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Original Article

Survey of pharmacist services and status of drug administration to patients with dysphagia in convalescence rehabilitation wards

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ABSTRACT
Otsubo H, Kishimoto K, Kumaki R, Akagawa K, Kurata N. Survey of pharmacist services and status of drug administration to patients with dysphagia in convalescence rehabilitation wards. Jpn J Compr Rehabil Sci 2019; 10: 108–116.
Objective: To investigate the role of pharmacists through a survey on pharmacist services and the status of drug administration to patients with dysphagia.
Methods: A survey of members of the Kaifukuki Rehabilitation Ward Association was conducted using a questionnaire.
Results: Investigation of the pharmacist services indicated that in wards in which pharmacist services were provided to ≥90% of in-hospital patients, drugs brought to the hospital by the patients were checked 88.1% of the time, guidance with regard to drug administration was provided 10.5% of the time, and guidance was provided at discharge 35.5% of the time. In many cases, patients with dysphagia were administered drugs in thickener after grinding or as a simple suspension. At 91.4% of the facilities surveyed, this was confirmed by the medical staff, but was directly confirmed by the pharmacist at 26% of facilities. Swallowing ability was assessed at 21.2% of facilities, the name and type of thickener used was checked at 39.3%, and the type of feeding tube used was checked at 73.1%. These implementation rates were positively correlated with the time at which the pharmacist made rounds in the convalescence rehabilitation ward.
Conclusion: To increase the involvement of pharmacists in providing drug-taking guidance and caring for patients with dysphagia in convalescence rehabilitation wards throughout the country, measures should be taken to increase their time in the ward.
Key words: convalescence rehabilitation ward, pharmacist services, dysphagia patient, current status survey, simple suspension method

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Introduction

Convalescence rehabilitation wards (hereafter referred to as "convalescence rehab wards") accept patients who have completed acute-stage care for conditions such as cerebrovascular disorders. These wards play an important role as a bridge to a long-term care facility, nursing home, or at-home care, a role that has become increasingly important in Japan's super-aging society.

In general, elderly patients suffering from chronic illnesses such as hypertension and diabetes use multiple drugs concurrently. There is therefore a high risk of adverse drug reactions among the elderly [1]. In addition, a study of elderly patients in convalescence rehab wards showed that 70% of patients used at least one "high-risk drug," such as anticoagulants and cardiovascular agents [2].

Between 37% and 78% of patients who have had a stroke suffer from dysphagia [3]. Furthermore, in convalescence rehab wards in Japan, 5.1% of patients have a nasogastric tube and 1.4% have a gastrostomy feeding tube [4]. If dysphagia is mild to moderate, it may be possible to use a variety of methods to help patients take food and drugs by mouth. However, if patients have nasogastric or gastrostomy feeding tubes, drugs are administered through this tube as well. Previously, pharmacists would grind drug tablets and open capsules (grinding method), suspend the resulting powder in water at the patient's bedside, and administer the mixture via the patient's feeding tube.

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However, this reportedly led to tube clogging rates of 6–38% [5]. To resolve this drawback of the grinding method, a "simple suspension," which involves placing a tablet or capsule in water heated to 55℃ for disintegration and suspension prior to administration, is prepared [6]. This method subsequently came into widespread use. However, it also causes tube clogging as well as discoloration of the suspension, and pharmacists often receive queries from medical staff for these reasons [7].

Each year, the Japanese Society of Hospital Pharmacists conducts a survey of the current status of hospital pharmacies at all medical facilities, but as convalescence rehab wards are often categorized as part of general wards, the situation in such wards remains unknown. Previous survey reports on the status of drug administration to patients with dysphagia have been limited mainly to general hospitals [8, 9].

Therefore, in this study, the current status of pharmacist services in convalescence rehab wards and of drug administration to patients with dysphagia was surveyed. In addition, factors related to the role played by pharmacists in convalescence rehab wards were assessed.

Methods

1. Questionnaire survey method

The main survey items comprised the following: (1) basic data such as number of beds and number of pharmacists, (2) status of pharmacist services such as drug-related guidance, (3) status of drug administration to patients with dysphagia, and (4) adoption of the simple suspension method. The questions included on the questionnaire sheet are listed in Table 1 in simplified form. For example, the question "Do you check the type and name of the thickener used in the ward for the purpose of drug administration to patients with dysphagia?" is listed in Table 1 as "Checking the type and name of the thickener." Pharmacists in charge of convalescence rehab wards included both full- and part-time staff. The total time such pharmacists were present in the ward was designated as the "time present in the convalescence rehab ward."

