

Pandemic preparedness among community pharmacists across South Carolina

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ABSTRACT

Objectives: As the most easily accessible healthcare professionals, community pharmacists often work with public health agencies to ensure patients receive care during natural disasters and public health emergencies, such as the COVID-19 pandemic. However, there is a gap in the literature exploring pharmacists' level of pandemic preparedness and previous training acquired. The objectives of this study were to 1) determine pharmacists' current and past pandemic preparedness and experiences, 2) identify pharmacists' pandemic-related knowledge, and 3) examine pharmacists' modified practices in response to COVID-19.

Methods: A descriptive cross-sectional survey was administered to actively practicing community pharmacists, specifically pharmacists in charge, throughout the state of South Carolina. The survey was hosted on Qualtrics and distributed via postcard mailed to pharmacists' addresses obtained from the SC Board of Pharmacy. Pharmacists received a custom postcard with a unique QR link to the online survey. Additional recruitment methods included a second round of postcards and reminder telephone calls with follow-up information sent via email and/or fax. The survey consisted of several questions in three domains including: participant demographics, pandemic knowledge, and pandemic practice. All data analysis was conducted using the IBM Statistical Package for Social Sciences (SPSS). Descriptive statistics were used to characterize participants and their practice settings and to summarize results.

Results: A total of 104 South Carolina community pharmacists completed the survey. The majority of respondents (74%) do not have, or are unsure if their pharmacy has, a formal plan or agreement with local health departments in place that would prepare them to respond to the COVID-19 pandemic. Pharmacists reported engaging a wide range of strategies to protect their staff and patients from COVID-19. This includes local or state mandated protocols, such as reduced hours of operation (12.5%), limited number of individuals in the building at one time (32.7%), limited services offered (9.6%), and required face coverings (64.4%). Many respondents indicated additional measures their pharmacy has put in place including encouraging employees to stay home when sick (92.3%), cleaning high-touch surfaces

frequently (89.4%), installing physical barriers between patients and staff (76.0%), and encouraging patients to call in refills rather than wait in the pharmacy. While only 4.8% of respondents had participated in pandemic preparation exercises, and only 12.5% reported receiving formal epidemic and/or pandemic education, the majority of pharmacists correctly answered questions asking them to define 'pandemic' (90.4%) and 'close-contact' (77.9%) and to select pharmacy-specific CDC guidance (67.3%).

Conclusions: Pandemic preparedness plans and formal training are limited among community pharmacies in South Carolina. Willingness to participate in outbreak efforts, though, is noted by pharmacy protocols to protect staff and patients and by the creation of formalized plans and agreements with local health departments in preparation for the COVID vaccine. Pandemic preparedness plans may increase readiness and ability to combat pandemic situations, but further studies are needed to assess their impact.

Introduction

As vital members of interdisciplinary healthcare teams, pharmacists have essential roles in patient care.¹ Pharmacists are the drug information experts and are relied on by their interdisciplinary team members to evaluate literature regarding medication therapies, to participate in patient treatment decisions, and to ensure patient access to these therapies and medications.² Patients have easy access to community pharmacists, and most pharmacists see their patients 1.5 to 10 times more frequently than patients see their primary care physicians.³ Patient care in the community also includes community pharmacists working with public health during emergencies and disasters to ensure patients are still being managed and cared for.

In the spring of 2009, H1N1, a novel influenza virus, also known as the “swine flu,” was discovered in the U.S. and quickly spread globally; according to the World Health Organization (WHO), this was the first flu pandemic in 40 years.⁴ Estimates between 151,000 and 575,000 people were infected and died from H1N1, with 80% of deaths in individuals less than 65 years of age.⁴ As seen during the H1N1 pandemic, community pharmacists assisted in creating national guidance for state officials so that community pharmacies could be partner vaccination sites for H1N1.⁵ A study conducted in 2017 in California used a simulation model to forecast the potential effect of retail pharmacy vaccine administration on pandemic flu vaccine uptake; the results showed that pharmacists could increase the numbers of vaccine doses administered and reduce the time to achieve 80% coverage.⁶ As part of pandemic efforts, vaccine recommendations and administration are large roles that can be fulfilled by pharmacists.

