

Original Research

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Comparison of Perceived Importance and Performance of Community Pharmacists' Role in South Korea During the Coronavirus Disease 2019 Pandemic

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Abstract

Objective: This study aimed to identify the roles of community pharmacists (CPs) during the coronavirus disease 2019 (COVID-19) pandemic, the differences in their role performance compared with their perceived importance, and limiting factors.

Methods: A cross-sectional online survey of CPs was conducted. The CPs self-measured the importance and performance of each role during the pandemic using a 5-point Likert scale. A paired t-test was used to compare each role's importance and performance scores. A logistic regression analysis of the roles with low performance scores, despite their level of importance, was conducted to determine the factors affecting performance. The limiting factors were also surveyed.

Results: The 436 responses to the questionnaire were analyzed. The performance scores were significantly lower than the perceived importance scores for 15 of the 17 roles. The source and update frequency of COVID-19 information and participation in outreach pharmaceutical services were associated with low performance scores. Insufficient economic compensation, the lack of communication channels, and legal limitations were the limiting factors in performing the CPs' roles.

Conclusions: The participation in outreach pharmaceutical services, economic compensation, and communication channel should be improved to motivate the CPs in performing their roles.

The spread of severe acute respiratory syndrome coronavirus 2, which caused the coronavirus disease 2019 (COVID-19) pandemic, has resulted in more than 600 million confirmed cases and more than 6 million deaths worldwide as of November 2022.¹ In the early stage of the pandemic, preventive measures, such as social distancing, quarantine, and lockdown, were implemented in many countries, including the United States (US) and across Europe and Asia.² Although these measures were effective in slowing the rate of infection, patients who required treatment experienced treatment delays due to poor access to health care, surgical interventions, and other hospital services, combined with fear of exposure to the virus.^{3,4} Community pharmacists (CPs) have been important in maximizing the effectiveness of health-care systems by providing accurate information on COVID-19, educating patients on telehealth services, conducting consultations with patients with mild infections, and managing medication for patients with chronic infections.^{5,6} Therefore, CPs continued to be a highly useful resource for patients during the pandemic.

According to previous studies that reviewed the literature on the services offered by CPs during the COVID-19 pandemic, CPs performed a variety of roles and activities. CPs provided services to address medication shortages, conducted teleconsultation, performed a medication review, optimized the medication regimen, monitored the occurrence of adverse drug reactions, and resolved the medication-related problems, with a particular focus on ensuring sufficient chronic disease medication supply and providing education. The specific services were different between countries.⁷ For example, in several European countries, CPs were authorized to renew repeated prescriptions for chronic medications to ensure treatment continuity.⁸ CPs also carried out COVID-19 vaccination and testing in France and the United States.^{6,9} Furthermore, the majority of CPs in Qatar encouraged and educated the patients on hand hygiene and the use of gloves and face masks to prevent exposure to the virus.¹⁰ CPs in Jordan followed up on the latest information that can help improve community health.¹¹ In Korea, CPs are responsible for dispensing prescriptions, providing medication information, and educating the public on the safe use of medications. During the COVID-19 pandemic, CPs actively participated in

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additional activities, such as the implementation of national health and quarantine policies by distributing face masks and educating the public on the proper use of personal protective equipment.¹²

During a disaster, CPs are suggested to perform various roles in the following phases: prevention, preparation, response, and recovery (PPRR).¹³ Based on these 4 phases, Cadogan and Hughes¹⁴ and Watson *et al.*¹⁵ outlined the role of CPs during the COVID-19 pandemic.^{14,15} In the prevention phase of the COVID-19 pandemic, CPs provided disease information, educated the public about infection control, and implemented in-pharmacy preventive measures. In the preparation phase, CPs ensured service and medication supply continuity and obtained up-to-date information. In the response phase, CPs identified suspected patients, monitored patients, or reported suspected patients to proper authorities, continuously supplied medicines, and adopted counter-measures to address the medication shortages. In the recovery phase, the CPs resumed their normal work routine, identified and managed vulnerable patients, and updated the patient information.^{14,15}

The guidelines of the International Pharmaceutical Federation (FIP) and of each country, such as the Korean Pharmaceutical Association (KPA), emphasized that the role of CPs is important in a pandemic situation; however, no studies have examined the extent to which it is being implemented.^{16,17} A previous study surveyed the Canadian pharmacist; however, they only reported the frequency of each role at the beginning of the COVID-19 pandemic.¹⁸ In addition, no study has evaluated the gap between the importance and performance of CP roles. Identifying these gaps and using PPRR are expected to predict the role of CPs in similar pandemic situations in the future. Therefore, this study aimed to identify the roles that the CPs considered important but could not perform and investigate the factors that limited their ability to perform these roles.

