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ORIGINAL ARTICLE

Factors Affecting Discharge to Home of Geriatric Health Services Users: An Analysis of Physical Conditions and the Contents of Care Received

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ABSTRACT

Japan's long-term care insurance system, which was put in place in 2000, is roughly divided into at-home care services and facility services. Facility services comprise three types: special nursing homes, geriatric health service facilities, and medical care facilities. To obtain useful findings for the promotion of discharge to home, this study analyzed the discharge-related data of a geriatric health services facility promoting home care. On examining the 52-month data (from 2012) of 541 users discharged from the facility, the energy intake was shown to most markedly influence the feasibility of discharge to home, followed by the duration of the time spent out of bed and nocturnal incontinence rate. The importance of mealtime assistance and necessity of prolonging the duration of the time spent out of bed by supporting diurnal arousal and independent urination during the night-time were also suggested as effective approaches to promote discharge to home.

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Japan, geriatric health services facility, discharge-related data analysis, discharge to home, discriminant analysis

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I. Introduction

Japan's long-term care insurance system, which was put in place in 2000, is roughly divided into at-home care services and facility services. Facility services comprise three types: special nursing homes, geriatric health service facilities, and medical care facilities. Currently, there are 4,045 geriatric health services facilities located throughout Japan. These facilities are also called 'middle facilities', as they are in an intermediate position between hospitals and home care service providers or between medical and welfare services (Japan Association of Geriatric Health Services Facilities, 2016a). In 2012, the care fee calculation system for geriatric health services was revised, and the basic fees and additional fees applied to support discharge to home or home care facilities were newly defined. At that time, geriatric health care service facilities focusing on home discharge were classified into three main types: those promoting home care (type-1); those supporting home care with additional medical fees (type-2); and the conventional type (type-3) (Japan Association of Geriatric Health Services Facilities, 2015). The classification requirements for type-1 and -2 facilities include: rates of discharge to home of >50 and >30%, respectively, and bed turnover rates of 10% or higher and 5% or higher, respectively. Thus, those not meeting these requirements are classified as type-3 facilities. The rate of type-1 facilities, which was limited to 3.8% in April 2012, slowly increased to 9.4% in October 2013, 10.6% in October 2014, and 16.4% in October 2015. Similarly, the rate of type-2 facilities was 10.4% in April 2012 and slightly increased to 24.0, 24.4, and 29.6%, respectively. In contrast, type-3 facilities had accounted for as high as 85.8% until April 2013, but its rate decreased to 54.0% in October 2015 (Japan Association of Geriatric Health Services Facilities, 2016b). These changes in the rate of discharge may represent the gradual responses of these facilities to national measures to promote discharge to home and home care.

Since geriatric health services facilities were classified into 3 types in 2012, several studies have been conducted to examine discharge from the facility to home. For example, the Japan Association of Geriatric Health Services Facilities conducted a survey, and reported that "a limited number of users desiring to return to home in the facility" and "insufficient approaches" were negative factors for discharge to home (Japan Association of Geriatric Health Services Facilities, 2013). A questionnaire survey, involving care managers working in geriatric health services facilities, revealed that activities of daily living (ADL) support and information for family care-givers are provided more frequently in type-1 compared with other facilities (Nakamura, 2016). Furthermore, in an interview-based survey to examine nurses working in geriatric health services facilities, facility staff recognized "a high ADL level", "the absence of severe dementia", and "a shorter duration of facility use" as factors promoting discharge to home (Hatakeyama, Masumitsu, Osawa et al., 2016). The importance of leading users and their families to accurately recognize support for discharge to home in the early stages, establishing

systems to fulfill users' and facilities' needs, and providing support through multi-professional collaboration to promote discharge to home was also noted in another interview-based survey, involving multiple professionals, including nurses, working in geriatric health services facilities (Hayashi, 2015). However, as all of these previous studies targeted facility staff, factors influencing the feasibility of discharge from geriatric health services facilities to home remained unclear. Therefore, this study analyzed the discharge-related data of a type-1 facility to obtain useful findings for the promotion of discharge to home.

II. Definitions of terms

1. Functional recovery care

Functional recovery care is a theory of care established and defined by Takeuchi as 'supporting individuals to achieve and improve/maintain their physical, mental, and social independence through care' (Takeuchi, 2017).

2. Basic care approaches

Functional recovery care is provided through basic care approaches, covering 4 important areas of health: "fluid", "nutrition", "exercise", and "excretion". Takeuchi defines that "these areas should be commonly addressed in any type of older people care" (Takeuchi, 2017).