The questionnaire sheet was mailed to supervisors of the pharmaceutical departments at 1,128 facilities that were members of the Kaifukuki Rehabilitation Ward Association as of December 1, 2016. The study period was the month of March 2017. Participants were asked to return their responses either via mail (return envelope provided) or via email for the questionnaire sheet (Excel file) uploaded on the university's homepage. This survey was conducted after receiving the approval of the Institutional Review Board of the School of Pharmacy, Showa University (approval number: 266). The study was conducted in accordance with the "Ethical Guidelines for Medical and Health Research Involving Human Subjects (established in 2014)."

2. Statistical analysis

Statistical analysis was performed using JMP Pro 14.0.0 (SAS Institute Inc., Cary, NC, USA). Multivariate analysis was conducted using logistic regression analysis. The response variables indicated on a nominal scale were: (1) drugs brought into the convalescence rehab ward were checked in ≥90% of cases, (2) drug administration guidance was provided during hospital stay in ≥90% of cases, (3) guidance was provided at discharge in ≥90% of cases, (4) involvement in swallowing ability assessments, (5) type and name of thickener was checked, and (6) type of feeding tube was checked. The predictor variables were: (1) total number of beds, (2) number of full-time pharmacists, (3) number of pharmacists in charge of the convalescence rehab wards, and (4) time pharmacists spent per day in the convalescence rehab wards. These are based on the facility standards for ward pharmaceutical services of general wards. Analyses were performed using the total number of beds listed per 100 beds and full-time pharmacists listed per 5 people. All predictor variables are shown on an ordinal (sequential) scale. Spearman's ranked correlation coefficient for relationships between predictor variables was ≤0.8 in all cases. The variance inflation factor (VIF) was subjected to multiple logistic regression analysis when it was ≤2. The relationship between guidance provided at discharge in ≥90% of cases and use of the grinding method at discharge was investigated using Fisher's exact test. The standard of significance used for all statistical results was 5%.

Results

Of the 1,128 facilities contacted, 420 provided responses (recovery rate: 37.2%).

1. Basic data for all facilities

The highest number of responses was obtained from facilities with 100–199 beds (197/420 facilities; 46.9%). Responses from convalescence rehab wards with 1–49 beds accounted for 44.9% of the total (189/420). A total of 28.1% of facilities (118/420) reported having 3 or 4 full-time pharmacists and facilities with ≤4 pharmacists accounted for over half of the responses. However, 43.6% of facilities (183/429) did not have a pharmacist in charge of the convalescence rehab ward (Figure 1 ①). No convalescence rehab wards were eligible for medical fee calculation (under the National Health Insurance system in Japan), but 82.4% of facilities (346/420) calculated a fee for drug management guidance by pharmacists, and 29.0% of facilities (122/420) performed additional calculations for ward pharmacist services provided. A pharmacist was present in the convalescence rehab ward every day in 46.4% of facilities (195/420), but in many facilities the amount

Table 1. Questionnaire sheet (simplified form).

(1) Basic data for all institutions (CRW: Convalescence Rehab Ward)

①Total number of beds in the institution	☐ 1–49 ☐ 50–99 ☐ 100–199 ☐ 200–299 ☐ 300–499 ☐ More than 500 beds
②Number of beds in CRW	☐ 0–19 ☐ 20–49 ☐ 50–99 ☐ 100–199 ☐ 200–299 ☐ More than 300 beds
③Number of full-time pharmacists in the institution	☐ 0–2 ☐ 3–4 ☐ 5–6 ☐ 7–8 ☐ 9–10 ☐ 11–15 ☐ 16–20 ☐ 21–30 ☐ More than 31 persons
④Number of charge pharmacists in CRW	☐ 0 ☐ Less than 1 ☐ 1–2 ☐ 3–4 ☐ More than 5 persons
⑤Fee for drug management guidance	☐ Calculate ☐ Don't calculate ☐ Not applicable
⑥Additional calculations for ward pharmacist services	☐ Calculate ☐ Don't calculate ☐ Not applicable
⑦Amount of time pharmacists spend per day in CRW	☐ Less than 1 hour ☐ 1–2 hours ☐ 2–4 hours ☐ Half day ☐ All day ☐ Don't go every day (hours/week)