Methods

Study Design

A cross-sectional online survey of pharmacists working in community pharmacies in Seoul, South Korea, was conducted between June 2, 2022, and June 10, 2022. The survey was discontinued after 9 d, after reaching the target sample of 375. Participants voluntarily consented to complete the survey after fully understanding its purpose and content. The study was approved by the Institutional Review Board of Sungkyunkwan University (approval number: SKKU 2022-05-016).

Survey Development

The survey tool was developed based on the current literature on the role of CPs in responding to disasters and pandemics,^{14,15,19–22} and Korean context.^{12,23} For example, the questions in the response phase were developed considering Korean policy.^{12,23} Finally, we revised the survey tool in accordance with the opinions of academic experts in pharmacy practice and duration. The survey questions were divided into 3 sections: (1) characteristics of the pharmacists and pharmacy, (2) the importance and roles of CPs recognized during the COVID-19 pandemic, and (3) the factors limiting the performance of the roles of CPs during the COVID-19 pandemic.

The first section comprised (1) questions regarding the characteristics of CPs, including sex, age, work type (eg, pharmacy owner or pharmacy employee), pharmacy work experience, and working hours per day; (2) questions on whether the CP

participates in outreach pharmaceutical services (eg, pharmacist home visit, drug safety use education, and safe pharmacy program) and frequently provides consultation and relevant information on the efficacy and side effects of over-the-counter (OTC) medicines; (3) questions about COVID-19 information resources (eg, government, KPA, academic journals or professional books, online newspapers, and Social Networking Service [SNS]) and the frequency of using these resources; and (4) questions regarding pharmacy characteristics, including pharmacy location, the total number of pharmacists working for the pharmacy, the total number of daily prescriptions dispensed at the pharmacy, and the total sales of OTC drugs per day.^{20–22}

The second section of the survey comprised questions regarding the importance and performance of the roles that the CPs recognized during the pandemic. The role of the CPs in the PPRR phases, reported in the study by Cadogan and Hughes,¹⁴ were determined during the COVID-19 pandemic, and the specific roles were modified based on the situation in Korea. The most relevant CP roles for the COVID-19 pandemic were selected based on our review of preliminary studies and expert advice.^{14,15,19,23}

In the prevention phase, the role of CPs involves the prevention of COVID-19 spread; in the preparation phase, CPs are involved in planning for a quick response in the event of a COVID-19 outbreak. This encompasses acquiring and maintaining an inventory of prescription and OTC medications, as well as ensuring access to up-to-date patient care information. In the response phase, the role of CPs focused on the implementation of health and quarantine government policies to control the spread of COVID-19. Listing and selling of emergency medications for COVID-19 at-home care or self-isolation (P3_1_1) and involvement in the implementation of the mask policy (P3_1_2) are adopted. The Korean government controlled the mask supplies by only allowing Korean citizens to purchase masks from pharmacies on designated days from March to July 2020. Moreover, the prescribing physician is contacted to change or modify the prescriptions, or admit dispensing the generic form of the medication in cases of shortage or unavailability of chronic disease drugs to ensure the continuous supply of medications (P3_4_1). The roles during the recovery phase focused on actively managing patients who fully recovered from COVID-19 (P4_1), updating the pharmacy manual to regulate the pharmaceutical practice during the pandemic, and preparing in-pharmacy evaluation data (P4_2).

A 5-point Likert scale was used to measure the importance of each role (5 = very important, 4 = important, 3 = moderately important, 2 = slightly important, and 1 = unimportant). In addition, the performance of each role was measured using a 5-point Likert scale (5 = always, 4 = often, 3 = sometimes, 2 = rarely, and 1 = never). The specific roles classified into 4 phases are presented in [Table 1](#).

The third section of the survey focused on the factors limiting the performance of CPs during the COVID-19 pandemic. The factors were selected based on previous literature reviews^{24,25} and the opinions of academic experts in pharmacy practice and education. The selected factors included time, economic compensation, sense of duty and awareness, government policy, consumer demands for CP services, doctors' willingness to cooperate with pharmacists, availability of communication channels, and legal limitations of CPs' responsibilities. Each item was measured using a 5-point Likert scale (5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, and 1 = strongly disagree), indicating the degree of agreement.

