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Factors Contributing to Pharmacies With Good Disaster Preparedness and the Activities of Their Prefectural Pharmaceutical Association: Pharmacies' resilience and associations

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Abstract

Objective: Pharmacies have a particularly important responsibility to supply medicine to disaster victims in order to save lives. This study investigated the characteristics of pharmacies that are well prepared for disasters as well as the efforts of the prefectural pharmaceutical association (PPA) to which the pharmacies belong.

Methods: Questionnaires on matters related to disaster preparedness were mailed to 50 randomly selected pharmacies in each of Japan's 47 prefectures as well as all 47 PPAs in Japan. Logistic regression analysis was performed to examine the association of pharmacy background and the activities of the PPA to which they belong with pharmacy disaster preparedness as well as the association with pharmacies' awareness of disaster preparedness.

Results: Pharmacies in prefectures that conducted disaster preparedness training at least three times a year were better prepared for disasters. In addition, pharmacies with high online utilization and high disaster-preparedness awareness were significantly more prepared for disasters.

Conclusions: Pharmacies that can promptly provide medicine to disaster victims are considered to be well-prepared for disasters. The results suggest that pharmacy preparedness is also influenced by the disaster preparedness activities of their prefectures.

Pharmacies and their communities

Pharmacies are intricately connected to their communities and play a significant role in daily life by dispensing prescription drugs and selling over-the-counter medicine. In Japan, there is increasing recognition of the importance of having a family pharmacy/pharmacist along with a family doctor.

Experiences of large-scale disasters and emerging infectious diseases have reaffirmed the importance of healthcare professionals in times of disaster, and pharmacists are attracting attention as a member of this group. In Japan, pharmacists are basically not allowed to dispense medicines without a prescription from a doctor, except when engaged in disaster relief activities, and this exception has been applied in past disasters. In addition, vaccinations are administered by doctors and nurses, but when the new coronavirus infection spread, pharmacists, who had not previously been recognized as candidates to administer vaccines, appeared on the scene as a measure to secure labor. Although direct vaccination by pharmacists was eventually abandoned, pharmacists played a variety of roles related to vaccination. Their main roles included preparing for, and assisting in the implementation of vaccinations, storing, and managing vaccines, as well as monitoring and providing information on the health status of vaccine recipients.

In Japan, after becoming a pharmacist, many efforts are made to respond to various situations, and improve professional skills by continuing education, research in specialized areas, cooperation with medical teams, and participation in pharmacist associations and societies. Furthermore, pharmacies where approximately 60% of pharmacists in Japan work, have a particularly important responsibility to supply necessary medications to disaster victims to save lives in the event of a disaster in the community. In addition, pharmacies must be able to respond to patients in a flexible manner (e.g., by incorporating telemedicine) in response to unexpected changes in social conditions such as during outbreaks of infectious disease such as COVID-19.¹ In times of disaster (including outbreaks of emerging infectious diseases), access to medicine is an important issue for victims, especially those with illnesses because it is a matter of life, and death as well as health security. Pharmacies are well prepared for disasters if they can promptly supply medicine to victims who need them in times of disaster.

In recent years, Japan has experienced many earthquakes, weather events, floods, and other disasters that have caused major damage and made it difficult for people to obtain medicine.^{2,3} The tsunami following the Great East Japan Earthquake of 2011 destroyed many pharmacies, cutting off the supply of medicine.⁴ This triggered the idea of using campers as mobile pharmacies.⁵ These “disaster-preparedness pharmaceutical supply vehicles,” which are equipped with facilities for dispensing medicine, were deployed in 2014 after the Kumamoto earthquake, demonstrating their potential as pharmaceutical logistics bases in disaster areas.⁶ Mobile pharmacies might also be used to provide regional support during outbreaks of emerging infectious diseases, especially in areas where there are drug supply problems due to increased demand for medicine as well as reduced manufacturing and logistics capacity.^{7,8} Presently, the number of prefectural pharmaceutical associations (PPAs) that own a mobile pharmacy is on the rise.