(2) Status of drug administration guidance and other pharmacist services in CRW

①Checking drugs brought into the hospital by patients	☐ More than 90% ☐ 70–90% ☐ 50–70%, ☐ 30–50% ☐ 10–30% ☐ Less than 10%
②Provision of drug administration guidance to in-patients	☐ Given to more than 90% of all in-patients ☐ Only when asked by a physician or nurse ☐ Only to those needing it (use of high-risk medicine, transition to self-care) ☐ Others ( )
③Provision of guidance at discharge	☐ Given to more than 90% of all in-patients including family etc. ☐ Only upon discharge to home ☐ Only when asked by a physician or nurse ☐ Others ( )
④Methods of checking patients with dysphagia	☐ Don't check
	☐ Check (select from below, multiple answers allowed) ☐ Based on admission summary ☐ Check of swallowing at interview ☐ Contact from ward ☐ Based on inquiry of crush prescription ☐ Others (e.g. conference)
⑤Pharmacist involvement in evaluating swallowing ability	☐ Not involved
	☐ Involved (select from below, multiple answers allowed) ☐ Direct conversation with patient ☐ Pharmacist participation in VE or VF ☐ Enforcement of screening test
⑥Drug administration to patients with dysphagia from mouth (multiple answers allowed)	☐ After grinding, suspend in water and mix with thickeners ☐ After suspending by simple suspension method, mix thickeners ☐ Wrap in jelly ☐ Wrap in oblate ☐ Mix in meal
⑦Checking the type and name of the thickener	☐ Check ☐ Don't check
⑧Checking the type of feeding tube used (nasogastric tube, gastric tube, intestinal tube)	☐ Don't check
	☐ Check (select from below, multiple answers allowed) ☐ Check by patients' medical records ☐ Check by asking the nurse in charge ☐ Check by looking directly at the feeding tube ☐ Check with written prescription

(3) Simple suspension method in CRW

①Usage of simple suspension method	☐ Yes
	☐ No
If used, answer the following:	
②Dispensing method of simple suspension method	☐ All in one package ☐ Separate for cracking medicine ☐ PTP
③Place and staff who break the coatings	☐ Pharmacist at the dispensing room ☐ Pharmacist in the ward ☐ Nurse in the ward ☐ Pharmacist or nurse as appropriate
④Dispensing method for patients with dysphagia at discharge	☐ Simple suspension method ☐ Grinding method ☐ Simple suspension or grinding, depending on the situation

of time the pharmacist spent in the ward was ＜2 h. However, 9.5% of facilities (40/420) reported that a pharmacist spent at least half a day in the ward every day (Figure 1 ②).

2. Status of drug administration guidance and other pharmacist services

A large percentage (88.1%; 370/420) of facilities reported that a pharmacist checked the drugs brought into the hospital by patients at admission in ≥90% of cases (Figure 2 ①). However, the percentage of facilities in which a pharmacist provided drug administration guidance to patients on admission was low (10.5%; 44/420). The remaining facilities stated that they shifted to self-management and provided explanations regarding changes in factors such as dose when required, or that they provided such guidance only on the request of a physician or other healthcare professional. The percentage of facilities that provided discharge guidance to ≥90% of family members or staff at facilities where the patient would be transferred was 35.5% (149/420), and half of the facilities