Table 1. Scores for the importance, performance, and differences between the importance and performance in the role of community pharmacists

Roles	Scores measured by Likert scales ^a						
	Importance		Performance		Difference (paired t-test) (ref: performance)		
	Mean	SD	Mean	SD	Mean	SD	P-Value
Phase 1: Prevention							
P1_1: Providing information on COVID-19 symptoms and related information	4.36	0.74	3.88	0.89	0.48	0.75	<0.0001
P1_2: Provision of infection prevention education, such as hand hygiene, social distancing, and proper use of masks	4.36	0.83	3.79	1.04	0.57	0.89	<0.0001
P1_3: Checking of quarantine guidelines, such as disinfection and ventilation of pharmacies, wearing of personal masks, and hand hygiene	4.59	0.61	4.29	0.75	0.31	0.63	<0.0001
Phase 2: Preparation							
P2_1: Preliminary securing of prescription drug supply, including chronic disease drugs (except when the drugs are out of stock)	4.62	0.59	4.21	0.79	0.41	0.75	<0.0001
P2_2: Preliminary securing of over-the-counter drugs and quasi-drugs (disinfectants, masks, etc.)	4.49	0.66	4.09	0.82	0.40	0.74	<0.0001
P2_3: Preparation of COVID-19-related work guidelines in pharmacies (e.g., designating the role, quarantine guidelines, and reporting guidelines)	4.19	0.83	3.69	0.98	0.50	0.82	<0.0001
P2_4: Collecting and updating the latest information for the treatment and management of patients with COVID-19	4.53	0.64	3.91	0.85	0.61	0.8	<0.0001
Phase 3: Response							
P3_1: Implementation of the COVID-19-related health and quarantine policies of the government							
P3_1_1: Listing and selling of emergency medicines for COVID-19 needed for at-home care or self-isolation	4.37	0.75	4.13	0.87	0.24	0.71	<0.0001
P3_1_2: Involvement in the implementation of the Mask Policy ^b	3.71	1.17	4.13	0.98	-0.4	1.07	<0.0001
P3_2: Guiding pharmacy visitors on the use of COVID-19 home test kits and the proper countermeasures in case of COVID-19-positive pharmacy visitors	4.35	0.83	4.31	0.82	0.04	0.65	0.24
P3_3: Identification of patients suspected with COVID-19 and provision of information obtained from public health centers, clinics, and KDCA to the suspected patients	4.23	0.89	3.79	1.09	0.44	0.85	<0.0001
P3_4: Ensuring sufficient drug supply and creation of solution plans for out-of-stock medications							
P3_4_1: In case of shortage or unavailability of chronic disease drugs, the prescribing doctors are contacted to change/modify the prescription or request for generic substitution	4.71	0.53	4.30	0.89	0.41	0.84	<0.0001
P3_4_2: The shortage of over-the-counter or quasi-drug supply should be monitored to urge the government and KPA to provide a solution or exchange insufficient over-the-counter drugs through local pharmacies	4.56	0.66	3.60	1.13	0.96	1.15	<0.0001
P3_5: Electronic prescriptions, fax prescription dispensing, and drug delivery which were temporarily allowed during the COVID-19 pandemic	3.26	1.18	3.11	1.23	0.15	0.92	<0.0001
P3_6: Reporting of the adverse events of COVID-19 vaccines and treatments to MFDS, KIDS, and KPA	4.32	0.78	3.03	1.20	1.29	1.29	<0.0001
Phase 4: Recovery							
P4_1: Identifying and actively managing patients who have recovered from COVID-19 (sequelae and drug consultation, etc.)	4.39	0.70	3.82	0.96	0.57	0.89	<0.0001
P4_2: Update work guidelines related to the pandemic (prevention, stockpiling, dispensing, administration, etc.) and prepare internal evaluation data	4.17	0.79	3.54	0.98	0.63	0.89	<0.0001

Abbreviations: KDCA, Korea Disease Control and Prevention Agency; KIDS, Korea Institute of Drug Safety and Risk Management; KPA, Korean Pharmaceutical Association; MFDS, Ministry of Food and Drug Safety; SD, standard deviation.

^aLevel of importance (5=very important, 4=important, 3=moderately important, 2=slightly important, and 1=unimportant). Performance level (5=always, 4=often, 3=sometimes, 2=rarely, and 1=never).

^bFrom March 9 to July 11, 2020, the government's policy of controlling the supply of masks in response to manage the shortage situation during the COVID-19 pandemic. Korean citizens could purchase masks on designated days in a pharmacy.

Survey Implementation and Sample Size

The study participants were recruited through social media (KakaoTalk), and Google Forms was used to collect the survey data. Considering that over 90% of pharmacists in Seoul are members of the Seoul Pharmaceutical Association, the members of the Association were surveyed.^{26,27} A URL link was posted on KakaoTalk to help the members of the Seoul Pharmaceutical Association (the Gangseo-gu and Dongjak-gu branches of the

Seoul Pharmaceutical Association), members of groups that provide pharmaceutical outreach services, and members of local society meetings gain access to the survey form.