Now, the world is experiencing a pandemic ruled by the novel coronavirus, SARS-CoV-2, or COVID-19, a respiratory virus that is spread from person to person via droplets than can cause mild to severe illness, with more common symptoms including fever or chills, cough, shortness of breath, fatigue, muscle/body aches, headache, loss of taste or smell, sore throat, congestion, nausea or vomiting, and diarrhea.⁷ The first case documented in the U.S. was in January 2020 and has rapidly spread since. As of June 2021, the CDC has reported more than 33 million cases and nearly 600,000 deaths.⁷ Pharmacists are on the frontlines battling this pandemic. It is important to understand pharmacy pandemic preparedness to inform COVID-19 and future pandemic response efforts.

Previous research identified existing relationships with pharmacies and planning activities reported by public health programs, finding that state public health programs are willing to work with pharmacies but that there were significant gaps in the planning process and lack of needed formalized relationships.⁸ Several studies outside of the U.S. have specifically looked at pandemic preparedness among pharmacists: Basheti and colleagues found that only about half of pharmacists believed they received enough education previously about epidemics/pandemics,⁹ and in community pharmacies in Egypt, researchers concluded that more attention was needed for infection control measures regarding interactions between staff and customers.¹⁰ To help combat pandemics, it is important for pharmacists to stay up-to-date on recommendations and guidelines and to learn the roles required of pharmacists in these efforts.

However, few studies have identified U.S. pharmacists' experiences preparing for pandemic response. Thus, the purpose of this project is to determine South Carolina community pharmacists' current and past pandemic preparedness experiences, pandemic-related knowledge, and modified practices in response to COVID-19. This data will support our long-term goal of improving pharmacist preparedness to respond in pandemic situations.

Objectives

The objectives of this study were to 1) determine pharmacists' current and past pandemic preparedness and experiences, 2) identify pharmacists' pandemic-related knowledge, and 3) examine pharmacists' modified practices in response to COVID-19.

Methods

Study Design and Sample

This study used a cross-sectional survey to identify community pharmacists' pandemic preparedness knowledge, perceptions, and willingness to participate in outbreak response efforts. This study was part of a larger survey investigating pharmacist current practices and perceived barriers related to immunization services and the COVID-19 pandemic. Eligible participants included actively practicing community pharmacists, specifically pharmacists in charge, throughout the state of South Carolina.

A list of active pharmacists' addresses and phone numbers were obtained from the South Carolina Board of Pharmacy. Initial recruitment included a postcard containing a link and QR code to the electronic survey, as well as a unique survey code for each pharmacist. The postcard detailed the purpose of the survey and how to access it online via the link or QR code. To ensure only eligible community pharmacists were included, a screening question was included at the beginning of the survey to identify primary pharmacy practice setting and to exclude non-community pharmacist participants. Recruitment began with postcards mailed to potential participants in December 2020, and at 4 weeks, reminder calls were made to those who received postcards. Upon calling, participants were asked if they would like to receive the survey details and link via email or fax if the information was needed. A second round of postcards were also mailed out during the follow-up phase. Each participant received a \$10 Amazon e-gift card and were entered into a drawing to win 1 of 5 \$50 Amazon e-gift cards. This study was granted exemption by the University of South Carolina Institutional Review Board Committee.