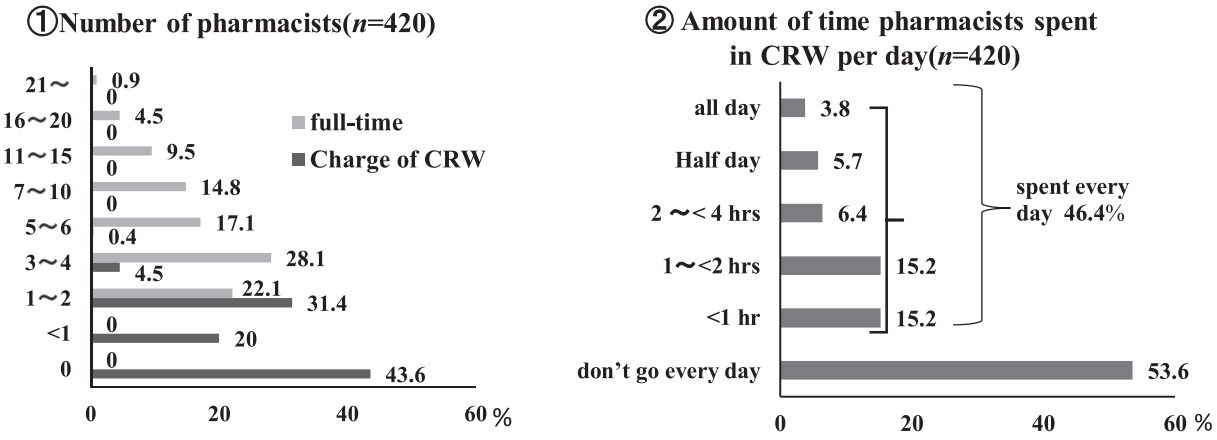

Figure 1. Basic data of each institution.
①Number of pharmacists (*n*=420)
Vertical axis (persons), Number of full-time pharmacists and charge pharmacists in CRW (convalescence rehabilitation wards).
Horizontal axis (%), Response rate of number of full-time pharmacists and number of charge pharmacists.
②Amount of time pharmacists spent per day in CRW (*n*=420)
Vertical axis (hours), Amount of time pharmacists spent per day in CRW (If there are multiple pharmacists, add the times together).
Horizontal axis (%), Response rate for amount of time pharmacists spent at each responding facility.

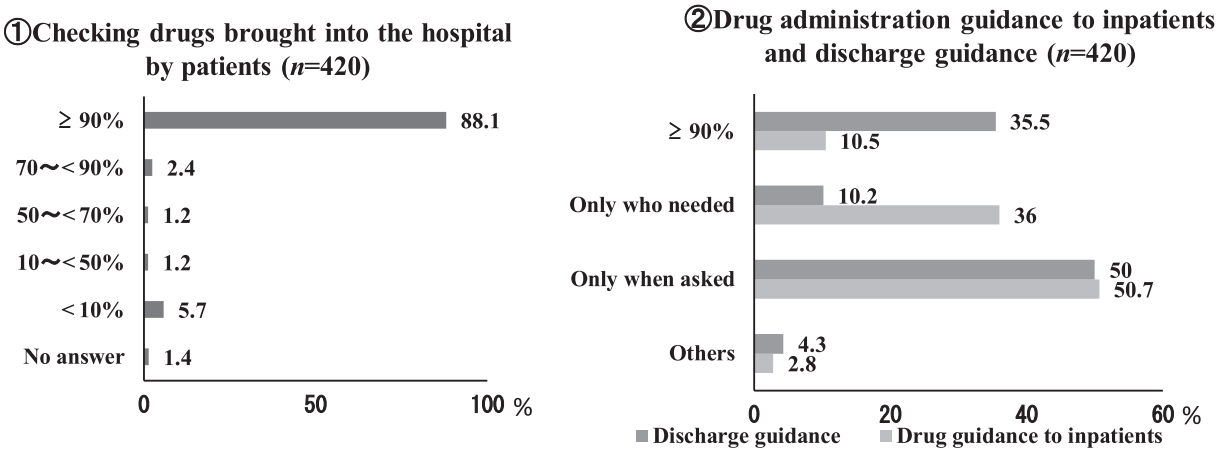

Figure 2. Status of drug administration guidance and other in CRW.
①Checking drugs brought into the hospital by patients (*n*=420)
Vertical axis (%), Checking rate at each responding facility.
Horizontal axis (%), Ratio of facilities corresponding to each checking rate.
②Drug administration guidance to in-patients and discharge guidance (*n*=420)
Vertical axis, Applicable items.
Horizontal axis (%), Ratio of facilities corresponding to applicable items.

responded that this was done only at the request of a physician or nurse (Figure 2 ②).

The independent variable for multiple logistic regression analysis was these services (checked drugs brought into the hospital, provided drug administration guidance during hospital stay, and provided guidance at discharge) for ≥90% of in-hospital patients. Checking drugs brought into the hospital was slightly positively correlated with the number of full-time pharmacists (odds ratio (OR): 0.67), and positively correlated with the amount of time pharmacists spent in the convalescence rehab ward (OR: 2.20). The provision of drug administration guidance to in-hospital patients was not correlated with the number of full-time pharmacists, but was positively correlated with the number of pharmacists in charge of the convalescence rehab ward (OR: 1.64) and with the amount of time pharmacists spent in the convalescence rehab ward (OR: 1.41). Provision of guidance at discharge was also positively correlated with the number of pharmacists in charge of the convalescence rehab ward (OR: 1.49) and the amount of time pharmacists spent in the convalescence rehab ward (OR: 1.38; Table 2 ①).