The sample size was calculated using the method published by the University of Florida.²⁸ The study population was assumed to be ~6,000 based on 5,959 pharmacists who were members of the Seoul Pharmaceutical Association and working in community pharmacies as of 2021.²⁶ Thus, the study sample size was set to at

least 375 considering a 95% confidence interval (CI) and a $\pm 5\%$ accuracy.

Statistical Analysis

Descriptive analysis was performed using the mean and standard deviation (SD) for continuous variables and percentage for categorical variables. The score for the importance and performance of the CP roles was obtained using a 5-point Likert scale and expressed as the mean \pm SD. The differences in the scores between the importance and performance of each role were calculated by subtracting the performance score from the importance score; a paired t-test was performed to assess the differences in scores.

A logistic regression analysis of the roles with low performance scores, despite their level of importance, was performed to determine the factors affecting performance. One role with the most significant difference score from each phase was selected among the roles with a performance score that was lower than the importance score. An additional role was selected in the response phase because the difference score was more significant than the scores for the roles in other phases. During the performance rating, a score of “5” on the Likert scale, which means “always performed,” was considered to indicate an event. Any other score (1-4 points) was considered to indicate the absence of events. Only a few survey participants (within 5%) selected the scores of 1 point (never) and 2 points (rarely), while most of them selected the scores of 3 points (sometimes) and 4 points (often). This means that the CPs were actively performing their role during the COVID-19 pandemic and only differed in terms of the level of role performance. In other words, the participants were divided into 2 groups according to the level of role performance (“always” group and “otherwise” group). The pharmacists’ demographic data, experience, and pharmacy details were used as covariates. All data were analyzed using the Stata 16 statistical software.

Results

Characteristics of the CPs and Pharmacies

Of the 458 responses, 436 were included in the final analysis. Answers with low reliability, duplicate responses, and responses that repeatedly selected 5 points for all questions related to the importance and performance of CP role were excluded. The characteristics of survey respondents are listed in Table 2. The responding CPs included 321 (73.6%) women, and 176 (40.4%) pharmacists were aged <40 y. A total of 245 (56.2%) CPs were pharmacy owners, and 197 (45.2%) participated in outreach pharmaceutical services. The responders obtained COVID-19 information from the online newspapers ($n = 237$; 25.2%), SNS or YouTube ($n = 212$; 22.6%), KPA ($n = 196$; 20.9%), and government (eg, the Ministry of Health and Welfare, Ministry of Food and Drug Safety [MFDS]) ($n = 193$; 20.6%). Among the respondents, 403 (92.4%) worked at pharmacies in nearby medical facilities, including general hospitals, hospitals, and clinics.

Perceived Importance and Performance of the CPs’ Roles

The differences between the scores for the importance and performance of roles recognized by CPs are expressed as the mean \pm SD (Table 1). Most CPs reported “In case of shortage or unavailability of chronic disease drugs, the prescribing doctors are contacted to change/modify the prescription or request for generic substitution” (hereafter, defined as “Changing the out-of-stock

Table 2. Baseline characteristics of the respondents ($N=436$)

Variable	<i>n</i>	%
Characteristics of the pharmacist		
Demographics		
Gender		
Male	115	26.4
Female	321	73.6
Age group (y)		
<40	176	40.4
40–49	100	22.9
≥ 50	160	36.7
Employment		
Pharmacy owner	245	56.2
Pharmacy employee	191	43.8
Community pharmacy experience		
<10 years	201	46.1
≥ 10 years	235	53.9
Average working hours per day		
<9 hours	202	46.3
≥ 9 hours	234	53.7
Characteristics related to service provision		
Participation in outreach pharmaceutical services ^a		
Yes	197	45.2
No	239	54.8
Counseling and providing information on the efficacy and side effects of over-the-counter medicines		
Every time	118	27.1
Not every time	318	72.9
Information on COVID-19		
Source of information (multiple selections possible)		
Government (MHW/KDCA/MFDS/others)	193	20.6
Korean Pharmaceutical Association	196	20.9
Academic journals or professional books	100	10.7
Online newspapers	237	25.2
SNS (KakaoTalk/Twitter/Facebook/others) or YouTube	212	22.6
Frequency of use of information sources		
Every day	143	32.8
≥ 2 days	293	67.2
Characteristics of the pharmacy		
Pharmacy location		
Near general hospital, hospital, or the clinic	403	92.4
Pharmacies with no medical facilities nearby	33	7.6
Number of working pharmacists		
One pharmacist	168	38.5
≥ 2 pharmacists	268	61.5
Number of prescriptions per day/amount of general sales per day excluding prescription drugs		
≥ 100 or \geq ₩ 500,000	292	67.0
<100 or < ₩ 500,000	144	33.0

Abbreviations: KDCA, Korea Disease Control and Prevention Agency; MFDS, Ministry of Food and Drug Safety; MHW, Ministry of Health and Welfare.

