

What should be done to improve the efficiency in dispensing-related tasks

Kayoko Takeda Mamiya¹, Tetsumi Irie², Hajime Hashiba³ and Kiyoshi Takahashi^{1,*}

¹ Department of Pharmaceutical Education, Faculty of Pharmaceutical Sciences, Hokkaido University of Science, Japan

² Department of Pharmaceutical Packaging Technology, Graduate School of Pharmaceutical Sciences, Kumamoto University, Japan

³ Amall Corporation, Japan

Received June 12, 2024

Revised August 5, 2024

Revised September 25, 2024

Revised October 18, 2024

Accepted October 24, 2024

*Corresponding author

Department of Pharmaceutical Education,
Faculty of Pharmaceutical Sciences,
Hokkaido University of Science, Maeda 7-5-
4-1, Teine-ku, Sapporo 006-8585, Hokkaido,
Japan
E-mail: tkiyoshi@hus.ac.jp

ABSTRACT

Objective: To determine areas in which pharmacists believe efficiency should be improved in dispensing-related tasks and understand the needs in health care settings. **Methods:** A web-based survey was conducted among pharmacists in Japan to identify dispensing-related tasks that could be improved to increase pharmacists' work efficiency. Descriptive statistics and chi-square tests were used for analysis. **Results:** Overall, 549 responses were analysed. Respondents included 301 (54.8%) community pharmacy pharmacists, 36 (6.6%) drugstore pharmacists, and 212 (38.6%) hospital pharmacists; 423 (77.0%) pharmacists had been working for more than 10 years. The results showed that 90.9% of pharmacists recognised the need to improve efficiency in dispensing-related tasks and to focus on interpersonal tasks. Regarding tasks that should be made more efficient, pharmaceutical inventory management, dispensing of one-dose packages, and counting dispensing were suggested by 66.8%, 46.3%, and 42.4% of respondents, respectively. If they could streamline their business, improving patient medication guidance and follow-up as well as investigating new drugs and diseases were reported by 40.8% and 38.8% of pharmacists, respectively. **Conclusions:** This survey research has identified dispensing-related tasks that need to be improved in terms of efficiency to meet the social needs of pharmacists.

Key words: questionnaire surveys, pharmacists, efficiency of dispensing-related tasks, interpersonal services

1. Introduction

In recent years, digital transformation (DX) in the medical field has been promoted. The environment surrounding pharmacists has been rapidly changing along with the development of information and communication technology and other technologies, such as the sharing of various types of medical information through online qualification verification systems, the introduction of electronic prescriptions, and the establishment of rules for online medical care as well as drug administration guidance. Effective use of these technologies will not only improve work efficiency but will also lead to the enhancement of interpersonal tasks (Ministry of Health, Labour and Welfare, 2022-23, 2022). The interpersonal tasks of pharmacists include checking prescriptions and for duplicate medications and drug combinations, referring questions to physicians,

providing careful instructions regarding medications, continuously monitoring medication status and side effects, providing feedback to physicians and making suggestions about prescribing based on that feedback, discarding leftover medications, health support, and disaster support.

Declining medication adherence among elderly adults has become a problem, and the use of one-dose packaging in which multiple prescription drugs are bundled together into a single package has been proposed to help overcome this problem (Sato, 2017). Naturally, medicines are packaged in a single package based on pharmaceutical knowledge or skills, in consideration the pharmaceutical properties. The dispensation of one-dose package medication is used in 20% of elderly outpatients. Because population aging is expected to continue in Japan, it is important to investigate the actual operational status of one-dose package dispensing and to consider how pharmacists can transition in terms of

interpersonal tasks in the future.

In Europe, automated dose dispensing (ADD) has been conducted based on the Council of Europe's ADD guidelines (European Directorate for the Quality of Medicines & HealthCare, 2018). ADD is outsourced dispensing, using an automated process, of one or more different medicinal products into an ADD container/ pouch for a patient to take at a particular date and time. In addition to improving the efficiency of pharmacists' work, the direct and indirect benefits of ADD through outsourced dispensing include 1) a reduction in dispensing errors through the use of ADD facilities and equipment, 2) more time to devote to patient care as a result of outsourcing, 3) reduced patient waiting times in pharmacies, 4) improved adherence to medication among elderly patients, and 5) reduced logistical costs (Department of Health and Social Care, Medicines and Medical Devices Bill, Impact Assessment, 2023; Kwint et al., 2013). Surveys conducted in Sweden have revealed that patients using ADD are generally satisfied and comfortable with this method of dispensing medication. Patients also want better information on treatment aims/goals and treatment-related changes and they want their individual preferences regarding adherence, safety issues, and how to receive and deliver medication to be addressed (Bardage and Ring, 2016). The main concerns regarding ADD through outsourced dispensing are 1) legal liability in outsourcing and contracting out, 2) accidents related to ADD that occur when entering prescription details into the pharmacy information system or when filling prescriptions (Cheung et al., 2014), and 3) ensuring market fairness (including competition policy) (Department of Health and Social Care, Hub and spoke dispensing, 2022).

We conducted a study entitled, 'Survey research on the efficiency of pharmacists' dispensing operations and associated patient-centred services in a regional inclusive society', which was funded by grants-in-aid for Scientific Research on Health, Labour and Welfare, Regulatory Science Research Projects for Drugs and Medical Devices (Irie and Takeda, 2024). In the course of the research, the 'Guidelines for Ensuring Medical Safety and Appropriate Implementation of Partial Outsourcing of Preparation Services in Dispensing Operations (Provisional Version)' (Supplement 1) was developed with reference to the ADD guidelines and published in 2023 to ensure medical safety and proper implementation of partial outsourcing of preparation work in dispensing services. In the Guidelines, 'outsourcing' means that a community pharmacy outsources the operations involved in packaging multiple prescription drugs into a single package (one-dose packaging operations) to an outside community pharmacy. Here, a pharmacy that outsources the one-dose packaging operations to an external pharmacy is referred to as an 'outsourcing pharmacy' and the external pharmacy that completes the one-dose package operations for the outsourcing pharmacy is referred to as a 'contracted

pharmacy'.