3. Drug administration to patients with dysphagia (oral + feeding tube administration)

Facilities that reported checking whether in-hospital patients suffered from dysphagia accounted for 91.4% (384/420), but those in which a pharmacist checked this information directly through a meeting with the patient accounted for only 26.0% (109/420). In many facilities, this check was conducted using the admission summary or by contacting the ward (Figure 3 ①). Pharmacists were directly involved in the swallowing ability assessment in 21.2% of facilities (89/420), and pharmacist participation in videoendoscopic evaluation (VE) and videofluoroscopic evaluation (VF) of swallowing was reported in ≤5% in both cases. Drug administration to patients with dysphagia who were able to ingest drugs by mouth was performed using thickener after grinding and suspension at 76.0% of facilities (319/420), and using thickener after use of the simple suspension method at 56.7% of facilities (238/420). However, the latter was used more often than the jelly or oblate methods (Figure 3 ②). Thus, thickener was used at many facilities to prevent aspiration, but the percentage of facilities at which a pharmacist checked the types and names of thickeners used in the ward was 39.3% (165/420). A pharmacist checked the type of feeding tube used by all patients in 73.1% of facilities (307/420), but at many facilities this information was obtained either by checking the patients' medical records or asking the nurse in charge. Only 7.9% (33/420) of facilities reported that a pharmacist checked this information by directly observing the tube (Figure 3 ③).

We performed multiple logistic regression analysis to investigate the relationships between the predictor variables of involvement of pharmacists in swallowing ability assessments, ascertaining the type and name of thickener used, and ascertaining the type of feeding tube used. Involvement in swallowing ability assessment was positively correlated with the number of pharmacists in charge of the convalescence rehab ward (OR: 1.32) and the amount of time spent in the convalescence rehab ward (OR: 1.40). Furthermore, ascertaining the type and name of thickener was positively correlated with the amount of time spent in the convalescence rehab ward (OR: 1.19), as was ascertaining the type of feeding tube used (OR: 1.28) (Table 2 ②).

4. Simple suspension method

In total, 82.4% of convalescence rehab wards (346/420) used the simple suspension method. However, the administration method used at discharge remained the simple suspension method at 51.2% of the facilities (177/346) and grinding was favored at 4.9% of facilities (17/346). The method used was determined to be either the simple suspension method or the grinding method according to that used at the facility where the patient was to be transferred or at home at 43.9% (152/346) of the facilities.

Of the facilities at which the simple suspension method was used for ≥90% of patients, 1.6% (2/129) reported favoring the grinding method, and of the facilities at which guidance at discharge was not provided to ≥90% of patients, 6.9% (15/217) reported favoring the grinding method, indicating a significant difference (Fisher's exact test, $p = 0.0365$).

In 47.4% of facilities (154/346) that employed the simple suspension method, the drug was wrapped in some other material when it was necessary to break open the original container. This percentage was higher than that of facilities that re-wrapped all drugs, and the number of facilities in which drugs were administered in the original press-through package (PTP) was small. In most facilities (42.8%; 148/346), a pharmacist broke the coatings in the pharmaceutical dispensing room, whereas this was done by a nurse in the ward at 37.6% of facilities (130/346), and by either a pharmacist or a nurse depending upon the specific circumstances at 16.8% of facilities (Figure 3 ④).

Discussion

This study is the first national survey of the status of pharmacist services at convalescence rehab wards and drug administration to patients with dysphagia. Over half of the facilities surveyed did not have a pharmacist in charge of the convalescence rehab ward and reported that a pharmacist did not visit the ward every day. Many facilities also reported that even if a pharmacist did visit the ward every day, the time spent in the ward was ＜2 h. Currently, the "Facility standards for convalescence rehab ward in-hospital fees" mentions

Table 2. ①Status of drug administration guidance in CRW and association of each factor (CRW: Convalescence Rehab Ward).