Disaster-preparedness training for pharmacies at the community level is especially important. In the event of a disaster, medical infrastructure may be damaged, and pharmacists can play a vital role in the community by sharing medical information and supplying medicine. To facilitate the smooth communication of medical information and provision of medical care, it is important to prepare for disasters in cooperation with local pharmacies and pharmacy associations.

This study focuses on pharmacies, which are thought to play a key role in providing necessary medications to disaster victims and examines the characteristics of pharmacies that are well prepared for disasters in terms of being able to provide medicine to patients so that they can continue taking their prescribed medications in the event of a disaster. In addition, we investigated the activities of the PPAs to which the pharmacies belong.

Methods

Two surveys were conducted from November 2021 to January 2022. In the first survey, a self-administered questionnaire on matters related to disaster preparedness was mailed to 50 randomly selected pharmacies in each of Japan's 47 prefectures. The survey included the following items: respondent and pharmacy attributes, whether or not furniture is securely fixed, and whether or not water is stockpiled; as well as whether or not there are rules of conduct for pharmacists in the event of a disaster, the utilization of online systems, the status of discussions with neighboring or nearby medical institutions regarding cooperation in the event of a disaster; consideration of a reserve of leftover medications in case of a disaster, the status of cooperation with neighboring or group pharmacies, whether or not support for disaster-affected areas is provided, and disaster preparedness.

In the second survey, a self-administered questionnaire on matters related to disaster preparedness was mailed to all 47 PPAs in Japan. The survey asked whether disaster-preparedness training was conducted and, if so, the number of disaster-preparedness training sessions, as well as whether the PPA owned a mobile pharmacy.

Logistic regression analysis was performed to examine the association of the pharmacies' preparedness for disasters as an objective variable with the following explanatory variables: the items on pharmacy background included status of online utilization, status of cooperation with neighboring or group pharmacies, status of discussions with neighboring or nearby medical institutions regarding cooperation in the event of a

disaster, and consideration of a reserve of leftover medications in case of a disaster, as well as the existence of support for disaster-affected areas, and awareness of natural disasters, while the items on the PPA included whether the pharmacies had received disaster preparedness training and whether they owned mobile pharmacies.

Pharmacies with good disaster preparedness were defined as those that satisfied the following criteria: having securely fixed furniture, stockpiled water, stockpiled disaster supplies, and rules of conduct in the event of a disaster. Pharmacies using online systems were defined as those that reported the intention of using online systems, posted their business status information online, and provided online medication counselling. Regarding disaster preparedness, the responses, “very aware” and “aware” pharmacies were defined as “high awareness,” while “cannot say either way,” “unaware,” and “not aware at all” were defined as “low awareness.” Model 1 was analyzed using only the single explanatory variable, Model 2 using the single explanatory variable plus the respondents' sex and age, and Model 3 using the single explanatory variable plus the respondents' sex, age, chain store status, and number of pharmacies per 100 km² of inhabitable land area.

In addition, logistic regression analysis was performed using the activities of the PPA to which the pharmacies belonged (whether they received disaster-preparedness training and whether they owned a mobile pharmacy) as explanatory variables and pharmacies' disaster awareness as the objective variable. Model 1 was analyzed with each single explanatory variable only, Model 2 with each single explanatory variable plus the respondents' sex and age, and Model 3 with each single explanatory variable plus the respondents' sex, age, chain store status, and number of pharmacies per 100 km² of inhabitable land area.

Ethical Code

This study was approved by the Ethics Committee for Clinical Research of the Hamamatsu University School of Medicine (Study No. 21-139). The purpose of the study was explained to each pharmacy and PPA, and responses were obtained only from those pharmacies and PPAs that provided consent.

Results

Responses were received from 931 of the 2 350 pharmacies (response rate: 39.6%) and 39 of the 47 PPAs (response rate: 83.0%). **Table 1** shows the demographics of the pharmacy survey respondents; 54.6% were male and 45.1% were female. There was equal distribution across respondents in their 30s, 40s, 50s, and 60s, with each accounting for about 20%. The position of most of the respondents was managerial pharmacist. About 30% of the respondents belonged to a chain pharmacy with 11 or more stores, and about 70% to individual pharmacies or those with 10 or fewer affiliated pharmacies.

