

*Original Article***A study of patients whose mode of food intake changed during long-term bedside care**

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ABSTRACT

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Objective: The objective of this study was to determine the characteristics of patients who exhibited changes in their food intake level (as determined by the Food Intake Level Scale [FILS] score) while hospitalized for long-term bedside care.

Methods: The subjects were 264 patients hospitalized for long-term bedside care. The FILS was used to assess the subjects' mode of food intake on the admission and survey dates. The FILS score was used to divide the patients into three stages: no oral intake, combined oral intake and alternative nutrition, and exclusively oral intake; the patients whose FILS stage on the survey date was different from that on the admission date were examined to determine whether there were any characteristic tendencies with regard to their age, sex, length of hospital stay, level of long-term care needed, primary illness, and dysphagia rehabilitation.

Results: Overall, 6.8%, 9.8%, and 4.5% of the subjects showed improvement in the FILS stage, experienced deterioration of the FILS stage, and transitioned to exclusively oral intake, respectively. Further, 33.3% of the improved-FILS stage group were in their ≥90s.

The results of the exact binomial test with the entire study cohort as the population proportion showed that there were significantly more females in the improved-FILS group. In addition, 83.3% of those who improved from no oral intake to exclusively oral intake had cerebrovascular disease. No difference in the length of hospital stay and level of long-term care needed was observed in either the improved-FILS or deteriorated-FILS group in comparison to their proportions in the entire study cohort. In the entire study cohort, a greater proportion of the subjects in the improved-FILS group underwent indirect or direct swallowing training than those in the deteriorated-FILS group; the improved-FILS group had no subjects who were assigned to watchful waiting.

Conclusion: Most patients who exhibited marked positive changes in their mode of food intake were females or patients with cerebrovascular disease. However, no characteristic attributes were observed among those whose FILS stage deteriorated.

Key words: long-term care beds, changes in mode of food intake (FILS), dysphagia rehabilitation

Introduction

Japan's Medical Service Law of 1948 requires "sanatorium-type medical care facilities for the elderly who require care" (*ryōyō-gata iryō shisetsu*; hereafter, "long-term bedside care") to be "hospital beds that are primarily meant for hospitalized patients who require long-term recuperation" [1]. Approximately 60% of patients hospitalized for long-term bedside care are considered to have dysphagia [2], and the proportion of those patients who transition to oral intake has fluctuated within a low range of 2.3–3.3% over the last 10 years [3].

Transitioning patients hospitalized for long-term

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bedside care to oral intake is important, partly because, as part of the Fiscal Year 2022 revisions to the medical service fees, the basic fees for hospitalization in long-term care wards for total parenteral nutrition were revised [4]. Further, a 2019 survey found that 46.6% of hospitals did not have speech-language-hearing therapists (STs) in their long-term care wards, and 60.1% of the hospitals did not include functional therapy for dysphagia in their billing system [5]. Learning about dysphagia is the first step toward effectively using limited manpower to promote oral intake among patients; however, to the best of our knowledge, there are no reports on the changes in the mode of food intake of patients with dysphagia receiving long-term bedside care or the characteristics of patients who exhibit changes in their mode of food intake. Therefore, this study aimed to identify and investigate the characteristics of patients who exhibited changes in their food intake level (as per the Food Intake Level Scale [FILS] score; Table 1) [6] while being hospitalized for long-term bedside care.

Methods

1. Subjects

This study included patients hospitalized for long-term bedside care at three hospitals affiliated with Medical Corporation A. The patients' data were collected and analyzed on a particular day in October 2019 (hereafter, "survey date"). Patients who met the exclusion criteria and those with missing data were excluded, resulting in a total of 264 subjects. The exclusion criteria were (1) three-digit level of disturbance of consciousness on the Japan Coma Scale, (2) loss of oral intake capability due to a sudden change in condition, and (3) admission for respite care. Patient information was extracted from medical,

nursing, and rehabilitation records. Their basic demographic information on the survey date is shown in Table 2. To prevent coronavirus disease from influencing the results of the survey, a survey date before the outbreak of the pandemic in Japan was chosen.