	Checking drugs brought in (370/420)					Drug administration guidance to inpatients (44/420)					Discharge guidance (149/420)				
Factor	Coefficient	Standard error	*p* Value	Odds ratio	95% CI	Coefficient	Standard error	*p* Value	Odds ratio	95% CI	Coefficient	Standard error	*p* Value	Odds ratio	95% CI
Total number of beds	−0.20	0.21	0.35	0.82	0.54–1.24	−0.31	0.25	0.20	0.73	0.45–1.18	−0.22	0.15	0.14	0.81	0.60–1.09
Number of full-time pharmacists	−0.40	0.18	0.03*	0.67	0.47–0.96	−0.04	0.24	0.86	0.96	0.60–1.53	−0.18	0.15	0.24	0.83	0.62–1.12
Number of charge pharmacists	0.27	0.19	0.17	1.29	0.90–1.86	0.50	0.17	<0.01**	1.64	1.17–2.30	0.40	0.12	<0.01**	1.49	1.18–1.87
Amount of time pharmacists spent	0.80	0.23	<0.01**	2.20	1.40–3.46	0.34	0.10	<0.01**	1.41	1.15–1.73	0.32	0.08	<0.01**	1.38	1.19–1.60

②Situation of checking patients with dysphagia and association of each factor.

	Swallowing ability assessment (89/420)					Type and name of thickener used (165/420)					Type of feeding tube used (307/420)				
Factor	Coefficient	Standard error	*p* Value	Odds ratio	95% CI	Coefficient	Standard error	*p* Value	Odds ratio	95% CI	Coefficient	Standard error	*p* Value	Odds ratio	95% CI
Total number of beds	−0.13	0.18	0.47	0.88	0.62–1.24	−0.07	0.14	0.64	0.94	0.71–1.23	0.10	0.15	0.51	1.11	0.82–1.50
Number of full-time pharmacists	−0.27	0.18	0.14	0.76	0.53–1.10	−0.04	0.13	0.78	0.96	0.74–1.25	−0.16	0.14	0.27	0.85	0.64–1.13
Number of charge pharmacists	0.28	0.13	0.03*	1.32	1.02–1.72	−0.04	0.11	0.70	0.96	0.77–1.19	0.22	0.13	0.08	1.25	0.97–1.60
Amount of time pharmacists spent	0.34	0.08	<0.01**	1.40	1.19–1.65	0.18	0.07	0.02*	1.19	1.03–1.38	0.25	0.09	<0.01**	1.28	1.06–1.54

Total number of beds, Analyses were performed using the total number of beds listed per 100 beds.

Number of full-time pharmacists, Analyses were performed using full-time pharmacists listed per 5 people.

Number of charge pharmacists, Pharmacists in charge of CRW included both full- and part-time staff.

Amount of time pharmacists spent, The total time such pharmacists were present in the ward was designated.

Spearman's ranked correlation coefficient for relationships between predictor variables was 0.8 or less in all cases. The variance inflation factor (VIF) was subjected to multiple logistic regression analysis when it was 2 or less.

Significant difference, **p* Value <0.05; ***p* Level <0.01.