III. Methods

1. Subjects and data collection

A total of 541 users discharged from a facility meeting the requirements for type-1 geriatric health services facilities within the 52-month period between April 2012 and July 2016 were studied. With the agreement of the facility chief, anonymized discharge-related data, not containing information that might allow the identification of individuals, were collected from the facility.

2. Study items

The following items were analyzed:

1) Basic information

The sex, age, care level based on the Long-term Care Insurance System, place of residence before facility admission, duration of facility use, and discharge destination (home/ other facilities).

2) Physical condition

The BMI, serum albumin level, degree of mouth opening, degree of tongue protrusion, and consciousness/spontaneity level; the degree of mouth opening is the distance between the lower edge of the upper lip and the upper edge of the lower lip when opening the mouth at the maximum, while that of tongue protrusion is the distance between the tips of the lip and tongue when protruding the latter forward at the maximum. The consciousness/spontaneity level was measured using a 5-item test developed by the study facility, in which higher scores indicate higher consciousness/spontaneity levels. "Meals", "conversations", "friendly talks", and "recreational activities" are rated on a 4-point scale from "spontaneous (4)", "following others' behavior (3)", "requiring guidance on some occasions (2)", and "requiring guidance at all times (1)". Similarly, "dozing" is rated on a 4-point from "never (4)", "occasionally (3)", "once a day (2)", and "several times a day (1)". Thus, the total score ranges from 5 to 20.

3) Contents of care

The fluid intake (daily mean), energy intake (daily mean), total walking distance (daily mean), duration of the time spent out of bed (daily mean), frequency of going out (monthly mean), diurnal incontinence rate, frequency of lower garment contamination during the daytime (monthly mean), nocturnal incontinence rate, and frequency of lower garment contamination during the night-time (monthly mean).

3. Analysis

All subjects were classified based on their discharge destinations: home (home group) and other facilities (non-home group), to calculate their means (standard deviations) and medians (interquartile ranges), and compare them using the unpaired t-test and Mann-Whitney U-test. Furthermore, discriminant analysis was performed, with the home and non-home groups as objective variables and the contents of care (fluid intake, the energy intake, total walking distance, duration of the time spent out of bed, diurnal incontinence rate, and nocturnal incontinence rate) as explanatory variables. Statistical analysis was performed using SPSS Statistics 24 for Windows, with the significance level set at $p < 0.05$.

4. Ethical considerations

Prior to the study, the chief and support consultant managing data of the study facility were provided with written and oral explanations to obtain their written consent. The data provided by them were anonymized, and they did not contain information that might allow the identification of individuals, such as names.

In addition, the study was previously approved by the ethics committee of Seirei Christopher University (approval number: 16011).

V. Results

1. Distribution of subjects' attributes

The subjects' mean age was 86.2±6.8 (range: 59 to 101). The numbers of home and non-home group members were 247 (45.7%; 56 males and 191 females; and mean age: 84.9±7.2) and 294 (54.3%; 88 and 206; and 87.2±6.3), respectively. Table 1 outlines the distribution of their attributes.

<Table 1>Distribution of Subjects' Attributes (n=541)

item	category	number (person)	rate (%)
Sex	Female	397	73.4
	Male	144	26.6
Age (years old)	<60	1	0.2
	60-64	4	0.8
	65-69	4	0.8
	70-74	21	3.9
	75-79	45	8.3
	80-84	141	26.1
	85-89	131	24.3
	90-94	153	28.3
Care level based on the Long-term Care Insurance System	95-99	35	6.5
	>100	6	0.1
	1	71	13.1
	2	140	25.9
	3	118	21.8
Place of residence before facility admission	4	114	21.1
	5	98	18.1
	Medical institutions	275	50.8
	Home	257	47.5
	Home (others)	7	1.3
Duration of facility use (day)	Care and welfare facilities	1	0.2
	Unknown	1	0.2
	<99	282	52.1
	100-199	105	19.4
	200-299	44	8.1
Discharge destination	300-399	23	4.3
	400-499	14	2.6
	>500	73	13.5
	Non-home group members	294	54.3
	Home group members	247	45.7

2. Basic information regarding the home and non-home groups

As shown in Table 2, the mean age and duration of facility use were significantly lower and shorter, respectively ($p < 0.001$ in both cases), in the home compared with non-home group.