Survey Variables and Measures

This study was part of a larger survey exploring immunization and COVID-19 pandemic practices. This report focuses on four survey domains including: 1) current and past pandemic preparedness and experiences, 2) pandemic-related knowledge, 3) COVID-19 response, and 4) demographics. A series of multiple choice and select-all-that-apply questions were used to identify pharmacists' current and past pandemic preparedness and experiences, knowledge, and COVID-19 response. For example, respondents were asked to indicate presence of a formal plan or agreement using a multiple-choice item, "Does your pharmacy currently have a formal plan or agreement with a public health entity related to the COVID-19 pandemic?" with response options including yes, no, or unsure. Further details about this plan were obtained via a select-all-that-apply item, "Which (if any) of the following does this agreement include? Select all that apply." Possible response options included COVID-19 vaccine distribution, COVID-19 vaccine administration, maintain stock of prescription medications, obtain PPE, screen patients, public education, or other. Free response items were included to elicit additional information regarding pharmacies policies and procedures developed in response to the

COVID-19 pandemic. The survey was created in Qualtrics and completed electronically by respondents.

Pre-testing

Survey questions were developed and refined by the research team. To ensure content validity, the survey was pre-tested among a sample of five pharmacists prior to distribution. Upon completion of pre-testing, minor modifications were made based on feedback provided.

Data Analysis

Completed surveys were reviewed weekly during the three-month collection period. Deidentified data were analyzed using the IBM Statistical Package for the Social Sciences (SPSS) version 27.0 (IBM Corp., Armonk, NY). Descriptive statistics were used to describe respondent characteristics, current pandemic preparedness, knowledge, perceptions, and willingness to participate in outbreak response efforts. Responses to open-ended questions were qualitatively analyzed and themes were reported in the results.

Results

A total of 104 individuals completed the survey. Table 1 displays characteristics of the pharmacist respondents and their pharmacies. The majority of respondents were female (53.5%), white (89.9%), with a PharmD degree (72.7%) and employed as a pharmacy manager at the primary practice site (72.7%). The greatest proportion of respondents were employed in a national chain pharmacy (43.3%), followed by single independent pharmacy (24.0%), and multi-store independent pharmacy (21.2%).

Table 1. Respondent Characteristics

Pharmacist & Pharmacy Characteristics	N(%)
Sex (N=99)	
Female	53 (53.5)
Male	45 (45.5)
Prefer not to answer	1 (1.0)
Race (N=99)	
White	89 (89.9)
Black or African American	3 (3.0)
Asian	2 (2.0)
Native Hawaiian or Pacific Islander	2 (2.0)
American Indian or Alaska Native	1 (1.0)
Other	2 (2.0)
Prefer not to answer	2 (2.0)
Ethnicity (N=99)	
Not Hispanic or Latinx	92 (92.9)
Hispanic/Latinx	0
Prefer not to answer	7 (7.1)
Highest Level of Pharmacy Training (N=99)	
PharmD	72 (72.7)
BSP Pharm	25 (25.3)
Residency	1 (1.0)
Master's Degree	1 (1.0)
Title (N=99)	
Pharmacy Manager	72 (72.7)
Staff Pharmacist	20 (20.2)
Owner/Partner	19 (19.1)
Other	1 (1.0)
Primary Practice Setting (N=104)	
National chain pharmacy	45 (43.3)
Regional chain pharmacy	4 (3.8)
Single independent pharmacy	25 (24.0)
Multi-store independent pharmacy	22 (21.2)
Supermarket pharmacy	8 (7.7)
Mean (SD)	
Age	40.9 (11.23)
Years practicing as a pharmacist	15.9 (11.97)

Current Pandemic Preparedness, Past Pandemic Experience, and Knowledge

Table 2 details the number of pharmacies with a formal plan or agreement in place with a public health entity to combat the COVID-19 pandemic. A total of 27 pharmacies (26.0%) reported that their pharmacy had a formal plan or agreement in place with a local health department at the time of completing this survey. These agreements include details for COVID vaccine distributions, vaccine administration, ensuring the pharmacy has prescription medications in stock, obtaining PPE, screening patients for COVID-19, and public education. Of those that did not have or were unsure of a formal plan or agreement, only one pharmacy had contacted their local health department or public health agency to begin the process. The majority of respondents had practiced as a pharmacist during the H1N1 outbreak (56.7%). During this time, pandemic preparedness plans were also uncommon, with only two respondents indicating they had a plan in place prior to H1N1. Further, only six respondents