Pharmacists are burdened daily with pharmacy operations to meet evolving social and medical needs. On the basis of an understanding of these issues, the work efficiency that is required in this profession should be considered; however, few studies have reported on the above issues. Therefore, the purpose of this study was to identify areas in which pharmacists believe that efficiency should be improved with regard to dispensing-related tasks and to understand the needs of this medical field.

2. Methods

2.1. Participants and study period

The participants in this study were pharmacists who stated that they understood the purpose of the study, agreed to participate, and responded to the survey voluntarily. In Japan, community pharmacy pharmacists and drugstore pharmacists are sometimes re-employed alternately. Drugstores refer to pharmacies that mainly deal with over-the-counter drugs but where prescription medicines are also dispensed. Hospital pharmacists were included in this study because the survey questions were related to the common work efficiency of pharmacists. The number of samples was calculated with a tolerance error of 5%, confidence interval of 95%, population rate of 0.5; thus, $n = (1.96/E)^2 p(1-p) = 384$. However, taking into account the number of people that could be handled by the research company in this study, as well as financial considerations, we set a target of more than 400 participants to capture as many opinions as possible. The survey period was from 3 to 9 February 2024. Intage, Inc., located in Japan, was commissioned to conduct a web-based survey, we used a survey panel owned by Intage, Inc. The purpose of the survey was stated on the first screen of the survey, and only those who stated that they understood and agreed with the purpose of the study were able to proceed with the questionnaire. In 2022, Intage Inc. registered 2,252 pharmacists using their licence numbers. An undisclosed number of points were awarded for completing the survey; these points could be exchanged for merchandise. Initially, 400 pharmacists from each workplace were targeted (total of 1,200 pharmacists), but we eventually decided that 594 was the limit and discontinued the survey after that number of respondents was reached. However, because the survey was conducted by a web-based company, the total number of patients contacted to participate in the study and the response rate were unknown. Table 1 shows a summary of the respondents' demographic characteristics. A wide range of pharmacists living in 46 prefectures of Japan from Hokkaido to Okinawa responded to the survey. The fact that more than 75% of the respondents had more than 10 years of experience as a pharmacist was an unavoidable result because of the reliance on the survey Intage Inc.'s panel.

Table 1. Respondent demographics (n=549).

Questionnaire	Category	Workplace size	Number of respondents (%)
Q1 Place of employment	Community pharmacy n=301 (54.8%)	1 facility	46 (8.4%)
		2–5 facilities	88 (16.0%)
		6–19 facilities	65 (11.8%)
		20–299 facilities	67 (12.2%)
		More than 300 facilities	35 (6.4%)
	Drugstore n=36 (6.6%)	1 facility	2 (0.4%)
		2–5 facilities	3 (0.5%)
		6–19 facilities	3 (0.5%)
		20–299 facilities	9 (1.6%)
	Hospital n=212 (38.6%)	More than 300 facilities	19 (3.5%)
Q2 Employment status	Manager		13 (2.4%)
	Pharmacist in management		102 (18.6%)
	Full-time working pharmacist		290 (52.8%)
	Part-time working pharmacist		128 (23.3%)
	Temporary working pharmacist		6 (1.1%)
	Other		10 (1.8%)
Q3 Professional career	Less than 0–3 years		25 (4.6%)
	Less than 3–5 years		29 (5.3%)
	Less than 5–10 years		72 (13.1%)
	More than 10 years		423 (77.0%)
*Regional data (prefecture)	Hokkaido 19, Aomori 8, Iwate 10, Miyagi 11, Akita 3, Yamagata 5, Fukushima 9, Ibaraki 16, Tochigi 8, Saitama 33, Chiba 31, Tokyo 68, Kanagawa 52, Niigata 16, Toyama 6, Ishikawa 10, Fukui 1, Yamagata 6, Nagano 6, Gifu 8, Shizuoka 12, Aichi 45, Mie 7, Shiga 9, Kyoto 20, Osaka 52, Hyogo 33, Nara 10, Wakayama 5, Shimane 1, Okayama 11, Hiroshima 23, Yamaguchi 8, Tokushima 4, Kagawa 5, Ehime 5, Kochi 4, Fukuoka 39, Saga 6, Nagasaki 7, Kumamoto 10, Ooita 5, Miyazaki 8, Kagoshima 8, Okinawa 7		

*Facilities: number of chain stores

2.2. Questionnaire items

A total of 21 questions were used to query the attributes of respondents and their opinions about the work of pharmacists. These items were prepared with reference to the ‘Survey and Research on the Appropriate Work of Pharmacies and Pharmacists/Grant-in-Aid for Scientific Research Project of the Ministry of Health, Labour and Welfare’ (Masuyama, 2016), with input from the co-author, Mr. Hashiba, Director of the Japanese Pharmacists Association. Currently, the supply of medicines in Japan is delayed owing to problems with the production of generic medicines, making ordering and stock management of medicines temporarily difficult. Our research was funded by the Health and Labor Sciences Research Grant (Research Project No. 22KC1002). Therefore, the survey of one package dispensing was necessary, from question 9 onward, survey questions were focused on one-package dispensing in the context of operations other than those mentioned above and under various social backgrounds (Supplement 2). And the questionnaire was set to a volume of questionnaire that could be answered within 15 minutes. In this survey, respondents were asked to answer questions about their work from the pharmacist’s perspective.

2.3. Statistical analysis

Descriptive statistics and chi-square tests were used in the analysis, together with IBM SPSS Statistics 25.0 (IBM Corp., Armonk, NY, USA). The significance level was set to $p < 0.05$, and expected frequencies < 5 were considered invalid. The chi-square test was used to analysis three workplace groups (pharmacy, drugstore, and hospital) and work history was compared in four groups. Fisher’s exact test was again performed for an expected frequency < 5 (Excel statistics; ESUMI Co., Tokyo, Japan).