<Table 2> Basic Information Regarding the Home and Non-home Groups

item	Discharge destination	Frequency	Means	Standard deviations	Medians	Interquartile ranges	p value
Age (years old) ¹⁾	Non-home group	294	87.2	6.3	87.0	83.0-92.0	0.000 ***
	Home group	247	84.9	7.2	85.0	80.0-91.0	
Duration of facility use (day) ²⁾	Non-home group	294	358.7	532.7	147.0	50.1-379.3	0.000 ***
	Home group	247	152.4	304.8	88.0	48.0-124.0	

1) Unpaired t-test

2) Mann-Whitney U-test

***p<0.001

3. Physical conditions of the home and non-home groups

As shown in Table 3, significant differences were observed in all physical health-related items. The BMI and serum albumin level were significantly higher in the home compared with non-home group (p<0.001 in both cases). The home group also showed significantly higher degrees of mouth opening and tongue protrusion and consciousness/spontaneity level (p<0.001).

<Table 3>Physical Conditions of the Home and Non-home Groups

item	Discharge destination	Frequency	Means	Standard deviations	Medians	Interquartile ranges	p value
BMI ¹⁾	Non-home group	291	21.17	3.54	21.40	18.8-23.3	0.000 ***
	Home group	246	22.29	3.28	22.30	20.2-24.6	
Serum albumin level (g/dL) ¹⁾	Non-home group	280	3.39	0.49	3.40	3.1-3.8	0.000 ***
	Home group	217	3.59	0.46	3.60	3.3-3.9	
Mouth opening (mm) ¹⁾	Non-home group	285	38.71	10.01	40.00	35.0-45.0	0.000 ***
	Home group	246	42.02	8.89	40.00	35.0-50.0	
Tongue protrusion (mm) ¹⁾	Non-home group	284	31.98	15.67	35.00	30.0-40.0	0.001 **
	Home group	246	37.09	12.39	40.00	32.8-45.0	
consciousness/spontaneity level (point) ¹⁾	Non-home group	292	12.7	5.0	13.5	8.0-17.0	0.000 ***
	Home group	247	16.8	3.2	18.0	15.0-19.0	

1) Unpaired t-test

p<0.01, *p<0.001

4. Contents of care for the home and non-home groups

As shown in Table 4, there were significant differences in all items, excluding the frequency of lower garment contamination during the night-time. Both the fluid and energy intakes were significantly higher in the home compared with non-home group (p<0.001 in both cases). The values representing the total walking distance, duration of the time spent out of bed, and frequency of going out were also significantly higher (p<0.001), with significantly lower diurnal incontinence and nocturnal incontinence rates in the home group (p<0.001). The frequency of lower garment contamination during the daytime was also significantly lower in the home group (p<0.05).

<Table 4>Contents of Care for the Home and Non-home Groups

item	Discharge destination	Frequency	Means	Standard deviations	Medians	Interquartile ranges	p value
Fluid intake (mL/day) ¹⁾	Non-home group	294	1458.4	429.2	1500.0	1177.3-1818.8	0.000 ***
	Home group	247	1673.3	316.5	1800.1	1500.0-1850.0	
Energy intake (kcal/day) ¹⁾	Non-home group	294	1133.1	375.0	1200.0	941.5-1402.0	0.000 ***
	Home group	247	1397.8	197.7	1442.0	1221.0-1563.1	
Total walking distance (m/day) ²⁾	Non-home group	294	183.7	267.7	125.9	10.0-228.2	0.000 ***
	Home group	247	379.4	398.6	261.0	143.6-498.0	
Duration of the time spent out of bed (hour/day) ¹⁾	Non-home group	293	11.2	4.7	13.0	10.0-14.0	0.000 ***
	Home group	246	13.9	1.3	14.0	14.0-14.0	
Frequency of going out (time/month) ¹⁾	Non-home group	294	2.8	3.3	2.0	1.0-3.3	0.000 ***
	Home group	246	7.6	5.3	7.0	4.0-11.0	
Diurnal incontinence rate (%) ²⁾	Non-home group	293	51.9	34.6	53.8	18.1-85.2	0.000 ***
	Home group	247	31.2	31.8	17.9	1.3-56.5	
Lower garment contamination during the daytime (time) ²⁾	Non-home group	294	2.7	4.5	1.0	0.0-4.0	0.033 *
	Home group	247	2.0	2.9	1.0	0.0-3.0	
Nocturnal incontinence rate (%) ²⁾	Non-home group	293	77.6	35.4	100.0	60.5-100.0	0.000 ***
	Home group	247	52.7	44.1	56.3	4.5-100.0	
Lower garment contamination during the nighttime (time) ²⁾	Non-home group	294	2.5	4.2	1.0	0.0-3.0	0.156
	Home group	246	1.9	3.0	1.0	0.0-3.0	