Table 2. Current Pandemic Preparedness and Past Experience, N=104

	N(%)
Formal plan or agreement currently in place with a public health entity	
Yes	27 (26.0)
No	36 (34.6)
Unsure	41 (39.4)
Plan/Agreement Components (N=27)	
COVID-19 vaccine distribution	18 (17.3)
COVID-19 vaccine administration	22 (21.2)
Maintain stock of prescription medications	13 (12.5)
Obtain PPE	13 (12.5)
Screen patients	14 (13.5)
Public education	11 (10.6)
Don't know	1 (1.0)
No formal plan in place, but have contacted local health department to begin process (N=36)	
Yes	1 (1.0)
No	35 (33.7)
Practiced as a pharmacist during the H1N1 outbreak	
Yes	59 (56.7)
No	45 (43.3)
Pandemic preparedness plan in place at the time of H1N1 outbreak(N=59)	
Yes	2 (1.9)
No	32 (30.8)
Unsure	25 (24.0)
Developed pandemic preparedness plan after H1N1?	
Yes	6 (5.8)
No	44 (42.3)
Unsure	52 (50.0)
Administered H1N1 vaccines? (N=59)	
Yes, agreement with public health entity to obtain vaccines once available	13 (12.5)
Yes, but no agreement with a public health entity	13 (12.5)
No	28 (26.9)
Unsure	5 (4.8)
Pharmacy school curriculum included epidemic and/or pandemic education	
Yes	13 (12.5)
No	66 (63.5)
Unsure	24 (23.1)
Participated in pandemic preparation exercises prior to COVID-19 pandemic	
Yes	5 (4.8)
No	91 (87.5)
Unsure	6 (5.8)
COVID-19 guideline and recommendation information sources	
Social media (Facebook, Twitter, Instagram, etc.)	28 (26.9)
CDC	86 (82.7)
WHO	12 (11.5)
DHEC	75 (72.1)
TV	18 (17.3)
News websites/articles	40 (38.5)
Friends	12 (11.5)
Professional pharmacy organizations	59 (56.7)
Other	9 (8.7)

indicated that after this experience, their pharmacy did work to develop a pandemic preparedness plan. Only 4.8% of respondents had participated in pandemic preparation exercises prior to the COVID-19 pandemic, and only 12.5% reported receiving epidemic and/or pandemic education within their pharmacy school curriculum. Despite this, the majority of pharmacists answered questions about pandemic definition (90.4%), pharmacy-specific CDC guidance (67.3%), and close-contact (77.9%) correctly (Table 3).

	Answered Correctly	Answered Incorrectly
Which of the following defines a pandemic? <ul style="list-style-type: none"> ○ Constant presence and/or usual prevalence of a disease or infections agent in a population within a geographic area ○ Epidemic that has spread over several countries or continents, usually affecting a large number of people ○ Aggregation of cases grouped in place and time that are suspected to be greater than the number expected\ ○ Increase, often sudden, in the number of cases of a disease above what is normally expected in that population area 	94 (90.4)	10 (9.6)
Guidance for pharmacies per CDC recommendation includes which of the following? <ul style="list-style-type: none"> ○ Pharmacists and pharmacy technicians should always wear a facemask while in the pharmacy. ○ Staff who are sick should stay home until completely recovered ○ Hand sanitizer with at least 60% alcohol should be provided to patients in the pharmacy ○ None of these are CDC recommendations 	70 (67.3)	34 (32.7)
Close contact to an infected person includes which of the following per CDC recommendations? <ul style="list-style-type: none"> ○ Within 15 feet for at least 15 minutes ○ Within 6 feet for at least 20 minutes ○ Within 20 feet for at least 20 minutes ○ Within 6 feet for at least 15 minutes 	81 (77.9)	23 (22.1)