2.4. Ethical considerations

This study was conducted in compliance with the Ethical Guidelines for Life Sciences and Medical Research Involving Human Subjects. The survey was reviewed and approved by the Ethical Review Committee of the Faculty of Pharmacy, Hokkaido University of Science (No. 23-09). Personal information and questionnaire content were collected in accordance with the guidelines of the abovementioned committee. To protect personal information, this study was anonymous, and the data processed from the web survey did not contain any personal information; therefore, individuals could not be identified. Additionally, a code was established for the data file such that only study personnel could access the data via a specific personal computer. The respondents

were informed in advance that this was a voluntary anonymous questionnaire and that they would not be at any disadvantage if they did not participate.

3. Results

3.1. Pharmacists' perception of pharmacist services

Regarding the need to improve the efficiency of dispensing-related tasks and shift toward interpersonal tasks, 499 (90.9%) respondents agreed. Table 2 shows the results of multiple responses regarding tasks that can or should be made more efficient, with 367 (66.8%) respondents selecting pharmaceutical inventory management, 351 (63.9%) selecting ordering medical supplies, 254 (46.3%) selecting dispensing of one-dose packages, and 233 (42.4%) selecting counting dispensing (dispensing by counting the number of medicines) (Table 2).

Table 3 shows responses regarding equipment installed at respondents' own pharmacy, and Table 4 lists responses regarding equipment that respondents would like installed because they did not have this equipment in their own pharmacy. Furthermore, Tables 3 and Table 4 also show the relationship with Table 2. A compliance package inspection machine (double-sided image type) was the most common type of equipment that respondents wanted installed in their pharmacy (178 respondents, 32.4%). Our guidelines also

recommend pharmacies that have installed “double-side image type” as “contracted pharmacy” because of the accuracy of “compliance (one-dose) package inspection machine (double-sided image type)”.

3.2. Perceptions of mechanisms and provisional guidelines regarding single packages and partial outsourcing of single-package preparation

In total, 477 (86.9%) of pharmacists believed that dispensing one-dose packages produced a workload burden. As for the provisional guidelines, 62 respondents (11.3%) knew about them, 182 (33.2%) had heard about them, and 305 (55.6%) did not know about the guidelines. Furthermore, among 62 respondents who were aware of the provisional guidelines, only 32 (51.6%) had read them. In total, 235 (42.8%) respondents said they would like to outsource the preparation of one-dose packages as an outsourcing pharmacy. We addressed the reasons for not wanting/wanting to outsource the preparation of one-dose packages (Table 5). Of 314 respondents who did not want to outsource, the most common reason was that they did not see the benefits of outsourcing (116, 36.9%). Among 167 (71.1%) of the 235 respondents who said they wanted to outsource, the main reason was because of the time needed to dispense one-dose packages.

Table 2. Operations for which pharmacists believe that operational efficiency needs to be improved in the future (n=549).

No	Operations	Multiple-choice answers		Single answer	
		n	%	n	%
1	Pharmaceutical inventory management	367	66.8	129	23.5
2	Ordering medical supplies	351	63.9	61	11.1
3	Dispensing one-dose packages	254	46.3	40	7.3
4	Counting dispensing*	233	42.4	55	10.0
5	Dispensing records, medications, drug histories	232	42.3	71	12.9
6	Prescription entry	223	40.6	48	8.7
7	Ointment dispensing	174	31.7	8	1.5
8	Receiving prescriptions	172	31.3	19	3.5
9	Dispensing of powdered medicines	166	30.2	9	1.6
10	Prescription audit	164	29.9	20	3.6
11	Dispensing of liquid medicines	149	27.1	1	0.2
12	Error countermeasures/response	110	20.0	7	1.3
13	Dispensing of injections (including mixing)	92	16.8	8	1.5
14	Final audit	85	15.5	11	2.0
15	※Patient follow-up	74	13.5	8	1.5
16	※Interprofessional health care team activities	74	13.5	6	1.1
17	※Human resource development	71	12.9	5	0.9
18	※Medication instructions	66	12.0	9	1.6
19	※Pharmacists' business improvement meetings	65	11.8	11	2.0
20	There are no operations that can be made more efficient	21	3.8	21	3.8
21	Other	4	0.7	2	0.4

※Interpersonal task.

* Counting dispensing is a process in which the number of medicines prescribed on a prescription is counted and the medicines are prepared accordingly. This also includes counting the number of bottles and jars and counting the number of capsules and tablets.

Table 3. Equipment installed in pharmacies (n=549).

Equipment	n	%	Operation number in Table 2**
Medication order management system	220	40.1	1, 2
Automatic prescription import system · 2D barcode scanner	206	37.5	6
Powder medication inspection system with integrated electronic balance	154	28.1	9, 12, 14
Automatic ointment mixer	146	26.6	7
Automatic tablet and powder packager (tablet + powder type)	137	25.0	3, 4, 9
Automatic tablet and powder packager: tablet (cassette) + powder type	126	23.0	3, 4, 9
Dispensing inspection support equipment (GS1 code scan type)	92	16.8	4, 12, 14
Deblistering machine	82	14.9	3
Not applicable	79	14.4	
Automatic powder packager (automatic weighing cassette type)	62	11.3	9, 12
Dispensing inspection support equipment (handy terminal type)	62	11.3	4, 12, 14
Automatic blister sheet dispensing machine	44	8.0	4, 12
Dispensing inspection support equipment (image verification type)	39	7.1	4, 12, 14
Compliance (one-dose) package inspection machine (double-sided image type)*	39	7.1	3, 12, 14
Automatic medication box loading/unloading equipment	30	5.5	1, 4, 12
Automatic tablet and powder packager: tablet (cassette)+powder (automatic weighing cassette) type	24	4.4	3, 9, 12
Automatic liquid medication dispensing machine	24	4.4	11, 12
Compliance (one-dose) package inspection machine (single-sided image type)*	24	4.4	3, 12, 14
Other	2	0.004	

Note: Multiple responses allowed.

* There are two types of compliance (one-dose) packaging inspection machines, with different degrees of accuracy. The double-sided image type is more accurate, but also more expensive.

** Related to the operation numbers listed in Table 2.

Table 4. Equipment that you want or need to buy (n=549).

