Information-Seeking Behavior of Community Pharmacists in Japan during the COVID-19 Pandemic: An Ecological Study Based on Indexing Web Page Access

Shota Suzuki, Yoshitaka Nishikawa, Hiroshi Okada, Takeo Nakayama

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Information-Seeking Behavior of Community Pharmacists in Japan during the COVID-19 Pandemic: An Ecological Study Based on Indexing Web Page Access

Shota Suzuki[1] MPH; Yoshitaka Nishikawa[1] MD, PhD; Hiroshi Okada[1] PhD; Takeo Nakayama[1] MD, PhD

[1]Department of Health Informatics, School of Public Health Kyoto University Kyoto JP

Corresponding Author:
Shota Suzuki MPH
Department of Health Informatics, School of Public Health
Kyoto University
Yoshida-Konoe-cho, Sakyo-ku
Kyoto
JP

Abstract

Background: The COVID-19 pandemic has caused an infodemic, and the need for rapid and accurate information seeking and providing has become an urgent issue. Community pharmacies play an important role in supporting the health of residents as "Communicators". In the early stages of the pandemic in Japan, there was a lack of information in pharmacies about infection control written in Japanese. Therefore, the Pharmacy Informatics Group (Kyoto, Japan) published a Japanese-language web page to disseminate this information. Nevertheless, the information-seeking behavior of Japanese pharmacists during disasters such as COVID-19 has not been fully evaluated.

Objective: This study aims to evaluate the information-seeking behavior of community pharmacists during the COVID-19 pandemic, with relation to COVID-19 infections and deaths within their local prefecture.

Methods: An ecological study comparing the number of accesses to the web page established by the Pharmacy Informatics Group and the number of infections and deaths in 47 prefectures was conducted. Total number of accesses (TA), total number of infections (TI) per 100,000 population, total number of deaths (TD) per 100,000 population, and number of pharmacists per 100,000 population for the 47 prefectures during the target period (April 6 to September 30, 2020) were calculated using the access information on the web page and public information.

Results: In Japan, during the first 6 months of the COVID-19 pandemic, TA was 226,130 (10,984–138,898), TI was 78,761 (1,738–31,857), and TD was 1,470 (39–436). The correlation between TA and TI per 100,000 population in 47 prefectures was r=.72 (95% CI: .55–.83, P<.001), and between TA and TD per 100,000 population in 47 prefectures was r=.44 (95% CI: .17–.65, P=.002).

Conclusions: Our findings indicate that information-seeking behavior of community pharmacists was positively correlated with infection status within the community.

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Introduction

The COVID-19 pandemic has highlighted various problems in obtaining and using accurate information. Infodemics have become a problem due to the large amount of information available, including rumors and false claims [1]. Language and other barriers to timely access to accurate information are also problematic [2-3]. In order to consider the handling of information in emergencies such as the COVID-19 pandemic, it is important to focus on both information providers and seekers [4].

Pharmacists play an important role in providing pharmaceutical information in emergency situations [5]. Based on the concept of the Seven-Star Pharmacist proposed by the WHO, pharmacists are expected to play the role of "Communicators" in the health care system [6]. Pharmacists working in community pharmacies should not only fill prescriptions issued by medical institutions, but also provide appropriate information to help patients achieve self-medication [7]. Therefore, even during the COVID-19 pandemic, pharmacists have needed to be proactive in providing correct and timely information to the community [8-11].

In Japan, almost all pharmaceutical education is conducted in Japanese, and many pharmacists have limited access to English information. In the early stages of the pandemic, there was a lack of infection control information in Japanese available to community pharmacists. Moreover, there was a delay in the provision of information in languages other than Japanese by the government. As a result, non-Japanese residents who were not fluent in Japanese were unable to access reliable information, which increased their anxiety [12].

We, the Pharmacy Informatics Group (Kyoto University, Kyoto, Japan), were concerned about the spread of COVID-19 through pharmacies and consequently, launched the COVID-19 Countermeasure Support Project (Project) for pharmacies and pharmacists. The Project launched a web page on April 6, 2020 and began disseminating infection control information in Japanese [13]. In general, unlike hospitals, many pharmacies have few opportunities to come into contact with experts in various fields at their workplaces, making it difficult for them to obtain information. Therefore, posters and leaflets based on information from academic societies and infection control organizations were made available free of charge on the Project’s web page. In addition, in cooperation with an infectious disease expert, we created several videos to help pharmacists combat COVID-19 and distributed them via social media [14].