^aThe outreach pharmaceutical services include pharmacist home visits, drug safety education, and safe-pharmacy program. The safe-pharmacy Program, provided by the Seoul Metropolitan Government, offers health care services at pharmacies such as comprehensive drug management, suicide prevention, and smoking cessation services etc.

prescription”) as the most important role (score = 4.71 ± 0.53). Meanwhile, “Guiding pharmacy visitors on the use of COVID-19 home test kits and the proper countermeasures in case of

COVID-19-positive pharmacy visitors” (hereafter, defined as “Guide the use of COVID-19 test kit”) was the most frequently performed role (score = 4.31 ± 0.82). The performance scores were significantly lower than the perceived importance scores for 15 of the 17 roles. The CPs’ performance scores were relatively higher than the perceived importance score for “Involvement in the implementation of the Mask policy” role in the response phase (importance: 3.71, performance: 4.13, gap: -0.4). The “Guide the use of COVID-19 test kit” role had the lowest difference between the importance and performance scores in the response phase (importance: 4.35, performance: 4.31, gap: 0.04). The largest difference was observed in the “Reporting of the adverse events of COVID-19 vaccines and treatments to MFDS, KIDS, and KPA” (defined as “Reporting adverse events”) role with a difference of 1.29 points. Supplementary Material 1 presents the top 5 rankings of roles with high importance and performance.

A logistic regression analysis was performed to identify the factors influencing the performance levels in the 5 selected roles (Table 3). The performance level was positively associated with the information source and frequency of use of information sources. For example, CPs who used academic journals or professional books had 4.51 times higher odds of performing the “Prevention education” role than those who did not use that resource (odds ratio [OR] = 4.51; 95% CI = 1.68–12.11; $P < 0.01$). Online newspapers used as COVID-19 information resources affected the performance of the “Prevention education” (OR = 0.34; 95% CI = 0.14–0.79; $P = 0.01$) and “Updating guidelines” roles (OR = 0.32; 95% CI = 0.13–0.84; $P = 0.02$). Furthermore, the daily use of an information source was significantly associated with performing the “Acquiring information” role (OR = 3.97; 95% CI = 1.66–9.48; $P < 0.01$). The ORs of age ≥ 50 y (OR = 5.52; 95% CI = 0.98–31.16; $P = 0.07$) and ≥ 2 working pharmacists (OR = 4.51; 95% CI = 0.27–2.11; $P = 0.7$) in the “Prevention education” role were both high, but not significant.

Limiting Factors Impacting the Performance of the CP Roles

Figure 1 presents the factors limiting the performance role of CPs during the COVID-19 pandemic. Most of the CPs agreed that “Insufficient economic compensation” was a limiting factor (score = 4.46). In addition, the CPs indicated that the lack of communication channels (score = 4.42), legal limitations (score = 4.33), the lack of government policy (score = 4.07), insufficient time (score = 4.02), and the lack of willingness of doctors to cooperate with CPs (score = 3.93) were limiting factors in the performance of their roles. By contrast, relatively few pharmacists agreed that the lack of consumer demand for CP services (score = 2.96) and the lack of duty and awareness of CPs (score = 2.61) were limiting factors.

Discussion

The CPs were surveyed to determine the perceived importance and performance of their roles during the COVID-19 pandemic. CPs recognized “Changing the out-of-stock prescription” as the most important role and “Guide the use of COVID-19 test kit” as the most frequently performed role. In addition, the odds of performing the role were higher in the group that used the COVID-19 information sources such as KPA, academic journals, or professional books and frequently updated the information. The challenges faced by CPs included inadequate economic compensation, the lack of communication channels, and legal limitations.

The “Changing the out-of-stock prescription” role received the second highest performance score. These results indicated the importance of a continuous supply of medications during the pandemic in Korea. The results of a Canadian study indicated that the most commonly performed CP role during the COVID-19 pandemic was the “limitation in the number of days for prescription or renewal/extension of prescriptions for continuity of care of patients with chronic diseases.” Furthermore, the study reported the “supply of medicine” as the most important issue during the pandemic.¹⁸ The role and efforts of CPs reported in this study were the same as those of Canadian CPs.