Equipment	n	%	Operation numbers in Table 2**
Compliance (one-dose) package inspection machine (double-sided image type) *	178	32.4	3, 12, 14
Medication order management system	111	20.2	1, 2
Automatic ointment mixer	107	19.5	7
Dispensing inspection support equipment (image verification type)	98	17.9	3, 4, 12, 14
Automatic blister sheet dispensing machine	85	15.5	4, 12
Automatic prescription import system · 2D barcode scanner	79	14.4	6
Automatic tablet and powder packager: tablet (cassette) + powder type	69	12.6	3, 9
Dispensing inspection support equipment (handy terminal type)	60	10.9	4, 12, 14
Automatic liquid medication dispensing machine	59	10.7	11, 12
Automatic powder packager (automatic weighing cassette type)	58	10.6	9, 11, 12
Powder medication inspection system with integrated electronic balance	57	10.4	9, 12, 14
Dispensing inspection support equipment (GS1 code scan type)	56	10.2	4, 12, 14
Compliance (one-dose) package inspection machine (single-sided image type) *	52	9.5	3, 12, 14
Deblistering machine	48	8.7	3
Automatic medication box loading/unloading equipment	47	8.6	1, 4, 12
Automatic tablet and powder packager: tablet (cassette)+powder (automatic weighing cassette) type	36	6.6	3, 9, 12
Automatic tablet and powder packager (tablet + powder type)	32	5.8	3, 9
Other	23	4.2	

Note: Multiple responses allowed.

* There are two types of compliance (one-dose) packaging inspection machines, with different degrees of accuracy. The double-sided image type is more accurate, but also more expensive.

** Related to the operation numbers listed in Table 2.

Regarding whether pharmacists would like to serve as a contracted pharmacy to undertake one-dose packaging operations, 165 respondents (30.1%) answered yes. The

reasons why pharmacists did or did not want to be a contracted pharmacy are given in Table 6.

Table 5. Reasons for wanting or not wanting outsourcing of the preparation of one-dose packages as an ‘outsourcing pharmacy’ (n=549).

Reasons for not wanting this, n=314	n	%	Reasons for wanting this, n=235	n	%
I don't see the benefit of outsourcing	116	36.9	Dispensing of one-dose packages takes a lot of time	167	71.1
The current situation is sufficient	108	34.4	Want to make time for interpersonal tasks	85	36.2
More work is needed to set up an outsourcing system	102	32.5	It's difficult to dispense one-dose packages in terms of staffing	58	24.7
Does not improve the efficiency of dispensing-related operations	94	29.9	I think safety will be guaranteed more than it is now	52	22.1
Difficult to deal with guidelines	27	8.6	I think it would benefit patients	34	14.5
Other	25	8.0	Want to make time for other work (apart from interpersonal tasks)	33	14.0
I don't think patients want it	19	6.1	Other	0	0.0
I've considered whether it improves operational efficiency more than dispensing a one-dose package myself	18	5.7			

Note: Multiple responses allowed.

Table 6. Reasons for wanting or not wanting to be entrusted with the preparation of one-dose packages in dispensing operations as ‘contracted pharmacy’ (n=549).

Reasons for not wanting this, n=384	n	%	Reasons for wanting this, n= 235	n	%
I don't see the benefit of outsourcing	193	50.3	It would be beneficial for patients.	55	33.3
Unable to cope in terms of manpower	175	45.6	Safety is more guaranteed	41	24.8
More work is needed to set up a contracting system	119	31.0	Providing medicines to patients requires a community-wide pharmacy approach.	39	23.6
No margin for equipment availability	71	18.5	With regard to human resources, there is scope for outsourcing	38	23.0
I consider it difficult to deal with guidelines	32	8.3	Currently, the use rate of single-packet dispensing equipment is low	22	13.3
Other	14	3.6	Other	18	10.9

Note: Multiple responses allowed.

We asked respondents to assume that they did not have to consider any financial aspects regarding buying the latest equipment or outsourcing equipment. A total of 415 (75.6%) pharmacists said that if this were the case, they preferred to install new equipment in their own pharmacy; 110 (20.0%) preferred to outsource.

3.3. Streamlining dispensing-related tasks and opinions regarding the guidelines

We queried what respondents would like to do if they could streamline dispensing-related tasks. In total, 224 (40.8%) respondents said that they wanted to improve their medication guidance and follow-up with patients, the most common response. Regarding opinions on the provisional guidelines and what content should be added to these, most respondents did not provide an opinion or additional information, perhaps because they had not read the provisional guidelines carefully. However, we received

various comments from respondents regarding outsourcing, including ‘It is possible for large chain pharmacies, but individual pharmacies cannot handle it’, ‘I want to know the cost’, ‘It will be complicated for outsourcing and contracting’, ‘I want it to go ahead’, ‘It still needs discussion’, and ‘It is necessary to ensure traceability, including safety’ (Supplement 3).

3.4. Differences by demographics

We compared three workplace groups (pharmacy, drugstore and hospital) and four work experience groups. We found significant differences among workplaces and for two-item responses (I want to or I don't want to) regarding whether pharmacists wanted to outsource the preparation of one-dose packages ($p < 0.05$, chi-square test). Significant differences were also found according to workplace and knowing about the provisional guidelines (I know about it, I have heard about them, I don't know about them) ($p < 0.01$,

chi-square and Fisher's exact tests). There were no significant differences with respect to work experience (data not shown).

All of the above data are provided together in Supplement 3.

4. Discussion

In recent years, there has been discussion regarding greater efficiency in pharmacy dispensing-related tasks and how pharmacists can transition toward interpersonal tasks. Pharmacist services are moving in the direction of placing more emphasis on in-person work, such as DX, partial outsourcing of packaging, and automated dispensing (Ministry of Health, Labour and Welfare, 2022-23, 2022). It is important to note that improvements in efficiency cannot be achieved simply by installing equipment. It is essential to reform the entire pharmaceutical distribution process. A recent proposal identifies various issues in Japanese pharmaceutical distribution from the perspective of improving efficiency and the sophistication of logistics and distribution, ensuring quality and sustainability of distribution, and makes recommendations regarding the government's role in resolving these issues (Japan Institute of Logistics System, 2024).