Table 2 shows the status of pharmacy preparedness and pharmacy characteristics. The preparedness status of the pharmacies tabulated in this study is as follows: 35.2% of the pharmacies did not have securely fixed furniture such as medicine cabinets, refrigerators, and dispensing machines which could lead to serious accidents potentially resulting in injury, or death in the event of a disaster such as a large earthquake. In addition, some pharmacies stockpiled bottled water, a commodity to sell to patients that can be converted to disaster supplies. However, 31.8% of the pharmacies did not stockpile water, which is important both

Table 1. Attributes of survey respondents

	n	%
Sex		
Male	508	54.6
Female	420	45.1
No answer	3	0.3
Age, years		
20-29	31	3.3
30-39	192	20.6
40-49	213	22.9
50-59	254	27.3
60-69	188	20.2
≥70	48	5.2
No answer	5	0.5
Position in the workplace		
Supervising pharmacist	816	87.6
Pharmacist	45	4.8
Manager/owner/opener/representative, etc.	40	4.3
Clerical staff, general affairs	10	1.1
Other	17	1.8
No answer	3	0.3

for drinking and for taking medicine, and 8.2% had not stockpiled any disaster supplies. About a third of the pharmacies (34.6%) had regulations regarding the actions of pharmacists in the event of a disaster, while 45.8% did not, and 17.5% were unclear. Thus, only 18.4% of the analyzed pharmacies satisfied all the criteria for being well prepared for disasters.

Regarding the status of discussions with neighboring or nearby medical institutions regarding collaboration in the event of a disaster, most pharmacies (71.5%) reported that they did not have any such discussions. Less than 50% of the pharmacies considered creating a reserve of leftover medication in case of disasters when adjusting residual medications. Regarding the status of cooperation with neighboring or group pharmacies, most of the pharmacies were engaged in some form of cooperation, while less than 20% of pharmacies responded that they were not, or that cooperation was unnecessary. In terms of whether they had experience providing support to disaster-affected areas, only about 10% of the pharmacies reported having done so. A minority of pharmacies (44.8%) were willing to implement online drug counselling, and just over 50% answered that they would not be able to post their business status online in the event of a disaster. Many pharmacies were willing to use a simple online system that could be used during disasters to inform community pharmacies if they were open for business, whereas a few were reluctant to do so, with 25% undecided. Thus, only 21.6% of the pharmacies satisfied the following criteria: willing to use an online system, posting business status information online, and providing online drug counselling.

Regarding awareness of natural disaster preparedness, more than 50% of the pharmacies were “very aware” or “aware,” while 35% were “cannot say either way,” and about 12% were “unaware” or “completely unaware.”

As for the implementation status of disaster prevention training organized by PPAs, 56.4% of the respondents answered that they “do not conduct such training,” 30.8% answered that they “do conduct such training (including online),” and 12.8% answered that they “used to conduct such training before the COVID-19

pandemic.” Among the PPAs that conduct disaster-preparedness training, 52.9% of the respondents reported that they conduct disaster-preparedness training “once a year,” 23.5% conduct it 3 or more times a year,” and 5.9% conduct it “twice a year.” Regarding the availability of mobile pharmacies in the prefecture, 30.8% responded “Yes” while 69.2% responded “No.”