1) Unpaired t-test
2) Mann-Whitney U-test
*:p<0.05, ***p<0.001

5. Discriminant analysis

The obtained eigenvalues and the results of a test to confirm the significance of discriminant functions are shown in Tables 5 and 6, respectively. The canonical correlation of 0.475 achieved in the former and the sufficient significance confirmed in the latter indicate sufficient discriminant functions (p<0.001). Among the standardized discriminant coefficients shown in Table 7, explanatory variables showing higher absolute values were the energy intake (0.48), duration of the time spent out of bed (0.38), and nocturnal incontinence rate (-0.38).

<Table 5>Eigenvalues

Function	Eigenvalues	Cumulative contribution rate	Canonical correlation
1	0.291	100	0.475

<Table 6>Significance of Discriminant Functions

Function test	Wilks's λ	χ ²	Degree of freedom	p-value
1	0.775	136.093	6	0.000

<Table 7>Standardized Discriminant Coefficients

Contents of care	Function
	1
Fluid intake	0.09
Energy intake	0.48
Total walking distance	0.17
Duration of the time spent out of bed	0.38
Diurnal incontinence rate	0.02
Nocturnal incontinence rate	-0.38

VI. Discussion

On analyzing the 541 users discharged from the study facility to home or other destinations within the 52-month period (4 years and 4 month) to clarify factors related to each type of discharge, significant differences were observed, as the home group showed more favorable scores for all items, excluding the frequency of lower garment contamination during the night-time. Among these scores, those related to nutrition particularly varied between the home and non-home groups. The home group's mean energy intake was 1,397.8 kcal/day, while the non-home group's value was limited to 1,133.1 kcal/day. Similarly, the serum albumin level as a nutritional index was 3.59 g/dL in the home group and 3.39 g/dL in the non-home group. In both cases, the values were higher in the home group. Furthermore, multivariate analysis to compare the contents of care for each group revealed that the energy intake was shown to most markedly influence the feasibility of discharge to home. In a previous study comparing the nutritional status and mental/physical conditions of the care-dependent older people living at home and facility users, their mean energy intakes were 1,389.06±317.32 and 1,327.27±244.44 kcal, respectively. Similarly, their mean serum albumin levels were 3.82±0.46 and 3.62±0.42 g/dL, respectively. In both cases, the values were higher among the care-dependent older people living at home (Fujio, Ogawa, Kodaira et al., 2016). A similar tendency was observed in comparison of the types of food consumed, as the rates of consuming regular types of food were 76.9 and 51.8%, respectively (Fujio, Ogawa, Kodaira et al., 2016). Another study analyzing the serum albumin levels and mental/physical conditions of care-dependent older people also highlighted the importance of improving their nutritional conditions to promote the recovery of their mental/physical functions (Fujio, Shimada, Sugiyama et al., 2017). As these data indicate that the nutritional conditions of care-dependent older people living at home is more favorable than those of facility users, and the results of the present study also support

this, the nutritional status may be a useful index of discharge to home.

Another important finding from multivariate analysis was that the duration of the time spent out of bed and nocturnal incontinence rate markedly influenced the feasibility of discharge to home, following the energy intake. This may be explained by the burden of family care-givers, which can be reduced by prolonging the times patients spend out of bed and preventing nocturnal incontinence among them. In this respect, these 2 approaches may promote discharge to home. In addition, support approaches that promote fluid and energy intakes may also be needed, as it is necessary to increase the diurnal arousal level, in order to prolong the duration of the time spent out of bed.

As a study limitation, the analytical data used in this study were obtained from a single type-1 facility. Furthermore, other factors possibly influencing the feasibility of discharge to home, such as family conditions promoting home care and the influence of post-discharge home care services, were not systematically examined. To address these challenges, it may be necessary to continue to examine the study items using data from other facilities. Moreover, based on data obtained by continuing the study, there is a need for widely disseminating support methods that increase the discharge to home rate.

VII. Conclusion

This study examined factors influencing the feasibility of discharge to home by analyzing 541 users discharged from a geriatric health services facility promoting home care within a 52-month period. Among the study items, the energy intake most markedly influenced such feasibility, followed by the duration of the time spent out of bed and nocturnal incontinence rate. The results suggest the importance of mealtime assistance, as well as the necessity of prolonging the duration of the time spent out of bed by supporting diurnal arousal and independent urination during the night-time as effective approaches to promote discharge to home.

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