All three hospitals had STs in the wards, although the number of STs per 100 hospital beds varied among the hospitals. In each of the hospitals, whether or not functional therapy for dysphagia and dysphagia rehabilitation as part of disease-specific rehabilitation (hereafter collectively referred to as "dysphagia rehabilitation") would be administered was determined according to the number of nurses with the skills to administer functional therapy for dysphagia and number of STs, and the final decision was made by the attending physician. For this reason, the criteria for prescribing dysphagia rehabilitation were not uniform. The hospitals' protocols for dysphagia rehabilitation are shown in Table 3, and the proportions of patients who had undergone dysphagia rehabilitation and their basic demographic attributes are shown in Table 4.

2. Method

The FILS was used to assess the subjects' food intake level on the admission and survey dates. Three STs certified in dysphagia treatment performed the assessment through discussions on the patients' dietary instructions, nursing records, and rehabilitation records. To ensure unbiased assessment, the three STs who performed the assessment were not providing treatment to any of the subjects.

The FILS values were divided into three stages, with a score of 1–3 denoting "no oral intake," that of 4–6, "oral intake and alternative nutrition (hereafter, "combined intake")," and that of 7–10, "exclusively oral intake." The patients whose FILS stage on the

Table 1. Food intake scores for patients with dysphagia (as per the Food Intake Level Scale; FILS).

No oral intake
Level 1: No swallowing training is performed except for oral care.
Level 2: Swallowing training not using food is performed.
Level 3: Swallowing training using a small quantity of food is performed.
Oral intake and alternative nutrition
Level 4: Easy-to-swallow food less than the quantity of a meal (enjoyment level) is ingested orally.
Level 5: Easy-to-swallow food is orally ingested in one to two meals, although alternative nutrition is also provided.
Level 6: The patient is supported primarily by ingestion of easy-to-swallow food in three meals, although alternative nutrition is used as a complement.
Oral intake alone
Level 7: Easy-to-swallow food is orally ingested in three meals. No alternative nutrition is provided.
Level 8: The patient eats three meals by excluding food that is particularly difficult to swallow.
Level 9: There is no dietary restriction, and the patient ingests three meals orally, although medical considerations are given.
Level 10: There is no dietary restriction, and the patient ingests three meals orally (normal).

Source: Table 1 in Reference [6], p. 203

Table 2. Basic demographic attributes of the patients on the survey date.

Age	81.4±11.5 (42–104) years 40s: 5; 50s: 10; 60s: 20; 70s: 60; 80s: 104; 90s: 62; 100s: 3
Sex	Male individuals: 103; Female individuals: 161
Length of hospital stay	255.9±225.2 (3–970) days 1–30 days: 32; 31–90 days: 44; 91–180 days: 52; 181–300 days: 43; 301–600 days: 73; 601+ days: 20
Level of long-term care needed	Requiring help 1: 4; Requiring help 2: 3; Long-term care level 1: 15; Long-term care level 2: 24; Long-term care level 3: 28; Long-term care level 4: 52; Long-term care level 5: 97; Had not applied: 41
Acuity level	Level 1: 25; Level 2: 160; Level 3: 79
Primary illness	Cerebrovascular disease: 106; Progressive neurological disease: 34; Respiratory illness: 37; Heart disease: 31; Other: 56
Dysphagia rehabilitation	Yes: 152; No: 112 (indirect swallowing training: 77; direct swallowing training: 28; watchful waiting: 74; some cases are in more than one category)
FILS on the survey date	FILS1: 109; FILS2: 26; FILS3: 11; FILS4: 5; FILS5: 7; FILS6: 18; FILS7: 42; FILS8: 25; FILS9: 20; FILS10: 1

Dysphagia rehabilitation: Patients who had functional therapy for dysphagia and/or dysphagia rehabilitation as part of disease-specific rehabilitation at least once in the 3 months leading up to the survey date were considered to have undergone dysphagia rehabilitation.

FILS, Food Intake Level Scale.