Table 3 shows the background of the pharmacies and the results of the association between the activities of the PPAs to which the pharmacies belong and pharmacies that are well prepared for disasters. In Models 1, 2, and 3, better disaster preparedness was significantly associated with high online utilization (odds ratio [95% confidence interval]: Model 1, 2.48 [1.71 - 3.58]; Model 2, 2.43 [1.67 - 3.53]; Model 3, 2.39 [1.64 - 3.48]), collaboration with neighbouring or group pharmacies (2.50 [1.47 - 4.56]; 2.50 [1.42 - 4.39]; 2.39 [1.35 - 4.21]), discussion about cooperation in case of a disaster with adjacent or nearby medical institutions (3.25 [2.29 - 4.61]); 3.46 [2.42 - 4.96]; 2.25 [1.51 - 3.35]), consideration of a reserve of leftover medications in case of a disaster (2.08 [1.48 - 2.95]; 2.10 [1.48 - 2.97]; 2.23 [1.57 - 3.17]), providing support for disaster-affected areas (1.76 [1.08 - 2.81]; 1.89 [1.16 - 3.07]; 1.91 [1.17 - 3.13]), high disaster awareness (2.32 [1.63 - 3.34]; 2.50 [1.72 - 3.63]; 2.14 [1.45 - 3.16]). In terms of prefectural activities, in Model 3, pharmacies belonging to PPAs that conducted 3 or more disaster-preparedness trainings a year were significantly better prepared for disasters (1.76 [1.001 - 3.11]). Ownership of a mobile pharmacy was not associated with better disaster preparedness.

Table 4 shows the results of the association between the initiatives of the prefecture to which the pharmacies belong, and the pharmacies’ awareness of disaster preparedness. Models 1, 2, and 3 all showed significantly higher disaster awareness among pharmacies in prefectures with at least 3 disaster-preparedness training sessions a year (1.83 [1.16 - 2.91]; 1.98 [1.24 - 3.17]; 2.24 [1.38 - 3.64]), and those with mobile pharmacies (1.46 [1.08 - 1.98]; 1.41 [1.03 - 1.92]; 1.61 [1.16 - 2.24]).

Discussion

This is the first study to examine the activities of PPAs to which pharmacies belong and to identify pharmacies that are well prepared for disasters.

The results suggest that pharmacies belonging to PPAs that conduct disaster-preparedness training sessions at least 3 times a year are better prepared for disasters compared with those that provide such training only once or twice a year, suggesting that the number of training sessions should be increased if possible. Furthermore, pharmacies belonging to PPAs that conduct 3 or more disaster-preparedness training sessions were considered to have more opportunities to participate in training, and they were also more aware of disaster preparedness. In addition, as a community-specific activity involving pharmacists, some prefectures provide disaster-preparedness training programs that enable pharmacists to learn about disaster scenarios, and response measures based on earthquake-damage assumptions, using educational materials developed by the prefecture.⁹

Ownership of a mobile pharmacy was not associated with better disaster preparedness, although pharmacies belonging to PPAs that owned mobile pharmacies had higher disaster awareness. This finding suggests that pharmacies in prefectures with mobile pharmacy ownership have more opportunities to use and see mobile pharmacies compared with those without mobile pharmacy ownership, which may increase disaster awareness.

Table 2. Pharmacy preparedness status and characteristics

	n	%
Securely fixed furniture (multiple answers accepted)		
Medicine cabinet	557	59.8
Medicine refrigerator	235	25.2
Automatic packaging machine	233	25.0
Copy machine	183	19.7
Other	36	3.9
None	328	35.2
No answer	18	1.9
Emergency water supply (multiple answers accepted)		
Water server	287	30.8
Bottled water	421	45.2
Cistern	24	2.6
Other	8	0.9
None	296	31.8
No answer	10	1.1
Disaster supplies (multiple answers accepted)		
Rubbing alcohol	778	83.6
Wet tissue	478	51.3
Portable toilets	110	11.8
Old newspapers	300	32.2
Bin bags	744	79.9
Plastic sheets	163	17.5
Emergency rations for employees	156	16.8
Plastic wrap	434	46.6
Cassette stove	116	12.5
Flashlight	454	48.8
Radio	241	25.9
Batteries	523	56.2
Batteries for recharging cell phones and other portable devices	138	14.8
Masks	745	80.0
Slippers	321	34.5
Disposable gloves	676	72.6
Paper cups	622	66.8
Ice packs	429	46.1
Coolers	317	34.0
Simple balance scales	159	17.1
Desk-top and small, simple dispensing machines	23	2.5
Other	13	1.4
None	76	8.2
No answer	11	1.2
Disaster protocol		
Available	322	34.6
Not available	426	45.8
Unknown	163	17.5
No answer	20	2.1
Discussion with neighbouring/nearby medical institutions regarding cooperation in the event of a disaster		
Discussing	42	4.5
Somewhat discussing	211	22.7
Not discussing	666	71.5
No answer	12	1.3