The most common role of CPs in Korea is to guide COVID-19 testing. The CPs either provided COVID-19 self-test kits to patients or directly performed the test at community pharmacies in 15 European countries. Therefore, European CPs played a crucial role in preventing unnecessary emergency room visits by screening suspected patients, lessening the burden on the medical system, and maximizing their effectiveness.⁸ In Korea, the CPs guided the pharmacy visitors on how to use the COVID-19 test kit and how to report when the COVID-19 test yielded a positive result; however, direct COVID-19 testing by CPs was prohibited by law. Having CPs perform the COVID-19 test at community pharmacies in easily accessible areas enabled the early diagnosis of infectious disease and thus prevented any emergencies. During the COVID-19 pandemic, CPs in Korea actively played a role in guiding pharmacy visitors on how to use the COVID-19 test kit and how to respond when the test yielded a positive result; as in the case of foreign countries, the expanded role of pharmacists in performing direct COVID-19 testing must be reviewed.

This study aimed to identify the specific CP role whose performance score was lower than the importance score and develop a plan to improve the performance level of that certain role; this survey showed that “Reporting adverse events” had the most significant difference in the performance and importance scores. CPs who participated in outreach pharmaceutical services more actively performed the corresponding role than those who did not participate in these activities. Because outreach pharmaceutical services for drugs include patient education and monitoring of medication side effects, participation in these activities may help in the reporting of adverse effects. CPs who provided these services might recognize that monitoring and reporting of adverse events are reasonable professional duties of CPs; this recognition might be connected to their role in monitoring and reporting the adverse events of vaccines and treatment agents during the COVID-19 pandemic. This finding is similar to that of a previous study, which demonstrated that CPs voluntarily accepted adverse event reporting as a pharmacist’s professional duty.^{29,30}

The survey results revealed that the role performance was positively associated with the use of information sources (KPA, academic journals, or professional books) and the frequency of daily updating of information sources. In the “Prevention education” (prevention phase), “Monitoring OTC” (response phase), and “Update the guidelines” (recovery phase), CPs who used the COVID-19-related information sources (professional books or journals) scored higher on perceived performance than those who did not use those sources. This result indicated that CPs attempted to provide evidence-based information to patients to prevent the spread of incorrect information and fake news.³¹ Moreover, the CPs who used resources every day performed the “Acquire information” role in the preparation phase and “Update the guidelines” role in the recovery phase more actively than those who did not use resources daily. This finding suggested that, as CPs

Table 3. Results of the logistic regression analysis of the performance of community pharmacists' roles