Table 3. Dysphagia rehabilitation systems at the three hospitals studied.

	Hospital B	Hospital C	Hospital D
STs staffed	2.17 per 100 beds	1.33 per 100 beds	0.39 per 100 beds
Determining (1) whether patients are capable of oral intake and (2) appropriate food textures	Decided by the physician in consultation with the ST/nurse/registered dietician	Decided by the physician in consultation with the ST/nurse/registered dietician	Decided by the physician
Rehabilitation for disease-specific therapy	ST	ST	ST
Dysphagia rehabilitation therapist	ST/Nurse	ST/Nurse	ST
Screening test	Performed by the ST on all admitted patients	Performed by the ST on all admitted patients	Performed by the ST on some patients
Swallowing contrast examination	Seldom performed	Seldom performed	None
Endoscopic evaluation of swallowing	Seldom performed	Seldom performed	Seldom performed

ST, speech-language-hearing therapist.

survey date was different compared with that on their admission date were identified. Next, the patients were divided into the improved-FILS and deteriorated-FILS groups; these groups were comparatively analyzed to determine any characteristic tendencies with regard to age, sex, length of hospital stay, level of long-term care needed, acuity level, primary illness, and receipt of dysphagia rehabilitation. The patients' ages were classified into one of seven 10-year groups from the 40s to the 100s, and the length of hospital stay was classified into one of six categories (1–30, 31–90, 91–180, 181–300, 301–600, and >600 days), with reference to the classification used in calculating medical fees. The patients who had undergone

dysphagia rehabilitation at least once in the 3 months leading up to the survey date were considered to have undergone it, with the rehabilitation itself being classified into the following three categories: indirect swallowing training (without the use of food), direct swallowing training (with the use of food), and watchful waiting (Table 2). In this study, if a patient's swallowing function was assessed every 3 months or if they only had received a short-term intensive intervention when there was a change in their swallowing function, it was regarded as watchful waiting. To assess the subjects' swallowing function, those with FILS scores of 1–4 were asked to perform the repetitive saliva swallowing test, modified water

Table 4. Proportion of patients undergoing dysphagia rehabilitation per basic demographic attribute.

(n = 264)

Age	40s: 100%; 50s: 60%; 60s: 60%; 70s: 75%; 80s: 55.8%; 90s: 38.7%; 100s: 66.7%
Sex	Male individuals: 63.1%; Female individuals: 54%
Length of hospital stay	1–30 days: 68.8%; 31–90 days: 50%; 91–180 days: 63.5%; 181–300 days: 51.2%; 301–600 days: 67.1%; 601+ days: 20%
Level of long-term care needed	Requiring help 1: 75%; Requiring help 2: 100%; Long-term care level 1: 86.7%; Long-term care level 2: 62.5%; Long-term care level 3: 50%; Long-term care level 4: 50%; Long-term care level 5: 49.5%; Had not applied: 73.2%;
Acuity level*	Level 1: 28%; Level 2: 65.6%; Level 3: 50.6%;
Primary illness	Cerebrovascular disease: 50.9%; Progressive neurological disease: 61.8%; Respiratory illness: 70.3%; Heart disease: 48.4%; Other: 64.3%

* $p < 0.05$ in a χ^2 test with the frequency in the entire study cohort as the expected proportion.

swallowing test, and food test, while for those with FILS scores of ≥ 5 , an observational assessment was performed when they ate.

Short-term intensive interventions that were administered when there was a temporary negative change in the patient's physical health (such as fever), a change in the swallowing function brought on by changes in medication, or changes in their masticatory function due to the breakage/adjustment/replacement of dentures included assessment of swallowing function and adjustment of the textures of foods given to them, as well as short-term indirect or direct swallowing training, as necessary. The patients who had been hospitalized for < 3 months by the survey date were not counted as having undergone dysphagia rehabilitation if they had only undergone screening on admission, although they were counted as being assigned to watchful waiting if their records indicated that they required it at the time of their admission assessment or that they underwent regular assessments thereafter. Subjects who did not undergo indirect swallowing training, direct swallowing training, or watchful waiting were considered not to have undergone dysphagia rehabilitation.