Until now, little is known about the information-seeking behavior of Japanese pharmacists during disasters such as the COVID-19 pandemic. Previous studies reported that pharmacists use web pages as a strategy to obtain information about COVID-19 [15]. In addition, a previous public survey on social media [16] and a report on the impact of COVID-19-related information and communication on pharmacists used questionnaires to assess information-seeking behavior [17]. However, it is burdensome and difficult to request frequent survey cooperation from healthcare professionals, such as pharmacists. In this study, we focused on the number of accesses to web page designed for community pharmacists, hoping that it could serve as an objective evaluation index for people accessing information. The purpose of this study is to evaluate the information-seeking behavior of community pharmacists during the COVID-19 pandemic by examining the relationship between the numbers of accesses to the Project’s web page and the local infection situation.

Methods

Setting

COVID-19 situations in Japan

COVID-19 spread rapidly throughout Japan after the first case was confirmed on January 16, 2020. In the following February, many cases were detected on a cruise ship [18] (Table 1). The number of COVID-19 cases increased continuously, and as a result, on March 23, the hosting of the Tokyo 2020 Olympics and Paralympics was postponed [19]. On April 7, a state of emergency was declared in areas with the highest numbers of COVID-19 cases (Tokyo, Kanagawa, Saitama, Chiba, Osaka, Hyogo, and Fukuoka). The emergency was later extended to the whole of Japan [20-21]. With the prohibition of unnecessary outings, the number of infections began to decline, and the declaration was canceled on May 25. The Japanese government announced a new lifestyle to prevent the spread of COVID-19, included a reminder to avoid the Three Cs: Closed spaces, Crowded places, and Close-contact settings. In addition, the use of masks and regular hand washing were recommended [22].

The Pharmacy Informatics Group

The Pharmacy Informatics Group was established in April 2019 with Okada as its leader. We examine the effectiveness of community pharmacists' interventions on patients with chronic diseases and their cost-effectiveness. We are also involved in research activities aimed at improving communication with non-Japanese patients in pharmacies. In addition to these, we try to establish educational programs for pharmacists [23-25].

In March 2020, when there was an increase in apprehension regarding the spread of COVID-19 in Japan, we recruited volunteers and launched the Project (Table 1). The Project held frequent online meetings among members to determine the information to be posted on the web page. To prevent the spread of infection through pharmacies, we prepared materials like a checklist in Japanese using the guidelines of the Center for Disease Control and Prevention (CDC, US) as a reference. We also compiled links to sources of information in Japanese and posted them on the web page.

Table 1. Events related to COVID-19.[a-e]

2020		World & Japan		Pharmacy Informatics Group
		Confirmation of pneumonia patient (Wuhan, China)		
January	6	MHLW[a] Alert (Japan)		
	16	Confirmation of 1st case of infection (Japan)		
	20	Cruise Ship Departure (Yokohama, Japan)		
February	3	Cruise Ship Arrivals (Yokohama, Japan)		
	13	Confirmation of 1st case of death (Japan)		
	27	Request to close schools (Japan)		
March	9	MHLW[a], Three Cs Avoidance Alert (Japan)		

	11	WHO pandemic declaration		
	23	Tokyo 2020 Olympics and Paralympics postponed (Japan)	26	Project[b] start
April	7	Declaration of State of Emergency (Japan)	1	Web survey of pharmacist front liner
	18	Number of infections 10,000 over (Japan)	6	Web page release

[a]MHLW: Ministry of Health, Labour and Welfare.
[b]Project: COVID-19 Countermeasure Support Project.

Study design and data sources

This was an ecological study. The access data after April 6, 2020, when the web page was released, was obtained from Wix (Wix.com Ltd., Tel Aviv, Israel), the web site manager. The number of infections and deaths in the 47 prefectures was available from the Japan Broadcasting Corporation (Nippon Hoso Kyokai, NHK) [26]. The population of the 47 prefectures was based on information published by the online portal of official statistics of Japan (e-Stat) in 2018 [27]. The number of pharmacists was sourced from information published by the Ministry of Health, Labour and Welfare (MHLW) in 2018 [28].

Data collection from the Project's web page

The total number of accesses (TA) during the period (April 6 to September 30, 2020) was counted. Accesses from outside the 47 prefectures were excluded after identification using code numbers. The total number of infections (TI), total number of deaths (TD), TI per 100,000 population, TD per 100,000 population, and the number of pharmacists per 100,000 population during the study period was calculated from publicly available information for the 47 prefectures.

