-related information with other types of profession, and improvements in service

users' levels of independence, no significant differences were observed in any case ($p > .05$).

<Table.6> Correlation between the care planning-assessment link and contents of care plans (n=714)

		Link with assessment (%)			χ^2	df	p value
		Entirely linked	Partially linked	Not linked at all			
Meeting/not meeting nutrition-related needs	Fully meeting	61(64.9)	25(26.6)	8(8.5)	23.924	6	.001**
	Adjusted residual	3.7	-3.4	-0.5			
	Partially meeting	240(45.7)	237(45.1)	48(9.1)			
	Adjusted residual	-1.2	1.9	-1.2			
	Rarely meeting	33(37.9)	42(48.3)	12(13.8)			
	Adjusted residual	-1.8	1.1	1.3			
Addressing/not addressing challenges identified through assessment	Not meeting at all	2(25.0)	3(37.5)	3(37.5)	24.989	6	.000***
	Adjusted residual	-1.3	-0.3	2.6			
	Addressing all challenges	131(57.5)	73(32.0)	24(10.5)			
	Adjusted residual	3.8	-4.1	0.4			
	Addressing some challenges	202(43.2)	222(47.4)	44(9.4)			
	Adjusted residual	-2.9	3.3	-0.7			
Satisfaction with care planning systems	Addressing few challenges	3(18.8)	11(68.8)	2(12.5)	30.097	6	.000***
	Adjusted residual	-2.3	2.1	0.3			
	Not addressing at all	0(0.0)	1(50.0)	1(50.0)			
	Adjusted residual	-1.3	0.2	1.9			
	Satisfactory	30(58.8)	19(37.3)	2(3.9)			
	Adjusted residual	1.7	-0.9	-1.5			
Satisfaction with care planning systems	Relatively satisfactory	238(52.0)	181(39.5)	39(8.5)	30.097	6	.000***
	Adjusted residual	3.5	-2.5	-1.7			
	Relatively unsatisfactory	54(34.4)	84(53.5)	19(12.1)			
	Adjusted residual	-3.5	3.0	1.0			
	Unsatisfactory	14(29.2)	23(47.9)	11(22.9)			
	Adjusted residual	-2.6	0.7	3.1			

Pearson's chi-square test *** $p < .001$, ** $p < .01$

8. Correlation between the sharing of care planning with service providers and contents of care plans (Table 7)

When the care planning process was entirely shared with service providers, the contents of care plans fully met nutrition-related needs (74; 78.7%), and when it was shared only partially, they rarely met such needs (38; 43.7%), revealing significant differences in both cases ($p < .05$). When the care planning process was entirely shared with service providers, the contents of care plans addressed all (182; 79.8%) challenges, when it was shared only partially, they addressed some (147; 31.4%) or few (8; 50.0%) challenges, and when it was not shared at all, they addressed few (2; 12.5%) challenges identified through assessment, revealing significant differences in all cases ($p < .05$). Furthermore, when care planning was entirely shared with service providers, the care planning system was satisfactory (43; 84.3%) or relatively satisfactory (332; 72.5%), when it was partially shared, the system was relatively unsatisfactory (54; 34.4%), and when it was not shared at all, the system was relatively unsatisfactory (9; 5.7%), revealing

significant differences in all cases ($p < .05$). On examining the correlations among the sharing of care planning with service providers, exchange of nutrition-related information with other types of profession, and improvements in service users' levels of independence, no significant differences were observed in any case ($p > .05$).