In addition, when identifying the attributes of the improved and deteriorated-FILS groups, since we could not rule out the possibility that the marked differences in the subjects in both groups who had undergone dysphagia rehabilitation were due to the effect of rehabilitation rather than the differences between the groups, those who had undergone dysphagia rehabilitation per the basic demographic attributes were examined by comparison with the entire study cohort.

3. Statistical analyses

To examine the patients' sex and type of dysphagia rehabilitation, we used the exact binomial test with the entire study cohort as the population proportion (one-sided test). To examine their age, primary illness, length of hospital stay, level of long-term care needed, and acuity level, we used the chi-squared (χ^2) test, with

the expected proportions adjusted to fit the entire study cohort. For multiple comparisons when the χ^2 test score was significant, we used the exact binomial test, with the p-value adjusted by Benjamini & Hochberg's method [7]. The significance level was set at 5% in all cases. R ver. 4.1.2 was used for the statistical analyses.

4. Ethical considerations

This study conformed to the principles of the Declaration of Helsinki and was conducted with the approval of the Ethics Committee of Medical Corporation A (approval number 2021-002).

Results

Regarding the subjects who had undergone dysphagia rehabilitation in the entire study cohort, the results of the χ^2 test showed no significant differences in age, sex, length of hospital stay, level of long-term care needed, or primary illness (age: $\chi^2(6) = 9.653$, n.s.; sex: one-sided probability as per exact binomial test $p = 0.1933$, n.s.; length of hospital stay: $\chi^2(5) = 7.822$, n.s.; level of long-term care needed: $\chi^2(7) = 7.087$, n.s.; primary illness: $\chi^2(4) = 7.016$, n.s.). In other words, the patients' age, sex, length of hospital stay, level of long-term care needed, and primary illness were regarded as not having any effect based on the dysphagia rehabilitation that the subjects had (or had not) undergone. However, a significant difference was found in acuity level ($\chi^2(2) = 6.26$, $p = 0.044$); acuity level was therefore excluded from consideration.

In all, the FILS scores of 18 patients had improved (Table 5) while those of 26 had deteriorated (Table 6). The subjects in the improved-FILS group, those in the deteriorated-FILS group, and those who transitioned from no oral intake or combined intake to exclusively oral intake accounted for 6.8%, 9.8%, and 4.5% of the entire study cohort, respectively.

No statistically significant difference was found in age in either the improved or deteriorated-FILS group compared with that in the entire study cohort (improved-FILS group: $\chi^2(6) = 4.862$, n.s.; deteriorated-FILS group:

Table 5. The improved-FILS group.

		Age (years)	Sex	Length of hospital stay	Level of long-term care needed	Acuity level	Primary illness	Dysphagia rehabilitation	FILS at the time of admission	FILS on the survey date
No oral intake to combined intake	A	72	M	23	Had not applied	3	Other	Indirect and direct	2	4
	B	60	F	547	Had not applied	2	Cerebrovascular disease	Indirect and direct	2	5
	C	84	F	23	5	2	Other	Indirect and direct	2	5
	D	90	F	251	2	3	Other	None	2	6
	E	97	F	235	5	3	Cerebrovascular disease	None	3	4
	F	84	M	304	2	2	Progressive neurological disease	Indirect and direct	3	5
No oral intake to exclusively oral intake	G	84	F	227	Requiring help 1	3	Cerebrovascular disease	Indirect and direct	2	7
	H	95	F	165	2	3	Cerebrovascular disease	None	2	7
	I	70	F	547	5	2	Respiratory illness	Indirect	2	7
	J	82	F	184	5	2	Cerebrovascular disease	Indirect and direct	2	9
	K	87	F	616	2	2	Cerebrovascular disease	Indirect	3	7
	L	90	F	570	5	3	Cerebrovascular disease	None	3	7
Combined intake to exclusively oral intake	M	91	F	201	Had not applied	1	Progressive neurological disease	None	4	7
	N	101	M	243	4	2	Cerebrovascular disease	None	5	7
	O	83	F	75	5	2	Progressive neurological disease	Indirect and direct	5	7
	P	73	F	132	Requiring help 2	3	Cerebrovascular disease	Indirect and direct	6	7
	Q	85	F	802	3	2	Respiratory illness	None	6	7
	R	87	F	159	4	2	Heart disease	Indirect and direct	6	7

All values are from the survey date.