Map creation

The regional distribution of TA and TI per 100,000 population, TD per 100,000 population, and number of pharmacists per 100,000 population during the period were displayed on a map of the 47 prefectures. For this purpose, we used the geographic information system QGIS version.3.16.2 [27].

Statistical analysis

Descriptive statistics was used to summarize each total number, and the Pearson's correlation between TA and TI per 100,000 population, and between TA and TD per 100,000 population were calculated. Multiple regression analysis was also performed with TA as the objective variable, TI or TD per 100,000 population, and the number of pharmacists per 100,000 population as the explanatory variable. The significance level was set at 5%, two-sided. The analysis was performed using JMP Pro (SAS Institute Inc., Cary, North Carolina, US) ver. 14.2.0.

Ethical consideration

This study was approved by the Kyoto University Graduate School and Faculty of Medicine, Ethics Committee (R2832) and adheres to the Ethical Guidelines for Medical and Health Research Involving Human Subjects.

Results

Data Collection and Map creation

Descriptive data appear in Table 2. There were 226,130 (range: 10,984–138,898) TA, 78,761 (1,738–31,857) TI, and 1,470 (39–436) TD. We mapped TA (Figure 1a), TI per 100,000 population (Figure 1b), TD per 100,000 population (Figure 1c), and number of pharmacists per 100,000 population (Figure 1d) for the 47 prefectures. The Pearson's correlation between TA and TI per 100,000 population was r=.72 (95% CI: .55–.83, P<.001) (Figure 2a), and between TA and TD per 100,000 population was r=.44 (95% CI: .17–.65, P=.002) (Figure 2b). Results accounting for outliers are shown in Multimedia Appendix 1 and 2.

Statistical Analysis

The regression coefficients of the multiple regression analysis with TA as the objective variable and TI or TD per 100,000 population and number of pharmacists per 100,000 population as explanatory variables were 1,227 (95% CI: 842–1,611), for TI per 100,000 population, and 87 (95% CI: 49–124) for the number of pharmacists per 100,000 population (Table 3), 2,314 (95% CI: 230–4,398), for TD per 100,000 population, and 108 (95% CI: 58–157) for the number of pharmacists per 100,000 population (Table 4).

Table 2. Number of accesses, infections, and deaths (April 6 to September 30).

	Access	Infection	Death
April	138,898	10,327	364
May	34,958	2,408	436
June	17,294	1,738	75
July	12,744	17,418	39
August	11,252	31,857	281
September	10,984	15,013	275
Total	226,130	78,761	1,470

Table 3. TA, TI per 100,000 populations and Number of pharmacists per 100,000.

Factors	Regression coefficient (95% CI)
	TA[a]
TI[b] per 100,000	1,227 (842–1,611)
Number of pharmacists per 100,000	87 (49–124)

[a]TA: Total number of accesses.

[b]TI: Total number of infections.

Table 4. TA, TD per 100,000 populations and Number of pharmacists per 100,000.

Factors	Regression coefficient (95 %CI)
	TA[a]
TD[b] per 100,000	2,314 (230–4,398)
Number of pharmacists per 100,000	108 (58–157)

[a]TA: Total number of accesses.

[b]TD: Total number of deaths.

Discussion

Principal Results and Comparison with Prior Work

Access to the COVID-19 web page, created for community pharmacists in Japan, was positively correlated with the number of infections and deaths in the 47 prefectures.

The project released the web page just before the first state of emergency was declared in Japan due to an increase in the number of infections, deaths, and concerns about the spread of infections. The number of accesses to the web page was concentrated in April, immediately after the announcement. This may have been due to our publicity activities, which attracted the attention of pharmacists and professional associations [30-31]. Previous study has reported that the information-seeking behavior surrounding the COVID-19 pandemic relies on social media as an information source [32]. It is thought that the information disseminated using social media on the Project web page brought many accesses in a short period of time.

A visual map of TA, TI, and TD showed that the spread of infection varied by prefecture, even after population correction. In terms of TA, the values for Tokyo and Okinawa differ from those of the other prefectures. In addition, there were many accesses from Kyoto and Osaka, where the main Project members reside. As for TI, even after adjusting for population, the metropolitan area where the state of emergency was declared, had an outstandingly high number. The distribution was different from that of TD.

The infection control information disseminated on the Project's page may have led to infection control actions at community pharmacies. The results of a questionnaire survey of pharmacies conducted jointly with the Kyoto Pharmaceutical Association in May 2020 revealed that the rate of implementation of infection control measures at pharmacies has rapidly increased since April, when the Project page began disseminating information [33]. It is believed that the contents were created after careful consideration of the information needed by pharmacies, and that it was useful for infection control.