(Continued)

Table 2. (Continued)

	n	%
Consideration of a reserve of leftover medications in case of a disaster		
Considered	96	10.3
Considered to some extent	334	35.9
Cannot say either way	117	12.6
Barely considered	176	18.9
Not considered	203	21.8
No answer	5	0.5
Collaboration with neighbouring or group pharmacies		
Collaboration with neighbouring pharmacies	402	43.2
Collaboration with group pharmacies	455	48.9
Participating in a system set up by a pharmacist association, etc.	219	23.5
Other	4	0.4
No collaboration with other pharmacies	159	17.1
No need to collaborate	4	0.4
No collaboration but have a cooperative relationship	8	0.9
No answer	7	0.8
Experience in supporting disaster-affected areas		
Yes	103	11.1
No	811	87.1
Unknown	7	0.8
No answer	10	1.1
Plan to implement online drug counselling		
Already implemented	61	6.6
Likely to implement in the future	356	38.2
Unlikely to implement in the future	417	44.8
No plan to implement	88	9.5
No answer	9	1.0
Ability to post business status online in the event of a disaster		
Can post	395	42.4
Cannot post	469	50.4
No need for such a system	56	6.0
No answer	11	1.2
Willingness to use a simple online system that can be used during disasters to notify whether pharmacies are open or not		
Already use such a system	34	3.7
Would like to use such a system	398	42.7
Somewhat willing to use such a system	238	25.6
Cannot say either way	231	24.8
Not particularly willing to use such a system	9	1.0
Unwilling to use such a system	8	0.9
No answer	13	1.4
Disaster awareness		
Very aware	56	6.0
Aware	431	46.3
Cannot say either way	326	35.0
Unaware	104	11.2
Completely unaware	8	0.9
No answer	6	0.6

Table 3. Pharmacy background and activities associated with better disaster preparedness

	Model 1			Model 2			Model 3		
	Odds ratio	95% CI	p-value	Odds ratio	95% CI	p-value	Odds ratio	95% CI	p-value
Survey items for pharmacies									
Online utilization*									
Low	1 (reference)			1 (reference)			1 (reference)		
High	2.48	1.71-3.58	<0.001	2.43	1.67-3.53	<0.001	2.39	1.64-3.48	<0.001
<i>Plan to implement online drug counselling**</i>									
No	1 (reference)			1 (reference)			1 (reference)		
Yes	1.92	1.36-2.70	<0.001	1.84	1.30-2.60	<0.001	1.77	1.25-2.52	0.002
<i>Ability to post business status online in the event of a disaster***</i>									
No	1 (reference)			1 (reference)			1 (reference)		
Yes	1.94	1.38-2.74	<0.001	1.97	1.39-2.79	<0.001	1.93	1.36-2.75	<0.001
<i>Willingness to use a simple online system that can be used during disasters to notify whether pharmacies are open or not****</i>									
No	1 (reference)			1 (reference)			1 (reference)		
Yes	2.01	1.31-3.16	0.001	1.88	1.21-2.92	0.005	1.90	1.22-2.96	0.005
Collaboration with neighbouring or group pharmacies									
No collaboration/not required	1 (reference)			1 (reference)			1 (reference)		
Some collaboration	2.50	1.47-4.56	<0.001	2.50	1.42-4.39	0.002	2.39	1.35-4.21	0.003
Status of discussion about cooperation in case of a disaster with neighbouring/nearby medical institutions									
Not discussing	1 (reference)			1 (reference)			1 (reference)		
Discussing/somewhat discussing	3.25	2.29-4.61	<0.001	3.46	2.42-4.96	<0.001	2.25	1.51-3.35	<0.001
Consideration of a reserve of leftover medications in case of a disaster									
Not willing to consider	1 (reference)			1 (reference)			1 (reference)		
Proactively considering	2.08	1.48-2.95	<0.001	2.10	1.48-2.97	<0.001	2.23	1.57-3.17	<0.001
Support for disaster-affected areas									
No/don't know	1 (reference)			1 (reference)			1 (reference)		
Yes	1.76	1.08-2.81	0.025	1.89	1.16-3.07	0.011	1.91	1.17-3.13	0.001
Disaster awareness									
Low*****	1 (reference)			1 (reference)			1 (reference)		
High*****	2.32	1.63-3.34	<0.001	2.50	1.72-3.63	<0.001	2.14	1.45-3.16	<0.001
Survey items for prefectural pharmacy associations to which pharmacies belong									
Disaster-preparedness training									
Less than twice a year	1 (reference)			1 (reference)			1 (reference)		
Three times a year or more	1.47	0.84-2.48	0.169	1.54	0.90-2.66	0.118	1.76	1.001-3.11	0.0496
Own a mobile pharmacy									
No	1 (reference)			1 (reference)			1 (reference)		
Yes	1.23	0.83-1.82	0.300	1.26	0.85-1.88	0.252	1.38	0.90-2.13	0.138