Dysphagia rehabilitation: The rehabilitation that patients had undergone in the 3 months leading up to the survey date were classified as indirect/direct swallowing training, or watchful waiting if they were assigned to watchful waiting.

FILS, Food Intake Level Scale.

$\chi^2(6) = 5.171$, n.s.). It is noteworthy that 33.3% (6/18) of the patients in the improved-FILS group were in their ≥ 90 s, which indicates that the FILS score can improve even in patients of very advanced age.

In terms of sex, there were significantly more females than males in the improved-FILS group (exact binomial test: proportion of samples 0.833, population proportion 0.61, one-sided probability $p = 0.04$). In particular, all six patients who showed improvement from no oral intake (FILS score, 1–3) to exclusively oral intake (FILS score, 7–10) were females. Meanwhile, no difference was found in sex in the deteriorated-FILS group (one-sided probability $p = 0.44$, n.s.).

No difference was found in the length of hospital stay in either group in comparison to that in the entire

study cohort (improved-FILS group: $\chi^2(5) = 5.132$, n.s.; deteriorated-FILS group: $\chi^2(5) = 2.409$, n.s.). Of note, 12 of the 18 patients in the improved-FILS group had a length of hospital stay of ≥ 181 days. No difference was found in the level of long-term care needed in either group in comparison to that in the entire study cohort (improved-FILS group: $\chi^2(7) = 10.648$, n.s.; deteriorated-FILS group: $\chi^2(7) = 6.188$, n.s.).

No difference was found in primary illness in either group in comparison to that in the entire study cohort (improved-FILS group: $\chi^2(4) = 1.506$, n.s.; deteriorated-FILS group: $\chi^2(4) = 4.192$, n.s.). In all, 83.3% (5/6) of the patients who showed improvement from no oral intake to exclusively oral intake had cerebrovascular

Table 6. The deteriorated-FILS group.

	Age (years)	Sex	Length of hospital stay	Level of long-term care needed	Acuity level	Primary illness	Dysphagia rehabilitation	FILS at the time of admission	FILS on the survey date	
Exclusively oral intake to combined intake	a	87	M	37	1	3	Cerebrovascular disease	Indirect and direct	7	4
	b	76	M	227	5	2	Progressive neurological disease	Indirect and direct	7	5
	c	85	F	11	4	2	Other	None	7	5
	d	90	F	84	5	3	Cerebrovascular disease	None	7	6
	e	91	F	55	5	2	Cerebrovascular disease	None	7	6
	f	97	F	105	5	1	Cerebrovascular disease	None	7	6
	g	95	M	109	5	3	Respiratory illness	None	7	6
	h	96	M	182	3	1	Respiratory illness	None	7	6
	i	84	M	189	5	1	Other	None	7	6
	j	90	F	404	4	3	Other	Indirect	7	6
	k	89	F	552	Had not applied	2	Cerebrovascular disease	None	8	5
	l	86	F	714	4	2	Other	None	8	6
	m	94	F	670	5	1	Other	None	8	6
	n	85	F	363	4	2	Other	None	9	6
Exclusively oral intake to no oral intake	o	83	M	69	5	2	Cerebrovascular disease	Watchful waiting	7	1
	p	84	M	89	4	2	Cerebrovascular disease	Watchful waiting	7	1
	q	84	F	194	Had not applied	2	Respiratory illness	Watchful waiting	7	1
	r	95	F	25	4	2	Heart disease	Watchful waiting	7	1
	s	97	M	242	2	2	Other	Watchful waiting	7	1
	t	68	M	119	3	1	Cerebrovascular disease	Indirect	7	2
	u	67	F	404	5	2	Progressive neurological disease	Indirect	7	2
	v	72	F	338	4	2	Progressive neurological disease	Indirect	7	2
	w	87	M	140	3	2	Progressive neurological disease	Indirect	7	2
	x	71	F	122	4	2	Cerebrovascular disease	Indirect and direct	7	3
Combined intake to no oral intake	y	63	F	790	4	3	Progressive neurological disease	None	5	1
	z	83	F	43	3	3	Progressive neurological disease	Indirect	5	2

All values are from the survey date. FILS, Food Intake Level Scale.