In Japan, the use of foreign language information, especially English, is not widespread. The language barrier may be one of the reasons why community pharmacists feel that there is a lack of useful information on COVID-19 measures. The checklists for use in infection control published in the Project were created based on the CDC guide, which was published in the early stages of the pandemic and updated monthly. If pharmacists had no difficulty in accessing English language information, it may have proved useful for infection control. The Project tried to disseminate information in Japanese, which was thought to match the information-seeking behavior of a larger number of pharmacists.

The use of social media to disseminate information will be useful in the future for pharmacists and pharmacy professionals. The amount of information related to COVID-19 is rapidly increasing, and it is desirable to quickly access, review, and utilize information. In recent years, Japanese pharmacists have learned how to critically analyze information by reading abstracts of research papers [34]. The use of social media has the potential not only to disseminate information but also to become a forum for interactive discussion.

The number of accesses to the web page may be useful as an objective evaluation index of

information-seeking behavior [35-36]. Most of the previous reports used questionnaires to examine the information-seeking behavior of the target population. However, health care workers fighting on the front lines against COVID-19 infection are exhausted, and using questionnaires would be labor intensive, and thus an unreasonable expectation. Indicators such as access information that can be surveyed without burdening the medical staff is therefore highly useful.

Limitations

First, this is an ecological study, and there may be an ecological fallacy in the relationship between the information-seeking behavior of individual pharmacists and the infection status at the prefectural level. The information-seeking behavior of individual pharmacists is likely to be influenced by infection status at the regional, rather than the prefectural level, which is what was used to assess infection status in this study. Second, data on the attributes of the accessors were not included. Therefore, the evaluation could not be truly limited to community pharmacists. Third, the access information used in this study was obtained using the Wix analysis tool, and the accuracy of the data has not yet been verified. Finally, there is a potential for unmeasured confounding, which is necessary to examine the association between TA and COVID-19 infection status.

Conclusions

There was a positive association between the number of accesses to web page for disseminating COVID-19-related information by community pharmacists and the numbers of infections and deaths caused by COVID-19 in the 47 prefectures during the target period (April-September 2020). Our findings indicate that information-seeking behavior by community pharmacists was positive correlated with the local infection situation.

Acknowledgements

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Authors' Contributions

SS analyzed the data and wrote manuscript. All authors conceptualized and designed the study and revised the manuscript.

Conflicts of interest

YN received personal fees from MRT Inc. outside the submitted work. HO employed in Industry-academia collaborative research course with I&H Co., Ltd. Nakagawa Pharmacy Co., and KRAFT Inc. TN received; personal fees from Otsuka Pharmaceutical Co., Dainippon Sumitomo Pharmaceutical Co., Ono Pharmaceutical Co., Chugai Pharmaceutical Co., Dentsu Inc., Takeda Pharmaceutical Co., Novo Nordisk Pharma Co., Janssen Pharmaceutical K.K., Boehringer Ingelheim International GmbH, Pfizer Japan Inc., Nikkei Business Publications, Inc., Eli Lilly Japan K.K., Baxter, Alexion, Mitsubishi Tanabe Pharma Co., and Novartis Pharma K.K.; other from Japan Medical Data Center, I&H Co., Ltd., Nakagawa Pharmacy Co., Ltd., and Toyota Tsusho All Life Co.; grants from Konica Minolta, Inc., outside the submitted work.

Abbreviations

e-Stat: Portal site of official statistics of Japan
MHLW: Ministry of Health, Labour and Welfare

NHK: Japan Broadcasting Corporation
Project: COVID-19 Countermeasure Support Project
TA: Total accesses
TD: Total deaths
TI: Total infections

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Supplementary Files

Figures

Multimedia Appendixes

Correlation between total accesses and infections except for Tokyo prefecture. (a) Number of total infections per 100,000 population. A strong correlation was observed in total infections (r=.56, 95% CI: .32–.73). (b) Number of total deaths per 100,000 population. A weak correlation was observed in total deaths (r=.33, 95% CI: .05–.57).
URL: http://asset.jmir.pub/assets/ccfafae1086a8523c76ebf7ab6bb4088.png

Correlation between total accesses and infections, except for Tokyo and Okinawa prefectures. (a) Number of total infections per 100,000 population. A strong correlation was observed in total infections (r=.79, 95% CI: .65–.88). (b) Number of total deaths per 100,000 population. A weak correlation was observed in total deaths (r=.39, 95% CI: .11–.62).
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