Pharmacies with high disaster preparedness were defined as those meeting all of the following criteria: have securely fixed furniture, have a disaster protocol, have stockpiled water, and have stockpiled disaster supplies.

*Online utilization was defined as those meeting all of the following criteria: plan to implement of online drug counseling, ability to post business status online in the event of disaster, and willingness to use an online system that can be used during disasters to notify whether pharmacies are open or not.

**For "Plan to implement online drug counselling," "already implemented" and "likely to implement in the future" were defined as "Yes," while "unlikely to implement in the future" and "no plan to implement" were defined as "No."

***For "Availability to post business status online in the event of a disaster," "can post" was defined as "Yes," while "cannot post" and "no need for such a system" were defined as "No."

****For "Willingness to use a simple online system that can be used during disasters to notify whether pharmacies are open or not," "already use such a system," "would like to use such a system" and "somewhat willing to use such a system" were defined as "Yes," while "cannot say either way," "not particularly willing to use such a system," and "unwilling to use such a system" were defined as "No."

*****Low disaster awareness: "cannot say either way," "unaware," and "completely unaware."

*****High disaster awareness: "very aware" and "aware."

Model 1 included only each single explanatory variable, Model 2 included each single explanatory variable plus the respondents' sex and age, and Model 3 included each single explanatory variable plus the respondents' sex, age, chain store status, and number of pharmacies per 100 km² of land area available.

Table 4. Association between the activities of the prefectural pharmaceutical association to which pharmacies belong and pharmacies' high disaster awareness

	Model 1			Model 2			Model 3		
	Odds ratio	95% CI	p-value	Odds ratio	95% CI	p-value	Odds ratio	95% CI	p-value
Disaster-preparedness training									
Less than 2 times a year	1 (reference)			1 (reference)			1 (reference)		
More than 2 times a year	1.83	1.16-2.91	0.009	1.98	1.24-3.17	0.004	2.24	1.38-3.64	0.001
Own a mobile pharmacy									
No	1 (reference)			1 (reference)			1 (reference)		
Yes	1.46	1.08-1.98	0.014	1.41	1.03-1.92	0.031	1.61	1.16-2.24	0.005

Model 1 included only each single explanatory variable, Model 2 included each single explanatory variable plus the respondents' sex and age, and Model 3 included each single explanatory variable plus the respondents' sex, age, chain store status, and number of pharmacies per 100 km² of land area available.