Although the survey was conducted among a small number of pharmacists in Japan (n=549), 90% of respondents said that they felt the need to be efficient in dispensing-related tasks and believed that they should shift more to interpersonal tasks in the future. Many respondents expressed a desire to improve the efficiency of tasks related to ordering medicines, which currently involves a heavy workload, followed by the efficiency of work related to one-dose packages. Regarding tasks that pharmacists would like to focus on if the efficiency of dispensing-related tasks were improved, patient follow-up and other interpersonal tasks was most cited, as well as investigating new drugs and diseases. Thus, our survey respondents acknowledged the need to improve the efficiency of dispensing-related tasks and enhance interpersonal tasks, in line with the opinions of other pharmacists in the field.

Many devices such as prescription-reading machines, medicine pouch machines, preparation support machines, inspection machines, electronic drug history and drug ordering systems are used for dispensing-related tasks within pharmacist services (Japan Pharmaceutical Equipment & Machinery Association). However, the performance of these devices declines with time, and there is a large expense when a device is added. Considering this context and the work burden on pharmacies that do not have the latest equipment, outsourcing the preparation of one-dose packages is not far removed from the needs of pharmacists, according to our survey. Furthermore, the survey showed that many pharmacists did not have compliance package inspection machines (double-sided image type) or machines for dispensing one-dose packages in their own pharmacies but

they would like to have these installed (Table 4). The results also showed that it would be helpful if pharmacies that have the necessary equipment were willing to handle some of the one-dose package dispensing. However, 75.6% of pharmacists said that they would install the latest equipment in their own pharmacy if price were not a consideration. Moreover, many pharmacists said that they were willing to handle the entire work process in their own pharmacy, indicating a high willingness to dispense medicines in their own pharmacies. This is consistent with the result that pharmacists in community pharmacies were less willing to outsource than pharmacists in other workplaces (Table 7). Therefore, it is important to share and clarify detailed work procedures at the time of outsourcing, including ensuring the traceability of outsourced one-dose packages (as stated in the provisional guidelines we have created).

Pharmacists' awareness of the provisional version of the guidelines on dispensing single packages was low, although the number of drugstore or community pharmacists who had heard of the guidelines tended to be higher than the number of hospital pharmacists (Table 7). Even among pharmacists who knew about the guidelines, only about half had read them (32 respondents). What's more, considering that many pharmacists did not see the benefits of outsourcing (Tables 5 and 6), further amendments to the provisional guidelines are considered necessary (Irie and Takeda, 2024). Detailed descriptions are not included in the provisional version of the guidelines but rather in the report submitted together with the provisional guidelines to the Ministry of Health, Labour and Welfare. It is therefore necessary to ensure that pharmacists are familiar with and understand these guidelines, as well as the report.

This survey was conducted to determine areas in which pharmacists believe efficiency should be improved in dispensing-related tasks and to understand the needs in health care settings (Irie and Takeda, 2024). The results of the questionnaire also revealed pharmacists' desire to improve the efficiency of objective work in other areas, such as pharmaceutical inventory management, ordering medical supplies, and counting dispensing. This is considered necessary to improve the workload and efficiency of ordering medicines owing to the recent medicine shortage; thus, there is a need to consider these areas in the future (Irie and Takeda, 2024). As mentioned, the needs of pharmacists naturally include dispensing-related tasks, and thus these tasks should not be neglected. Furthermore, our findings revealed advantages and disadvantages that were similar to the ADD guidelines in place in Europe (European Directorate for the Quality of Medicines & HealthCare, 2018). However, in Japan, the relationship between pharmacies themselves is contracting and outsourcing of pharmacies, and thus the role of each pharmacy in the community must be clarified and should include ensuring a stable supply of medicines in the community.

Table 7. Differences in pharmacists' opinions according to workplace (n=549).

			Q4			Pearson's chi-square test (2-sided)	Q9			Pearson's chi-square test (2-sided)	Q10			Pearson's chi-square test (2-sided)	Q12			Pearson's chi-square test (2-sided)	Q15			Pearson's chi-square test (2-sided)						
			Disagree	Agree	Total		Disagree	Agree	Total		Know about	Heard about	Don't know about		Total	Disagree	Agree		Total	Disagree	Agree		Total					
Q1. Workplace	Community pharmacy	Count	30	271	301	0.74	41	260	301	0.90	40	112	149	301	0.00**	187	114	301	0.03*	209	92	301	0.93					
		Expected Count	27.4	273.6	301.0		39.5	261.5	301.0		34.0	99.8	167.2	301.0		172.2	128.8	301.0		210.5	90.5	301.0						
		Residual	2.6	-2.6			1.5	-1.5			6.0	12.2	-18.2			14.8	-14.8			-1.5	1.5							
		Standardized Residual	0.5	-0.2			0.2	-0.1			1.0	1.2	-1.4			1.1	-1.3			-0.1	0.2							
		Adjusted Residual	0.8	-0.8			0.4	-0.4			1.6	2.2※	-3.1			2.6※	-2.6			-0.3	0.3							
	Drugstore	Count	3	33	36		5	31	36		4	18	14	36		17	19	36		26	10	36						
		Expected Count	3.3	32.7	36.0		4.7	31.3	36.0		4.1	11.9	20.0	36.0		20.6	15.4	36.0		25.2	10.8	36.0						
		Residual	-0.3	0.3			0.3	-0.3			-0.1	6.1	-6.0			-3.6	3.6			0.8	-0.8							
		Standardized Residual	-0.2	0.0			0.1	0.0			0.0	1.8	-1.3			-0.8	0.9			0.2	-0.2							
		Adjusted Residual	-0.2	0.2			0.1	-0.1			0.0	2.2※	-2.1			-1.3	1.3			0.3	-0.3							
	Hospital	Count	17	195	212		26	186	212		18	52	142	212		110	102	212		149	63	212						
		Expected Count	19.3	192.7	212.0		27.8	184.2	212.0		23.9	70.3	117.8	212.0		121.3	90.7	212.0		148.3	63.7	212.0						
		Residual	-2.3	2.3			-1.8	1.8			-5.9	-18.3	24.2			-11.3	11.3			0.7	-0.7							
		Standardized Residual	-0.5	0.2			-0.3	0.1			-1.2	-2.2	2.2			-1.0	1.2			0.1	-0.1							
		Adjusted Residual	-0.7	0.7			-0.5	0.5			-1.6	-3.4	4.3			-2.0	2.0※			0.1	-0.1							
	Total		Count	50	499		549	72	477		549	62	182	305		549	314	235		549	384	165		549				
			Expected Count	50.0	499.0		549.0	72.0	477.0		549.0	62.0	182.0	305.0		549.0	314.0	235.0		549.0	384.0	165.0		549.0				
	Expected value			/			3.28	/			4.72	/				4.07	/			15.4	/			10.8				
	Cramer's coefficient						0.03				0.02					0.14				0.11				0.02				
	Fisher's exact test						0.72				0.86					0.00				0.03				0.94				