Dysphagia rehabilitation: The rehabilitation that patients had undergone in the 3 months leading up to the survey date was classified as indirect/direct swallowing training or watchful waiting.

disease. Meanwhile, 41.7% (5/12) of the patients who deteriorated from exclusively oral intake or combined intake to no oral intake had progressive neurological disease.

The types of dysphagia rehabilitation that the improved-FILS and deteriorated-FILS groups underwent are shown in Tables 5 and 6, respectively. Indirect swallowing training was administered to patients with

FILS scores between 2 and 9 and direct swallowing training to patients with FILS scores between 3 and 7. Indirect swallowing training involved various kinds of training according to the patient's condition, including postural correction; relaxation and stretching of the trunk, head, and neck; oral care; cold oral stimulation; respiratory training; cough training; vocalization training; exercise of the orofacial muscles; and dry swallowing. Direct swallowing training involved feeding training using jellies and puddings for patients with FILS scores of 3 or 4, and progressive feeding training while for patients with FILS scores of ≥ 5 .

The proportions of patients in the improved-FILS group, deteriorated-FILS group, and entire study cohort who had undergone indirect or indirect swallowing training and had been assigned to watchful waiting are shown in Table 7. In all, 61.1% (11/18) of the patients in the improved-FILS group had undergone indirect swallowing training and 50.0% (9/18) of the patients had undergone direct swallowing training. The results of the exact binomial test with the entire study cohort as the population proportion showed that the proportion of subjects who had undergone indirect or direct swallowing training was significantly high in the improved-FILS group (indirect swallowing training: proportion of samples, 0.61; population proportion, 0.29; one-sided probability, $p = 0.005$ vs. direct swallowing training: proportion of samples, 0.50; population proportion, 0.11; one-sided probability, $p = 0.000$). Meanwhile, no significant difference was found in the deteriorated-FILS group (indirect swallowing training: proportion of samples, 0.31; population proportion, 0.29; one-sided probability, $p = 0.502$, n.s.; vs. direct swallowing training: proportion of samples, 0.12; population proportion, 0.11; one-sided probability, $p = 0.531$, n.s.).

No patient was assigned to watchful waiting in the improved-FILS group; this was a significantly low proportion in comparison to the proportion of patients assigned to watchful waiting in the entire study cohort (proportion of samples, 0; population proportion, 0.28; one-sided probability, $p = 0.003$). Meanwhile, no significant difference was found in the deteriorated-FILS group with regard to the proportion of subjects assigned to watchful waiting (proportion of samples, 0.19; population proportion, 0.28; one-sided probability, $p = 0.222$, n.s.).

Discussion

The improved-FILS group had the following characteristics. First, improvement in the FILS score was unrelated to age, and so the FILS stage can improve even in patients of very advanced age (>90 years). Previous studies on changes in swallowing function at acute-care hospitals have found that age had a minor effect on such changes, and even though this study differs from previous studies in the basic demographic attributes and assessment index analyzed, it indicates a similar tendency.

Second, there were many females in the improved-FILS group. In particular, all of the patients who showed a marked improvement in the FILS score were females. In their studies at acute-care hospitals, Matsuoka et al. [9] and Kumar et al. [10] considered that sex was not a factor involved in the recovery of one's swallowing function; on the other hand, Inamoto et al. stated that it may be easier for women to recover, depending on certain conditions [8]. Further studies are needed in this regard. However, older females have an advantage in terms of recovering their swallowing function and achieving positive changes in the mode of food intake, whereas males are considerably affected by some aging-related changes, such as considerable lowering of the larynx [11], decline in muscular reserve [12], and not increased range of motion during swallowing, which has been observed to increase in older females to compensate for the effects of aging, but not in older males [13]. It is possible that there was a marked sex difference in the results of this study since the majority of the subjects were older.