Variable	Phase 1 Prevention	Phase 2 Preparation	Phase 3 Response		Phase 4 Recovery
	P1_2 Prevention education ^a	P2_4 Acquiring information ^b	P3_4_2 Monitoring OTC ^c	P3_6 Reporting adverse events ^d	P4_2 Updating guidelines ^e
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Gender (vs. male)					
Female	1.36 (0.54–3.40)	1.08 (0.46–2.56)	0.63 (0.28–1.38)	0.56 (0.19–1.64)	0.70 (0.26–1.84)
Age group (y) (vs. <40)					
40–49	1.61 (0.28–9.32)	0.41 (0.09–1.95)	1.23 (0.27–5.64)	0.45 (0.05–3.73)	0.49 (0.07–3.51)
≥50	5.52 (0.98–31.16)	0.49 (0.11–2.24)	1.38 (0.30–6.35)	0.69 (0.09–5.13)	1.38 (0.21–9.17)
Employment (vs. employee)					
Owner	1.40 (0.46–4.24)	1.78 (0.60–5.29)	1.81 (0.65–5.04)	1.41 (0.35–5.63)	1.85 (0.53–6.47)
Community pharmacy experience (vs. <10 y)					
≥10 years	1.11 (0.23–5.35)	1.95 (0.48–7.84)	0.63 (0.16–2.53)	0.74 (0.11–5.16)	0.45 (0.08–2.60)
Average working hours per day (vs. <9 h)					
≥9 hours	1.06 (0.42–2.68)	0.40 (0.16–1.00)	1.13 (0.48–2.64)	0.86 (0.28–2.63)	1.36 (0.48–3.84)
Participation in additional pharmacist services (vs. no)					
Yes	0.80 (0.35–1.85)	0.84 (0.38–1.86)	1.44 (0.68–3.06)	3.02 (1.07–8.56)*	1.02 (0.41–2.58)
Counseling and providing information on efficacy and side effects of over-the-counter medicines (vs. not every time)					
Every time	2.80 (1.18–6.61)*	1.31 (0.58–2.92)	1.57 (0.72–3.45)	1.80 (0.65–5.02)	1.51 (0.60–3.82)
Source of information related to COVID-19^f					
Government (MHW/KDCA/MFDS/others)	1.09 (0.46–2.57)	1.10 (0.48–2.52)	0.45 (0.20–1.03)	1.27 (0.43–3.73)	0.77 (0.29–2.03)
Korean Pharmaceutical Association	1.55 (0.66–3.62)	2.55 (1.13–5.75)*	1.44 (0.65–3.16)	1.48 (0.50–4.37)	1.66 (0.63–4.40)
Academic journals or professional books	4.51 (1.68–12.11)**	1.62 (0.65–4.04)	2.52 (1.05–6.03)*	1.59 (0.52–4.84)	4.26 (1.5–12.06)**
Online newspapers	0.34 (0.14–0.79)*	1.06 (0.48–2.37)	0.62 (0.30–1.31)	1.93 (0.64–5.80)	0.32 (0.13–0.84)*
SNS (Kakao Talk/Twitter/Facebook/others) or YouTube	0.45 (0.17–1.20)	1.43 (0.54–3.76)	1.27 (0.50–3.27)	1.08 (0.33–3.53)	0.81 (0.27–2.38)
Frequency of use of information sources (vs. ≥2 days)					
Every day	1.09 (0.76–4.29)	3.97 (1.66–9.48)**	1.79 (0.80–4.01)	0.98 (0.32–3.03)	3.20 (1.18–8.67)*
Pharmacy location (vs. pharmacies with no medical facilities nearby)					
Near general hospital /hospital/the clinic	1.55 (0.29–4.84)	0.64 (0.17–2.47)	0.78 (0.20–3.07)	0.64 (0.12–3.37)	0.35 (0.08–1.58)
No. of working pharmacists (vs. 1 pharmacist)					
≥2 pharmacists	4.51 (0.27–2.11)	0.43 (0.16–1.14)	0.68 (0.27–1.72)	0.55 (0.16–1.93)	0.75 (0.25–2.25)
No. of prescriptions per day/amount of general sales per day excluding prescription drugs (vs. <100 or < ₩ 500,000)					
≥100 or ≥ ₩ 500,000	0.34 (0.56–3.53)	2.17 (0.86–5.51)	1.31 (0.56–3.04)	1.26 (0.39–4.06)	0.96 (0.35–2.64)

Abbreviations: CI, confidence interval; KDCA, Korea Disease Control and Prevention Agency; MFDS, Ministry of Food and Drug Safety; MHW, Ministry of Health and Welfare; OR, odds ratio.

^aProvision of infection prevention education, such as hand hygiene, social distancing, and proper use of masks.

^bCollecting and updating the latest information for the treatment and management of patients with COVID-19.

^cThe shortage of over-the-counter or quasi-drug supply should be monitored to urge the government and KPA to provide a solution or exchange insufficient over-the-counter drugs through local pharmacies.

^dReporting of the adverse events of COVID-19 vaccines and treatments to the Ministry of Food and Drug Safety, Korea Institute of Drug Safety and Risk Management, and the Korean Pharmaceutical Association

^eUpdate of work guidelines related to the pandemic (prevention, stockpiling, dispensing, administration, etc.) and preparation of internal evaluation data.

^fRef. Not using this information source.

*P<0.05,

**P<0.01 using logistic regression...

use resources daily, they are more likely to obtain the latest information and update relevant guidelines. Regarding the role of pharmacists, the inability to collect more updated information commonly affected their performance in the 4 phases. Therefore, obtaining accurate and updated information during a pandemic is important to pharmacists as health-care professionals,³² and we

suggest that the Pharmaceutical Association and academia provide CPs with reliable information daily. This will ensure that the CPs have access to the latest scientific evidence, which they can use to provide the best possible care to their patients.