* p<0.05

** p<0.01

※ 1.96<adjusted residual<2.58

Q4 Do you think pharmacists need to become more efficient in dispensing-related tasks and shift more to interpersonal work in the future?

Q9 Does the dispensing of one-dose packages involve a workload for pharmacists?

Q10 Do you know about the guidelines (provisional version) for outsourcing the preparation of one-dose packages?

Q12 If the law is amended, would you like to outsource the preparation of one-dose packages?

Q15 If the law is amended to allow contracting the preparation of one-dose packages, would you be willing to contract the preparation work for one-dose packages as an 'outsourcing pharmacy'?

As far as study limitations, the survey was conducted among a limited group of pharmacists registered with a research company and therefore cannot reflect the opinions of Japanese pharmacists as a whole. Furthermore, a small number of respondents may not have been sufficiently motivated because they were selected by a web-based survey company. In particular, according to questions 20 and 21, only a limited number of respondents share the same perceptions, which may be a limitation in understanding the narrative on this issue. Ongoing surveys with different populations are necessary because such surveys may change over time and with the development of automated devices.

5. Conclusion

The social needs of pharmacists are changing with the times, and there will be progress in the development of equipment that can accurately support the tasks of pharmacists. This survey research has identified dispensing-related tasks that need to be improved in terms of efficiency to meet the social needs of pharmacists.

Acknowledgement

We would like to thank Mr. Masashi Yuyama of YUYAMA MANUFACTURING CO., LTD. for providing information on the performance of dispensing equipment. We would like to thank Analisa Avila, MPH, ELS, of Edanz (<https://jp.edanz.com/ac>) for editing a draft of this manuscript.

Conflicts of interest

There are no conflicts of interest to disclose in relation to this paper.

Funding

This research was funded by Ministry of Health, Labour and Welfare, Grant Number 22KC1002.

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Supplement 1

Guidelines for Ensuring Medical Safety and Appropriate Implementation of Partial Outsourcing of Preparation Services in Dispensing Operations (Provisional Version)

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Supplement 2

(Questionnaire for pharmacists, English version)

Q1. Place of employment

- Community pharmacy ① 1 facility ② 2–5 facilities ③ 6–19 facilities ④ 20–299 facilities ⑤ More than 300 facilities
- Drugstore ① 1 facility ② 2–5 facilities ③ 6–19 facilities ④ 20–299 facilities ⑤ More than 300 facilities
- Hospital

Q2. Employment status

- ① Manager ② Pharmacist in management ③ Full-time working pharmacist
- ④ Part-time working pharmacist ⑤ Temporary working pharmacist ⑥ Other

Q3. Professional career

- ① Less than 0–3 years ② Less than 3–5 years ③ Less than 5–10 years ④ More than 10 years

Q4. Do you think pharmacists need to become more efficient in dispensing-related tasks and shift more to interpersonal work in the future?

- ① Strongly disagree ② Disagree ③ Agree ④ Strongly agree

Q5. Q6. Operations for which you believe that operational efficiency needs to be improved in the future Q5: (multiple responses allowed; Q6: single response)

- ① Pharmaceutical stock management ② Ordering medical supplies ③ Dispensing one-dose packages
- ④ Counting dispensing ⑤ Dispensing records, medications, drug histories ⑥ Prescription entry
- ⑦ Ointment dispensing ⑧ Receiving prescriptions ⑨ Dispensing of powdered medicines ⑩ Prescription audit
- ⑪ Dispensing of liquid medicines ⑫ Error countermeasures/response ⑬ Dispensing of injections (including mixing)
- ⑭ Final audit ⑮ Patient follow-up ⑯ Interprofessional health care team activities ⑰ Human resource development
- ⑱ Medication compliance instructions ⑲ Pharmacists' business improvement meetings
- ⑳ There are no operations that can be made more efficient ㉑ Other

Q7. Equipment installed in pharmacies (multiple responses allowed)

- ① Medication order management system ② Automatic prescription import system • 2D barcode scanner
- ③ Powder medication inspection system with integrated electronic balance
- ④ Automatic ointment mixer ⑤ Automatic tablet and powder packager (tablet + powder type)
- ⑥ Automatic tablet and powder packager: tablet (cassette) + powder type
- ⑦ Inspection support equipment (GS1 code scan type) ⑧ Deblistering machine ⑨ Not applicable
- ⑩ Automatic powder packager (automatic weighing cassette type)
- ⑪ Inspection support equipment (handy terminal type) ⑫ Automatic blister sheet dispensing machine
- ⑬ Inspection support equipment (image verification type)
- ⑭ Compliance package inspection machine (double-sided image type)
- ⑮ Automatic medication box loading/unloading equipment
- ⑯ Automatic tablet and powder packager: tablet (cassette)+powder (automatic weighing cassette) type
- ⑰ Automatic liquid medication dispensing machine
- ⑱ Compliance package inspection machine (single-sided image type) ⑲ Other

Q8. Equipment that you want or need to buy (multiple responses allowed)

- ① Compliance package inspection machine (double-sided image type)
- ② Medication order management system
- ③ Automatic ointment mixer
- ④ Inspection support equipment (image verification type)
- ⑤ Automatic blister sheet dispensing machine
- ⑥ Automatic prescription import system 2D barcode scanner
- ⑦ Automatic tablet and powder packager: tablet (cassette) + powder type
- ⑧ Inspection support equipment (handy terminal type)
- ⑨ Automatic liquid medication dispensing machine
- ⑩ Automatic powder packager (automatic weighing cassette type)
- ⑪ Powder medication inspection system with integrated electronic balance
- ⑫ Inspection support equipment (GS1 code scan type)
- ⑬ Compliance package inspection machine (single-sided image type)
- ⑭ Deblistering machine
- ⑮ Automatic medication box loading/unloading equipment
- ⑯ Automatic tablet and powder packager: tablet (cassette)+powder (automatic weighing cassette) type
- ⑰ Automatic tablet and powder packager (tablet + powder type)
- ⑱ Other

Q9. Does the dispensing of one-dose packages involve a workload for pharmacists?