Third, five of the six subjects who showed a positive change in the mode of food intake from no oral intake to exclusively oral intake had cerebrovascular disease. Since patients with cerebrovascular disease can recover their swallowing function over the long term [14], changes in their mode of food intake should be observed by regular assessments of their swallowing function.

Fourth, in comparison to the population proportion, the proportion of subjects whose dysphagia rehabilitation involved indirect or direct swallowing training was significantly high, while the proportion assigned to watchful waiting was low. However, since

Table 7. Proportion of patients who underwent dysphagia rehabilitation, by type of rehabilitation.

	Improved-FILS group ($n = 18$)	Deteriorated-FILS group ($n = 26$)	Entire cohort ($n = 264$)
Indirect swallowing training	61.1%*	30.8%	29.2%
Direct swallowing training	50.0%*	11.5%	10.6%
Watchful waiting	0%*	19.2%	28.0%

* $p < 0.05$ in an exact binomial test (one-sided test) with the frequency in the entire study cohort as the population proportion.

this study was a retrospective cross-sectional study of all of the patients hospitalized in long-term care wards at three hospitals on the survey date, the criteria for administering dysphagia rehabilitation were not uniform and depended on the workforce of the hospital ward and guidelines given by the attending physician. For that reason, it cannot be said that the training had an effect just because the improved-FILS group had many patients who had undergone functional training and none were assigned to watchful waiting. It is arguably a matter of time that the improved-FILS group had many patients who had undergone functional training, since it is likely that when a hospital sets out to administer dysphagia rehabilitation with limited manpower, it would prioritize functional training for patients whose FILS score is expected to change, whether for better or for worse.

In contrast, no noteworthy characteristics were observed in the deteriorated-FILS group. Patients with a variety of diseases are hospitalized in long-term care wards, and the course of every patient's disease is different. Cases in which the original disease relapses or a new one develops during a patient's stay in hospital are not uncommon. Furthermore, there may also be some cases, such as those with progressive neuromuscular disease, where maintaining swallowing function or decreasing the speed of deterioration is the goal, since swallowing function will inevitably decline with the passage of time. A decrease in the FILS score would not necessarily have a negative meaning in such cases. It may be possible to maintain the patients' health and quality of life longer by adjusting the textures of foods according to the decline in their swallowing function, supplementing deficiencies in their nutrition and hydration by non-oral means, and reducing the risk of aspiration pneumonia or choking by changing to non-oral intake. On the other hand, there are also cases in which the deterioration of the patient's FILS score may have been avoided if it had been possible to administer functional training or to optimize their environment. Rather than regarding the "deteriorated-FILS group" as a monolith, it might be reasonable to examine factors causing the decline in the FILS scores and their significance based on the course and prognosis of individual cases.

No characteristic tendencies were observed in the level of long-term care needed, regardless of whether the FILS scores improved or deteriorated. In this study, the level of long-term care needed was used as the index of activities of daily living. It appeared that many of those in the improved-FILS group needed only minimal or moderate care, while many of those in the deteriorated-FILS group needed extensive support, although no statistically significant differences were found. Since this study included a limited number of subjects, future studies on this topic should include a larger number of cases.

Since the objective of this study was to identify the

characteristics of the patients whose mode of food intake changed, we did not examine the group of patients whose FILS remained at the same stage, whether it was no oral intake, combined intake, or exclusively oral intake. However, the majority of inpatients receiving long-term bedside care fell under this category. It may be possible to examine key factors for the transition to oral intake by identifying groups of patients with similar conditions at the time of admission and comparing them with patients who remained at the stage of no oral intake and those who exhibited a positive change from no oral intake. Likewise, it may be possible to examine the factors necessary to maintain oral intake by comparing patients who maintained oral intake over the long term and those who exhibited a negative change from exclusively oral intake.