CPs responded that insufficient economic compensation, the lack of communication channels, and legal limitations hindered

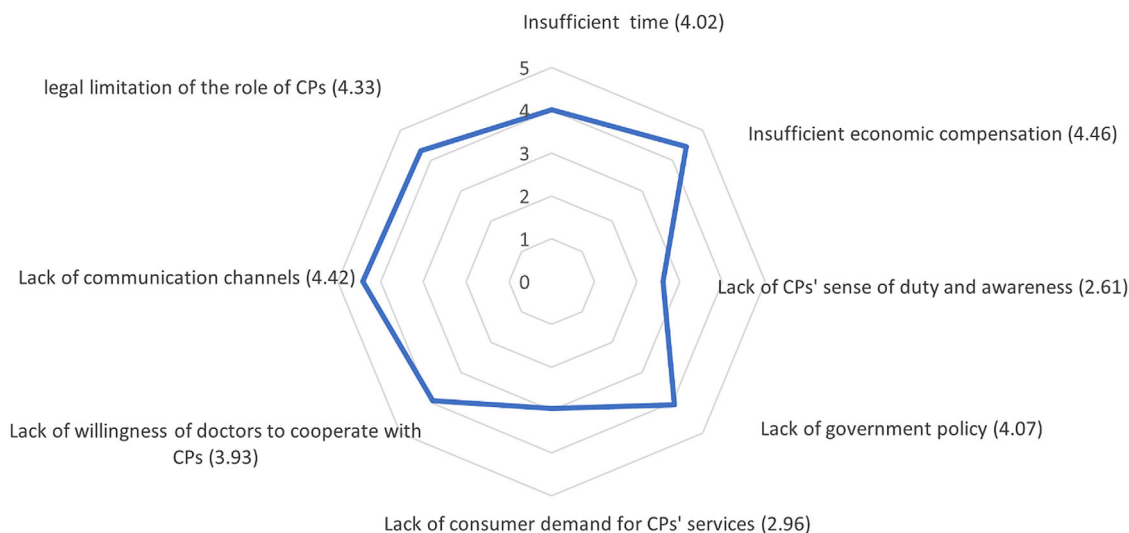


Figure 1. Limiting factors for pharmacists to perform the role in the COVID-19 pandemic.

the role performance. Some of these were also limiting factors for CPs in other countries. Organizations representing pharmacists in the United States and Europe suggested expanding the roles of CPs, such as COVID-19 testing and vaccination, to more efficiently support the COVID-19 response and ensure that patients received the necessary medical treatment; relevant policies were jointly published, such as appropriate compensation for the roles.^{8,33} The lack of communication among health authorities was confirmed as a barrier to the CPs' role performance in France.³⁴ In addition, the CPs of the current study responded with additional limiting factors. For instance, CPs expressed concern about the shortage and out-of-stock status of medicines and suggested simplifying the process of substituting the prescribed generic drugs, and active ingredient prescribing. In addition, drug shortages and the additional economic burden of pharmacy quarantine were stated as the limiting factors. In summary, we suggest a rapid response from the government to reduce the impact of these limiting factors in the future. For instance, expansion of the legally permitted CPs' role to include elements such as immunizations,³⁴ economic compensation for service provision,⁸ and collaboration with general practitioners and health authorities can be considered.³⁵ Furthermore, pharmaceutical associations should construct a system to actively and knowingly prepare, respond, and recover from disasters and emergencies, allowing more CPs to participate.³⁶ Pharmaceutical associations should allow the integration of CPs into a health-care team when responding to a local disaster or pandemic.

This study used the PPRR phase to assess the importance and performance of CPs' roles in disaster management. This approach allowed the examination of CPs' roles across the entire disaster management process, from prevention to recovery. The roles with the largest gap between perceived importance and performance were also identified, which can be prioritized for improvement. Despite these advantages and the significance of the study, caution should be observed when interpreting the study results due to the following limitations. First, the performance level was not directly measured with objective data but was considered self-perceived by CPs. There may be a gap between the actual performance levels. Considering that this study aimed to identify the degree and difference of the importance and performance perceived by pharmacists, which has not been identified in previous studies, the

self-evaluation results are meaningful. However, future studies can provide more accurate results using objective measurement methods. Second, only respondents who worked as CPs in Seoul were included in the survey. Although this study could not include CPs nationwide, Seoul is the largest city in Korea, and approximately 25% of CPs nationwide work in Seoul.²⁶ Hence, this does not negatively affect the representation. Finally, the investigated roles were not considered at the global level. Due to the circumstances caused by the pandemic, the roles of CPs are expanding worldwide, including vaccination and prescription refills. However, this study did not investigate these roles as they are illegal in Korea.

Conclusions

This study identified the roles in which CPs performed differently than their perceived importance during the COVID-19 pandemic and the factors that inhibited their performance. The information source, frequency of information acquisition, public roles of CPs like participation in outreach pharmaceutical services, monetary compensation for CPs' services, legal restrictions on CPs' role, and communication channels should be improved to enhance the performance of CPs' role in disasters. This will ensure that CPs are equipped to provide the highest quality care to their patients, even in the event of a future pandemic.

Supplementary material. To view supplementary material for this article, please visit <https://doi.org/10.1017/dmp.2023.221>

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