- (ア) Strongly disagree ② Disagree ③ Agree ④ Strongly agree

Q10. Do you know about the guidelines (provisional version) for outsourcing the preparation of one-dose packages?

- ① I know about it ② I have heard of it ③ I don't know about it

Q11. Have you read the (provisional) guidelines?

- ① I have read them ② I have read a little ③ I have not read much ④ I have not read them

Q12. If the law is amended, would you like to outsource the preparation of one-dose packages?

- (ア) Strongly disagree ② Disagree ③ Agree ④ Strongly agree

Q13. Reasons for not wanting to outsource the preparation of one-dose packages in dispensing operations as an 'outsourcing pharmacy'

- ① I don't see the benefit of outsourcing ② The current situation is sufficient
- ③ More work is needed to set up an outsourcing system
- ④ Does not improve the efficiency of dispensing-related operations
- ⑤ Difficult to deal with guidelines ⑥ I don't think patients want it
- ⑦ I've considered whether it improves operational efficiency more than dispensing a one-dose package myself
- ⑧ Other

Q14. Reasons for wanting partial outsourcing of the preparation of one-dose packages as an 'outsourcing pharmacy'

- ① Dispensing of one-dose packages takes a lot of time
- ② I want to make time for interpersonal tasks
- ③ It is difficult to dispense one-dose packages in terms of staffing
- ④ I think safety will be guaranteed more than it is now
- ⑤ I think it would benefit patients
- ⑥ I want to make time for other work (apart from interpersonal tasks)
- ⑦ Other

Q15. If the law is amended to allow contracting some dispensing of one-dose packages, would you be willing to contract some of the dispensing work for one-dose packages as an 'contracted pharmacy'?

- (ア) Strongly disagree
- ② Disagree
- ③ Agree
- ④ Strongly agree

Q16. Reasons for not wanting to be entrusted with dispensing of one-dose packages in dispensing operations as an 'outsourcing pharmacy'

- ① I don't see the benefit of outsourcing
- ② Unable to cope in terms of manpower
- ③ More work is needed to set up a contracting system
- ④ No margin for equipment availability
- ⑤ I consider it difficult to deal with guidelines
- ⑥ Other

Q17. Reasons for wanting to be entrusted with dispensing of one-dose packages in dispensing operations as an 'outsourcing pharmacy'

- ① It would be beneficial for patients
- ② Safety is more guaranteed
- ③ Providing medicines to patients requires a community-wide pharmacy approach
- ④ With regard to human resources, there is scope for outsourcing
- ⑤ Currently, the use rate of single-package dispensing equipment is low
- ⑥ Other

Q18. If you did not have to consider financial aspects, would you prefer to install the latest equipment at your own pharmacy or use outsourced equipment?

- ① I prefer to install the latest equipment at my pharmacy
- ② I prefer to outsource
- ③ Other

Q19. What would you like to do if you could streamline your operations (multiple responses allowed)?

- ① Improve medication guidance and follow-up with patients
- ② Study new drugs and diseases
- ③ Focus on my private life and non-work hobbies
- ④ Take measures against polypharmacy

Q20. Do you have any opinions about the provisional guidelines (provisional version)?

Q21. Do you have any opinions about content that should be added to the provisional guidelines (provisional version)?

(Japanese Questionnaire version)

対物業務の効率化と対人業務の充実に関する薬剤師の認識調査

Q1. あなたの勤務先の規模（会社が持っている施設数）

- 1 薬局（i 1施設 ii 2-5施設 iii 6-19施設 iv 20-299施設 v 300施設以上）
- 2 ドラッグストア（i 1施設 ii 2-5施設 iii 6-19施設 iv 20-299施設 v 300施設以上）
- 3 病院

Q2. あなたの立場

- 1 経営 2 管理薬剤師 3 常勤勤務薬剤師 4 パート勤務薬剤師 5 派遣薬剤師 6 その他

Q3. 薬局 or 病院の職務歴合計

- 1 0-3年未満 2 3-5年未満 3 5-10年未満 4 10年以上

Q4. 今後、対物業務の効率化から対人業務充実への移行は薬剤師にとって必要だと思いますか？

- 1 思わない 2 あまり思わない 3 少し思う 4 思う

Q5. Q6 今以上に業務を効率化できる or 効率化が必要な業務は何だと思いますか？

(Q5 複数回答可) (Q6 単一回答も聞いた)

- 1 処方箋受付
- 2 処方内容入力
- 3 処方内容監査
- 4 計数調剤
- 5 散剤調剤
- 6 水剤調剤
- 7 軟膏剤調剤
- 8 一包化調剤
- 9 注射剤調剤（混注含む）
- 10 最終監査
- 11 服薬指導
- 12 患者フォローアップ
- 13 調剤録・薬歴作成
- 14 医薬品発注
- 15 医薬品在庫管理
- 16 過誤対策・対応
- 17 人材育成
- 18 多職種連携
- 19 業務改善会議
- 20 その他（)
- 21 これ以上効率化できる業務はない

Q7. 対物業務を効率化するためには職場の設備が重要となりますが、あなたの職場で設置されている設備を選んでください（複数回答可）。

- 0 ない 1 ある
- 1 処方箋自動読み込み装置・2次元バーコード読み取り装置
- 2 自動薬品箱入出庫装置
- 3 自動PTPシート払い出し機
- 4 自動分割分包機（錠剤＋散剤タイプ）
- 5 自動分割分包機（錠剤（カセット付）＋散剤タイプ）
- 6 自動分割分包機（錠剤（カセット付）＋散剤（カセット自動秤量）タイプ）
- 7 自動散剤分包機（カセット自動秤量タイプ）
- 8 自動水剤分注機