Regarding the preparedness of individual pharmacies, the authors conducted a similar study in 2016 in Hamamatsu, Shizuoka Prefecture.¹⁰ In the present study, the scope was expanded to include pharmacies nationwide, and additional questions were added, including those related to telemedicine, which enabled contactless interaction between pharmacists and customers during the COVID-19 pandemic and may also be applicable to disaster preparedness.

Regarding telemedicine, it was suggested that pharmacies that are willing to use online systems are better prepared for disasters and can be regarded as community pharmacies that can be connected online as an option if their own pharmacies are unable to respond in the event of a disaster. This was also supported by the fact that pharmacies that collaborated with neighboring or group pharmacies were better prepared for disasters. Many group and chain pharmacies were already connected via the Internet, and the increase in the number of such pharmacies willing to utilize online systems was thought to be linked to the progress of medical digital transformation, which advanced rapidly during the COVID-19 pandemic.¹¹ On the other hand, some pharmacies were reluctant to use online systems. Reasons for this include concerns about personal information, concerns about the reliability of information, security issues, workload and time constraints, and lack of digital literacy.

Pharmacies that discussed disaster preparedness with adjacent and nearby medical institutions were also significantly more prepared for disasters, and some pharmacies and medical institutions had simple disaster prescription arrangements in place for disasters.

Pharmacies that considered a reserve of leftover medications in case of a disaster also showed prominent levels of disaster preparedness. In particular, it is thought that drugs for patients with intractable diseases, which are rarely handled by pharmacies, may need to be kept in reserve for a longer period compared with drugs used for chronic diseases, which require a 3 or 4-day reserve to last through the acute phase of a disaster.¹² It is also important to provide guidance to patients regarding the use of reserve medicine.

Pharmacies with experience in supporting disaster-affected areas witnessed the extent of the damage, suggesting that they are aware of the possibility of their own pharmacies being affected by a disaster, and may be preparing for a disaster. In addition, pharmacies with high disaster awareness are reported to be better prepared for disasters.¹⁰

A variety of specific initiatives and logistics are important for pharmacies to support community residents in the event of a disaster. These include emergency drug stockpiling in preparation for disasters, development of procedures for providing medicines during disasters, health counselling for community residents at evacuation centres, and sharing information on drug history/home health care, as well as providing information/ communication to community residents. Pharmacies can effectively support community residents and contribute to the provision of medical care during disasters.

In addition, pharmacists should conduct drills for disaster preparedness based on scenarios. The content of such training could include strengthening collaboration through the participation of doctors, nurses, and government officials, as well as other multidisciplinary personnel; exercises in providing medicines at evacuation centres, training in inventory management, logistics, use of digital tools, and formulation of recovery plans, as well as review and feedback. A comprehensive training program combining these elements would improve the skills of pharmacists

in the event of a disaster and provide prompt assistance to community residents.

The important findings on disaster preparedness in Japan obtained in this study, such as enhanced disaster drills and collaboration, use of mobile pharmacies, introduction of telemedicine, and collaboration/ information sharing with medical institutions and other pharmacies, as well as stockpiling of medicines and providing information during emergencies, can be applied in other countries as well. It is suggested that these approaches be considered to further enhance local disaster preparedness.

Limitations

This study had several limitations. First, the response rate from pharmacies was low at 39.6%, although this was considered adequate for the sample size. The response rate from PPAs was high (39 out of 47 prefectures), but it was not possible to obtain responses from all associations. In addition, some respondents did not answer all the questions.

Conclusion

Pharmacies that can promptly provide medicine to disaster victims who need them in the event of a disaster are well prepared for disasters. The provision of disaster-preparedness training at least 3 times a year by PPAs was associated with good disaster preparedness among member pharmacies, suggesting that the number of disaster-preparedness training sessions by PPAs should be increased if possible. In addition, pharmacies with high online utilization, high collaboration with neighboring or group pharmacies, discussions with neighboring, or nearby medical institutions regarding collaboration in the event of a disaster, allocation of additional drugs for disasters, provision of support for disaster-affected areas, and high disaster awareness were significantly better prepared for disasters.

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