One limitation of this study is that all of the data were collected retrospectively from medical records; thus, the index date for the assessment of swallowing function was not available for some of the patients, and in some cases, the original assessment was not made by an ST. Another limitation is that many factors are involved in a patient's mode of food intake, such as the texture of food, nutritional state, attending physician's treatment guidelines, number of ward staff available for meal assistance and supervision, and intentions of the patient and his/her family. It was not possible to examine these points in this study. Going forward, we would like to comprehensively examine the factors that lead to changes in patients' mode of food intake, taking these points into consideration.

In addition, since this study was a cross-sectional study at one point in time, we could not obtain detailed data on the course of the condition of the patients after admission. In the future, we would like to assess the changes in the patients' mode of food intake over time in light of the course of their general condition and swallowing function.

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References

1. Medical Service Law 1948. Sample References. Available from: <https://elaws.e-gov.go.jp/document?lawid=323AC0000000205> (cited 2022 August 8).
2. National Institute for Longevity Sciences. Report of Research Project on Ingestion and Swallowing Disorders. Heisei 23rd Annual Health Promotion for the Elderly. 2012. Sample References. Available from: https://www.ncgg.go.jp/ncgg-kenkyu/documents/roken/cl_hokoku1_23.pdf (cited 2022 August 8).
3. Shirahase M, Hatakeyama M, Suzuki S, Morita K,

- Yamashita S, Konishi M, et al. Influence of the swallowing rehabilitation system in medical care beds on the feeding and swallowing function of hospitalized patients. *JMC* 2022; 142: 2–9. Japanese.
4. Revision of Medical Service Compensation. FY2022 Revision of Medical Service Compensation. Sample References. Available from: <https://www.mhlw.go.jp/content/12404000/000905284.pdf> (cited 2022 August 8).
 5. Mizuho Research & Technologies. Survey and research project on the state of rehabilitation in facilities for long-term treatment 2019. Sample References. Available from: https://www.mizuho-rt.co.jp/case/research/pdf/mhlw_kaigo2019_04.pdf (cited 2022 August 10).
 6. Kunieda K, Ohno T, Fujishima I, Hojo K, Morita T. Reliability and validity of a tool to measure the severity of dysphagia: the Food Intake LEVEL Scale. *J Pain Symptom Manage* 2013; 46: 201–6.
 7. Benjamini Y, Hochberg Y. Controlling the false discovery rate: A practical and powerful approach to multiple testing. *J R Stat Soc Ser B* 1995; 58: 289–300.
 8. Inamoto Y, Hota S, Oguchi K, Saitoh E. The variance of dysphagia severity scale and diet modification before and after swallowing training in inpatients with swallowing disorders following stroke. *JJDR* 2003; 7(2): 117–25. Japanese.
 9. Matsuoka M, Nakanishi K, Watabe H. The effect of dysphagia rehabilitation in an acute care hospital. *JJDR* 2008; 12(2): 124–34. Japanese.
 10. Kumar S, Doughty C, Doros G, Selim M, Lahoti S, Gokhale S, et al. Recovery of swallowing after dysphagic stroke: an analysis of prognostic factors. *J Stroke Cerebrovasc Dis* 2014; 23: 56–62.
 11. Oguchi K. Dysphagia. *Jpn J Rehabil Med*. 2017; 54: 358–62.
 12. Logemann JA, Pauloski BR, Rademaker AW, Colangelo LA, Kahrilas PJ, Smith CH. Temporal and biomechanical characteristics of oropharyngeal swallow in younger and older men. *J Speech Lang Hear Res* 2000; 43: 1264–74.
 13. Logemann JA, Pauloski BR, Rademaker AW, Kahrilas PJ. Oropharyngeal swallow in younger and older women. *J Speech Lang Hear Res* 2002; 45: 434–45.
 14. Ohta F, Ito H, Kato T, Moriyama H. Long-term progress after treatment of dysphagia. *J Jpn Broncho-Esophagol Soc* 2000; 51: 405–10.