Table 3. Pharmacists' Pandemic-Related Knowledge, N=104

Modified Practices in Response to COVID-19

Pharmacists reported implementing a wide range of strategies to protect their staff and patients from COVID-19 (Table 4). This included local or state mandated protocols, such as reduced hours of operation (12.5%), limited number of individuals in the building at one time (32.7%), limited services offered (9.6%), and required face coverings (64.4%). Many respondents indicated additional measures their pharmacy has put in place including encouraging employees to stay home when sick (92.3%), cleaning high-touch surfaces frequently (89.4%), installing physical barriers between patients and staff (76.0%), and encouraging patients to call in refills rather than wait in line. Less frequently employed strategies included refusing to handle patient bottles for refills (20.2%), operating with drive-thru only, and requiring electronic or telephone prescriptions only (3.8%). The majority of

pharmacies did *not* close at any time during the COVID-19 pandemic (81.7%), however some did offer additional services to minimize patient contact including curbside pick-up (18.3%), drive-thru (12.5%), and delivery (4.8%) services. A range of PPE was provided to pharmacy staff and available for patient purchase.

Five major themes, listed in Table 5, were reported by respondents regarding modifying pharmacy practice. These themes included enhanced cleaning protocols, social distancing, COVID-19 screening/testing, enforcing face coverings, and providing additional precautions for close-contact services, such as administering immunizations.

Table 4. COVID-19 Response and Modified Practices, N=104

	N (%)
Local or State Mandated Protocols	
Reduced hours of operation	13 (12.5)
Limited # of individuals in building at one time	34 (32.7)
Limited services allowed to be offered	10 (9.6)
Required face coverings	67 (64.4)
Other	7 (6.7)
Measures in place to protect staff and customers	
Operating with drive-thru only	6 (5.8)
Requiring patients to wear a mask	86 (82.7)
Limiting the capacity of the pharmacy	37 (35.6)
Requiring employees to wear a mask	90 (86.5)
Encouraging employees to stay home if sick/fever	96 (92.3)
Cleaning high-touch surfaces frequently	93 (89.4)
Requiring electronic or telephone prescriptions only	4 (3.8)
Refusing to handle patient bottles for refills	21 (20.2)
Encouraging patients to call in refills rather than wait in line	50 (48.1)
Installing physical barriers between patients and staff	79 (76.0)
Other	4 (3.8)
Pharmacy closure to the public during the initial outbreak of COVID-19	
Yes	
<1 month	5 (4.8)
1-2 months	7 (6.7)
>2 months	4 (3.8)
Still closed	2 (1.9)
No, we did not close	85 (81.7)
Strategies employed to manage patient prescriptions with limited public contact	
Drive-thru	13 (12.5)
Delivery	5 (4.8)
Curbside	19 (18.3)
Other	1 (1.0)
PPE Available to Pharmacy Staff	
Surgical masks	89 (85.6)
Cloth masks	43 (41.3)
N95 masks	38 (36.5)
Face shields	62 (59.6)
Gloves	90 (86.5)
Gowns	26 (25.0)
Eye protection	19 (18.3)
PPE Available for Patient Purchase	
Hand sanitizer (at least 60% alcohol)	96 (92.3)
Disinfectants	69 (66.3)
Surgical masks	82 (78.8)
Cloth masks	68 (65.4)
N95 masks	22 (21.2)
Face shields	33 (31.7)
Gloves	77 (74.0)
Thermometers	83 (79.8)

Theme	Quote
Enhanced cleaning protocols	<p>"If we come into contact with a covid positive patient we have extensive cleaning protocol for pharmacy."</p> <p>"We clean and sanitize surfaces and door handles often. Our staff is also more aware of touch points regarding hard copy scripts and money."</p>
Increased social distancing	<p>"In the beginning, we closed our lobby and served patients through the drive through window only. Our doors have been reopened, but most patients feel safer in their vehicles instead of coming inside."</p> <p>"We have tried to put everyone's credit card on file, along with an id, so to eliminate the exchange of germs."</p>
COVID-19 screening and testing	"Staff tested if any symptoms present."
Face covering enforcement	<p>"We all wear face masks, at all times, and require the public to do the same."</p> <p>"We wear new surgical grade masks each day per CDC guidelines."</p>
Additional precautions for close-contact services	"Temperature is taken and covid questions asked before vaccinating and requiring patient and pharmacist to wear masks."