<Table.7> Correlation between the sharing of care planning with service providers and contents of care plans (n=714)

		Sharing with service providers (%)			χ^2	df	p value
		Entirely shared	Partially shared	Not shared at all			
Meeting/not meeting nutrition-related needs	Fully meeting	74(78.7)	19(20.2)	1(1.1)	19.366	6	.004**
	Adjusted residual	2.1	-1.7	-1.2			
	Partially meeting	370(70.5)	137(26.1)	18(3.4)			
	Adjusted residual	0.8	-1.2	0.9			
	Rarely meeting	47(54.0)	38(43.7)	2(2.3)			
	Adjusted residual	-3.4	3.7	-0.5			
Addressing/not addressing challenges identified through assessment	Not meeting at all	6(75.0)	1(12.5)	1(12.5)	26.371	6	.000***
	Adjusted residual	0.3	-0.9	1.6			
	Addressing all challenges	182(79.8)	40(17.5)	6(2.6)			
	Adjusted residual	4.1	-4.0	-0.5			
	Addressing some challenges	307(65.6)	147(31.4)	14(3.0)			
	Adjusted residual	-3.2	3.4	-0.2			
Satisfaction with care planning systems	Addressing few challenges	6(37.5)	8(50.0)	2(12.5)	20.283	6	.002**
	Adjusted residual	-2.8	2.1	2.2			
	Not addressing at all	2(100.0)	0(0.0)	0(0.0)			
	Adjusted residual	0.9	-0.9	-0.3			
	Satisfactory	43(84.3)	8(15.7)	0(0.0)			
	Adjusted residual	2.4	-1.9	-1.3			
Satisfaction with care planning systems	Relatively satisfactory	332(72.5)	116(25.3)	10(2.2)	20.283	6	.002**
	Adjusted residual	2.2	-1.6	-1.9			
	Relatively unsatisfactory	94(59.9)	54(34.4)	9(5.7)			
	Adjusted residual	-3.0	2.3	2.2			
	Unsatisfactory	28(58.3)	17(35.4)	3(6.3)			
	Adjusted residual	-1.8	1.3	1.3			

Pearson's chi-square test *** $p < .001$, ** $p < .01$

9. Points of improvement of care planning systems (Table.8)

Through analysis of the care managers' free descriptions, we created 130 codes, 18 subcategories (< >), and 7 categories ([]), explaining points of improvement of care planning systems as follows: <The necessity of reviewing the current care planning system> and <its poor usability> indicated the necessity of [enhancing the usability of the system]. To resolve <difficulty in clarifying nutritional conditions through assessment> and <difficulty in identifying challenges through assessment> due to <an insufficient connection between assessment results and care plans> and <no link between assessment and care planning>, [linking care planning] and [improving assessment to accurately identify challenges] may be essential. Furthermore, <insufficient information-sharing> and <insufficient collaboration among different types of profession and service> revealed the demand for [systems that facilitate

information-sharing], while <insufficient consideration of individuality when planning> revealed the demand for [systems that allow care planning with sufficient consideration of individuality]. [The necessity of digitization] was also suggested to improve the current <not yet digitalized> system.

<Table.8> Points of improvement of care planning systems (n=130)

Categories	Subcategories	Number of codes
Enhancing the usability of the system	Burdensome data entry	6
	Poor usability of the current care planning system	19
	Necessity of reviewing the current care planning system	8
	Need for systems with higher usability	4
	Poor environments to use the care planning system	6
	Limited time frames to use the care planning system due to heavy workloads	14
	Variations in skills to use the system among persons	6
Improving assessment to accurately identify challenges	Difficulty in clarifying nutritional conditions through assessment	6
	Difficulty in identifying challenges through assessment	8
	Poor usability of the current assessment system	8
	Care managers' lack of knowledge	3
Linking care planning	Insufficient connection between assessment results and care plans	11
	No link between assessment and care planning	7
	Not systematically linked	5
Systems that facilitate information-sharing	Insufficient information-sharing	4
	Insufficient collaboration among different types of profession and service	3
Systems that allow care planning with sufficient consideration of individuality	Insufficient consideration of individuality when planning	6
Necessity of digitization	Not yet digitized	6

IV. Discussion

On examining the care managers' basic attributes, the most frequent basic qualification was care worker, accounting for approximately 60%, followed by nurse, accounting for approximately 10%. These values are similar to those reported in the [Survey Report on the Quality of Long-Term Home Care Support Service Providers and Care Managers' Work] (Mitsubishi Research Institute, Inc., 2014), as care worker was the most frequent qualification among care managers, at 63.4%, followed by nurse, at 11.5%. Based on this, the results of the present study may accurately represent national tendencies.