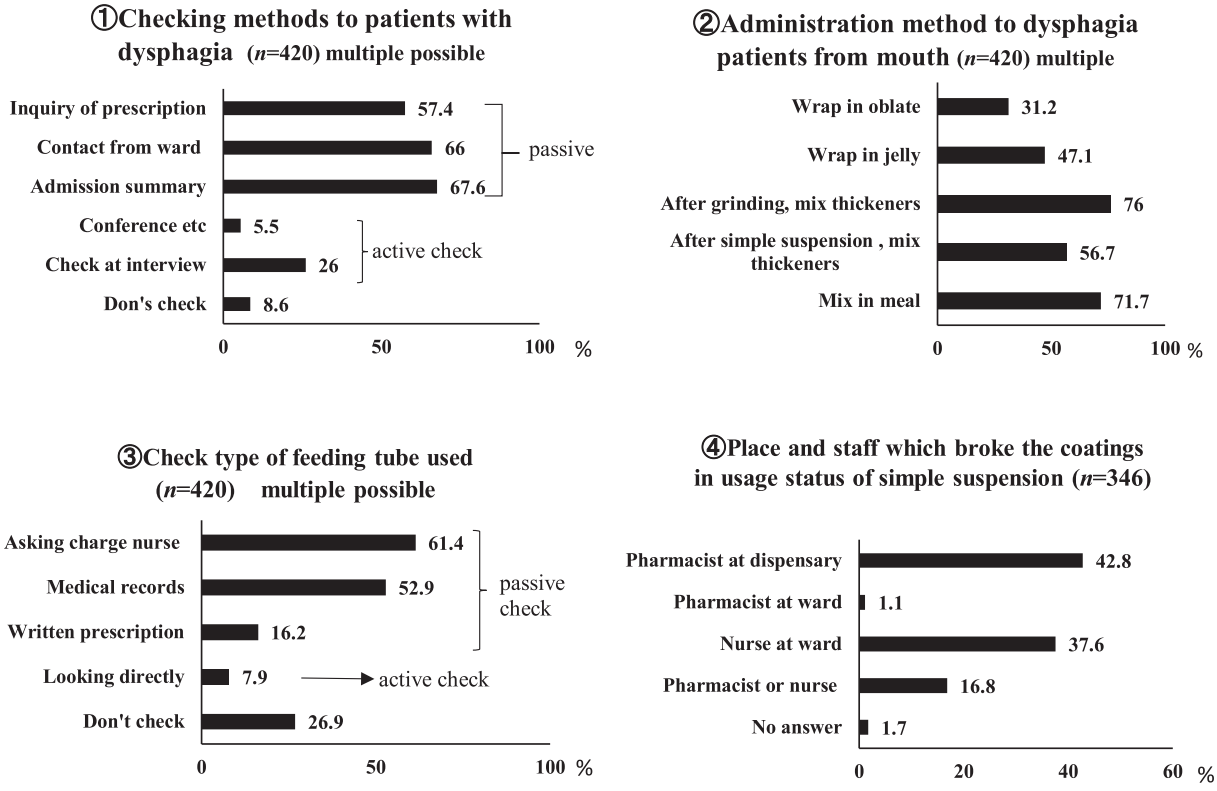

Figure 3. Checking the situation of patients with dysphagia in CRW.
①Methods of checking patients with dysphagia (*n*=420) (multiple answers allowed).
Vertical axis, Checking methods.
Horizontal axis (%), Ratio of facilities corresponding to applicable items.
Display "passive check" and "active check."
②Administration method for patients with dysphagia (*n*=420) (multiple answers allowed).
Vertical axis, Administration methods.
Horizontal axis (%), Ratio of facilities that answered.
③Checking of type of feeding tube used (*n*=420) (multiple answers allowed).
Vertical axis, Checking methods.
Horizontal axis (%), Ratio of facilities that answered.
Display "passive check" and "active check."
④Place and staff who broke the coatings for use in simple suspension (usage status, *n*=346).
Vertical axis, Applicable items.
Horizontal axis (%), Ratio of facilities that answered.

the presence of physicians, nurses, physical therapists, occupational therapists, and other medical practitioners, but not "pharmacists" [10]. Because medical care remuneration for drug management, guidance fees, and additional ward pharmacy-related services fees provided at convalescence rehab wards is not currently recognized, convalescence rehab wards have greater difficulty than general hospital wards in ensuring that they have the required personnel and that such staff members are appropriately assigned. For example, 88.1% of facilities check drugs brought into the hospital by patients in ≥90% of cases, but the implementation rates for drug administration guidance and for guidance provided at discharge are 10.5% and 35.5%, respectively, both of which are low. However, as these figures are for facilities at which services are provided for ≥90% of in-hospital patients, they reflect the fact that services that are requested and required by patients are provided despite the shortage of personnel in these wards. The 2014 revision of the Pharmacists Act made it obligatory for "guidance based on pharmacological information" to be provided to patients on admission and discharge. From this perspective, our results indicate that the system is falling short of this obligation.

Checking whether patients suffered from dysphagia was done at 91.4% of facilities, and the type of feeding tube used by patients was checked at 73.1% of facilities. However, many of these facilities performed these checks indirectly and passively within the pharmacy division required to dispense drugs using the grinding method or the simple suspension method.

In contrast, pharmacists met directly with patients and actively confirmed the type of feeding tube used in 26% and 7.9% of facilities, respectively. This indicates that individual patients receive insufficient prescription care and advice regarding the form in which the drug should be taken, and that there is insufficient subsequent active involvement.

Investigation of the facilities' background characteristics indicated that 82.4% calculated drug management and guidance service fees and 29.0% calculated additional ward drug service fees. At the facilities where such calculations were made, there was a high likelihood that a pharmacist was placed in charge of the convalescence rehab ward. Additionally, facilities in which pharmacists spent more time in the convalescence rehab ward had higher implementation rates for services such as checking drugs brought into the hospital by patients, providing drug administration guidance, and providing guidance at discharge (Table 2 ①).