- 9 PTP 除包機
- 10 自動軟膏練合機
- 11 鑑査支援装置（ハンディターミナルタイプ）
- 12 鑑査支援装置（画像識別タイプ）
- 13 鑑査支援装置（GS-1 コード読み取りタイプ）
- 14 一包化鑑査支援装置（片面画像タイプ）
- 15 一包化鑑査支援装置（両面画像タイプ）
- 16 電子天秤一体型散剤監査システム
- 17 医薬品発注システム
- 18 その他（ ）

Q8. Q7 の中で自薬局の設備は無いため、直ぐに取り入れたい or 取り入れて欲しい機器は何ですか？
（複数回答可）→上記に合わせる

- 1 処方箋自動読み込み機
- 2 自動錠剤払い出し機（バーコード読み取り等）
- 3 自動水剤調整機
- 4 自動散剤調整機
- 5 自動錠剤分包機（一包化機械）
- 6 自動鑑査機（調剤された医薬品を鑑査する）
- 7 自動一包化鑑査機（一包化された医薬品を鑑査する）
- 8 自動発注システム

Q9. 一包化調剤は薬剤師にとって業務負担となっていると思いますか？

- 1 思わない 2 あまり思わない 3 少し思う 4 思う

Q10. 一包化調剤の調製業務の一部作業を外部委託できる仕組みのガイドライン案が作成されましたが、それは知っていますか？ 1 知っている 2 知らない

Q11. Q10 で「知っている」と回答した方、ガイドライン案は読まれましたか？

- 1 読んでいない 2 あまり読んでいない 3 少し読んだ 4 読んだ

Q12. 一包化調剤の調製業務の一部作業を外部委託可能となる法改正が行われた場合、一包化調剤の調製業務の一部作業を外部に委託したいと思いますか？

- 1 思わない 2 あまり思わない 3 少し思う 4 思う

Q13. Q12 で「思わない、あまり思わない」と回答した方、それは何故ですか？（複数回答可）

- 1 現状で十分対応できているから
- 2 委託する体制を整えるために業務が増えるから
- 3 患者さんがしたいと思わないと考えられるから
- 4 委託するメリットを感じないから
- 5 委託することで対物業務の効率化がされるように思えないから
- 6 ガイドライン案の対応が困難と考えられるから
- 7 一包化調剤以外の業務効率化であればお願いするかもしれない
- 8 その他（ ）

Q14. Q12 で「思う、少し思う」と回答した方、それは何故ですか？（複数回答可）

- 1 現状、一包化調剤でかなり時間がとられているから
- 2 患者さんにメリットをもたらすと思われるから
- 3 人間的に一包化調剤が厳しい状況だったから
- 4 対人業務に時間を作りたいから
- 5 対人業務以外の業務に時間を使いたいから
- 6 安全性がより担保されるから
- 7 その他

Q15. 一包化調剤の調製業務の一部作業を外部委託可能となるできる法改正が行われた場合、一包化調剤業務の調製業務の一部作業を受託したいと思いますか？

- 1 思わない
- 2 あまり思わない
- 3 少し思う
- 4 思う

Q16. Q15で「思わない、あまり思わない」と回答した方、それは何故ですか？

- 1 人間的に現状では対応できないから
- 2 一包化調剤機器の稼働率的に現状では余裕がないから
- 3 受託する体制を整えるために業務が増えるから
- 4 受託するメリットを感じないから
- 5 ガイドライン案の対応が困難と考えられるから
- 6 その他

Q17. Q15で「思う、少し思う」と回答した方、それは何故ですか？

- 1 現状、一包化調剤機器の稼働率が低いから
- 2 患者さんにメリットをもたらすと思われるから
- 3 人間的に一包化調剤の調製業務の一部作業を受託する余裕があるから
- 4 地域全体の薬局で患者に医薬品を提供する姿勢が必要だと思うから
- 5 安全性がより担保されるから
- 6 その他

Q18. 価格面を考慮しない場合において、一包化調剤に関して「調製業務の一部作業を外部委託する場合」と「自薬局に最新の調剤機器を導入する場合」のどちらが今後の薬局のあり方として、より良いと思いますか。

- 1 調製業務の一部作業の外部委託
- 2 自薬局に最新の調剤機器を導入
- 3 その他 ()

Q19. 業務を効率化した後、あなたは何をしたいですか？（複数回答可）

- 1 新薬や疾病に関する勉強
- 2 AIや科学技術に関する勉強
- 3 臨床研究
- 4 患者への服薬指導やフォローアップの充実
- 5 在宅業務
- 6 夜間・休日対応
- 7 退院時カンファレンス、地域ケア会議等への参加
- 8 オンライン服薬指導
- 9 症例検討（会）
- 10 ポリファーマシー対策
- 11 地域活動
- 12 地域DI活動
- 13 薬局内での健康増進イベント
- 14 薬局外での健康増進イベント
- 15 要指導・一般用医薬品の提供・相談応需
- 16 健康食品・サプリメント等の提供・相談応需
- 17 薬剤師会等の団体活動
- 18 プライベート・仕事以外の趣味等の充実
- 19 その他 ()
- 20 特に何もしない

Q20. ガイドライン案を「少し見た、見た」を選択した方、「一包化調剤の一部外部委託のガイドライン(暫定版)」に対する感想があれば教えてください。

Q21. ガイドライン案を「少し見た、見た」を選択した方、「一包化調剤の一部外部委託のガイドライン(暫定版)」に追加すべき項目、削除すべき項目があれば教えてください。

Supplementary 3

Supplementary 3 consists of the “raw data”, the results of questionnaire survey and the statistical analysis of the responses. If you would like to receive Supplementary 3, please contact the author by email (takeda-ka@hus.ac.jp or tkiyoshi@hus.ac.jp). The data is only available in Japanese, but we will send it to you as an attachment by email.