In the present study, although nearly 80% of the care managers used ICU for care planning, the rate of entirely linking such planning with assessment was limited to 50%,

and that of entirely sharing it with service providers was approximately 70%. ICT was used for care planning more actively in home care than facility services. When it was used, service users' mean Care Grade was lower. When it was not used, care planning tended to be neither linked with assessment nor shared with service providers. As home care services are provided by independent offices, and they need to collaborate with service providers, ICT use may have been promoted among them. At the same time, despite their active ICT use, the link between assessment and care planning and the sharing of the former with service providers remained insufficient in some cases, revealing their challenge. An association between ICT use and service users' Care Grade was also suggested, but this should be further examined, considering that such use was not significantly correlated with improvements in their levels of independence.

Concerning care plans, 80 to 90% of the care managers answered that care plans met nutrition-related needs, addressed challenges identified through assessment, nutrition-related information was exchanged with other types of profession, and there had been improvements in service users' levels of independence. On the other hand, 30% of them found their care planning systems unsatisfactory, suggesting that importance is given to individual care managers' skills, rather than systems, when creating care plans at present. The absence of any correlation between ICT use for care planning and the contents of care plans also suggests such a situation.

As for the correlations of linking and sharing care planning, when care planning was entirely linked with assessment, care plans met all nutrition-related needs, and they addressed all challenges identified through assessment. Based on this, a link between assessment and care planning may be indispensable for the creation of care plans that facilitate nutrition improvement. Care plans also met all nutrition-related needs, and they addressed all challenges identified through assessment, when care planning was entirely shared with service providers. Therefore, the sharing of care planning with service providers may be another requirement for such creation. In contrast, when care planning was not linked with assessment, or it was not shared with service providers, the care planning system was relatively unsatisfactory/unsatisfactory in 40 to 70% of all cases. Thus, the rate of ICT use for care planning was high, but care plans were neither sufficiently linked with assessment nor sufficiently shared with service providers. This result is similar to that reported by the Ministry of Health, Labour, and Welfare (Ministry of Health, Labour, and Welfare, 2014). According to this report, many ICT-based systems are not being effectively operated. Nutrition improvement may be one of the challenges faced in the current situation.

As points of improvement of care planning systems, the care managers mainly noted the importance of enhancing the usability of the system, improving assessment to accurately identify challenges, linking assessment and care planning, sharing information, considering service users' individuality when planning, and promoting ICT use. These points are similar to those reported in a previous study, examining measures

to establish care systems (Yamamoto, 2001). Thus, they suggest the necessity of promoting the sharing of related information, adopting IT (information technology)-based support information network systems, and actively and effectively using them.

Based on these findings, we propose an ICT program to prevent the progression of care dependency among care service users by improving their nutritional conditions through interprofessional collaboration, adopting the following approaches: 1) incorporating the Alb level, BMI value, food types, food intake, and walking ability into assessment as required items, as their importance was shown in our previous studies (Fujio & Kodaira, 2014; and Fujio, Ogawa, Inoue, et al., 2016). The standardization of assessment will facilitate the identification of challenges to nutrition improvement, and these challenges should be organically reflected on care plans, actively and effectively using ICT; 2) encouraging communities to share their care planning systems to promote the sharing of care plans for nutritional improvement with service providers; and 3) promoting interprofessional collaboration by sharing these care planning systems. These approaches are based on the standardization, IT use, sharing, open, and collaboration promotion policies advocated by Yamamoto toward the systematization of community-based comprehensive health care (Yamamoto, Yokoyama & Yamada, 2010). Regarding such systematization, some researchers defined systems as collaboration (Yokoyama & Yamamoto, 2004), and collaboration signifies cooperation among equal partners to fulfill their common purpose/purposes based on individual members' resources, functions, roles, and abilities. As a future perspective, it is expected that interprofessional collaboration will be further promoted with the development of care planning systems that facilitate nutrition improvement to prevent the progression of care dependency among care service users. Case studies may also be needed to put the proposed ICT program into practice.

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