In order to avoid drug interactions and severe adverse drug effects, "high-risk drugs" that require safety management (e.g., anticoagulants, antidiabetic drugs, and anti-epileptic agents) require the implementation of pharmaceutical management services such as continuous drug administration guidance and adverse drug effect management [11]. Ogawa et al. reported that approximately 70% of patients in convalescence rehab wards received high-risk drugs and that pharmacist involvement was therefore an important aspect of appropriate drug administration to ensure safety during rehabilitation [2]. Fujiwara et al. found that convalescence rehab wards implemented drug administration guidance, test value checks, adverse drug effect monitoring, and other ward services at significantly lower rates than general hospital wards [12], and reported that both physicians and nurses were strongly in favor of providing drug administration guidance and adverse drug effect monitoring when self-management was in practice and when prescriptions were changed [13].

Despite the fact that 37−78% of patients who have had a stroke suffer from dysphagia [3] and that many patients with dysphagia are in convalescence rehab wards, the results of the present study indicate that pharmacists are actively involved in checking for dysphagia and assessing swallowing ability at a small number of facilities only. Thus, there is a need to consider improving the services provided at convalescence rehab wards.

According to the findings of this survey, approximately half of the facilities at which nurses grind drugs in the ward prior to administration to patients with swallowing difficulties use the simple suspension method. The use of thickener, a substance to facilitate swallowing, is widespread when administering drugs to patients with dysphagia who are able to ingest by mouth, but only a small percentage (39.3%) of facilities ascertain the type and name of thickener used by the patient. Additionally, 26.9% of facilities did not check the type of feeding tube in use (e.g., nasogastric or gastrostomy feeding tube).

Drugs are available in sustained-release formulations, enteric-coated preparations, orally disintegrating tablets, and other pharmaceutical formulations. The decision as to whether to grind these drugs, mix with thickeners, or administer by feeding tube requires pharmacological knowledge. For example, there are cases in which grinding nifedipine controlled-release (CR) tablets and administering them via gastrostomy feeding tube can cause hypotension. Similarly, administration of Oxycontin time-release (TR) tablets ground up prior to administration may lead to respiratory difficulty [14]. It has also been reported that thickener may break up magnesium oxide tablets and affect drug dissolution [15], and that the aqueous solution of xanthan gum added as a thickener to viscosity-adjusted foods may have an effect on the breakdown of fast-disintegrating tablets [16].

In clinical settings, it is impossible to judge by visual inspection whether the release of a drug's active ingredient has been altered, and it is therefore difficult for physicians and nurses to know what preparations to use when administering drugs. Interactions between drugs and foods are less well understood than those between different drugs, and it is thus imperative that pharmacists trained in pharmacology provide information regarding such issues.

Although the simple suspension method is used by a large number of medical facilities, Amano et al. reported that ＞40% of nurses experienced feeding tube clogging as a result of drug suspensions containing insufficiently dissolved drugs, and that additional causes of clogging include inappropriate temperature and amount of water used in the suspension [7]. The authors highlighted the importance of sharing multidisciplinary information. The present survey also revealed that patients would find it easier to continue using the simple suspension method after discharge if pharmacists provided guidance at discharge. As the number of patients with swallowing difficulties transferred to at-home care is expected to increase in the future, policies designed to facilitate cooperation with local pharmacist associations are required.

The present study revealed that implementation rates for services such as the provision of drug administration guidance and guidance at discharge increased when pharmacists spent more time in the convalescence rehab ward. Additionally, in such cases, pharmacists were also more likely to check the thickener and feeding tube used by patients with dysphagia. Therefore, it is necessary to create a system that allows pharmacists to spend more time in convalescence rehab wards. However, the present survey also revealed that there were only 40 facilities (9.5%) at which a pharmacist spent at least half a day in the convalescence rehab ward. The specific outcomes of this situation were not assessed in this

study.

In the future, the relationship between the time pharmacists spend in the convalescence rehab ward and drug optimization, as well as outcomes such as improvement in self-management, Functional Independence Measure (FIM) scores, and discharge-to-home rates will be elucidated. We hope that these data may be used to improve the environment in which pharmacist services are provided.

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