Table 5. Pharmacy Modified Practices Themes

Discussion

The effectiveness of pharmacies in distributing vaccines has been widely demonstrated, with approximately 32% of U.S. adults receiving an influenza vaccine in a pharmacy setting in 2019.¹¹ Simulation models for pandemic influenza vaccination indicate that inclusion of community pharmacy vaccination efforts reduce the time required to reach 80% national vaccination coverage by 7 weeks.⁶ However, the ability of pharmacies to serve their communities in this manner are limited by a lack of formal pandemic preparedness plans and training. While South Carolina pharmacists demonstrated acceptable pandemic-related knowledge, and swiftly modified their practice to align with recommendations protecting staff and patient health, their overall pandemic preparedness is limited. Only 26.0% of pharmacies surveyed reported having a formal plan or agreement in place with local public health entities. Previous research suggests that despite most public health programs recognizing pharmacists, specifically community pharmacists, as valuable public health partners in outbreak response efforts, there were significant gaps in planning processes that would hinder the ability of pharmacies to participate in a timely manner.⁸ These planning gaps primarily centered around inclusion of pharmacists as pandemic vaccinators, and recognized limitations in quickly recruiting pharmacies and distributing vaccines including lack of up-to-date contact information, inconsistent recruitment processes, and inconsistent inclusion of pharmacies in local vaccine allocation and distribution plans.⁸ This previous research aligns with the results from this survey and demonstrate that efforts to improve pandemic preparedness and formal agreements between South Carolina pharmacies and public health entities are warranted.

Although the majority of respondents were actively practicing pharmacists during H1N1 in 2009, only 44% of those practicing at the time participated in vaccination efforts. This is not surprising, as pharmacies were not widely included in H1N1 vaccine administration until December 2009 and provided only 4.3% of doses administered.¹² As of June 3, 2021, more than 80 million doses of COVID-19 vaccines were administered by retail pharmacies in the United States, with more than 41,000 participating pharmacy locations.¹³ Most survey participants indicated that their pharmacy did not create a pandemic preparedness plan following the H1N1

outbreak. Previous studies have found that pharmacists with past experience during public health emergencies are more likely to participate in future pandemic response efforts.^{14, 15}

Limited pandemic education and training may be factors related to the lack of pandemic preparedness plans. The constant during both H1N1 and COVID-19 is that pharmacies remained open to serve their communities. Community pharmacists are known for their accessibility to patients, and that has not changed throughout this pandemic. The ability to maintain pharmacy operations and care for patients during a worldwide emergency is a necessity. Pharmacies managed this while making necessary changes to safely care for patients, while also keeping pharmacy staff healthy. Safety guidelines, both for pharmacy staff and patients, were initiated at the majority pharmacies during the start of COVID-19. Most of these protocols, and pharmacy-specific policies and procedures, completely changed the pharmacy's workflow, both inside and outside of the pharmacy – protective barriers between patient and pharmacist, drive-thru or curbside pickup only, hourly cleaning schedules, not accepting patient bottles for refills. These safety measures and pharmacy protocols are important features of a preparedness plans.

Though only nine respondents had an agreement with public health during H1N1 for administering vaccines, many more are willing to create these formal agreements. At the end of the collection period for this survey, almost 30% of pharmacies had a plan in place with a local health department to battle the pandemic. Future efforts to improve pandemic preparedness of community pharmacies should be informed by experiences during the H1N1 and COVID-19 pandemics and should be made widely available to community pharmacy staff. These efforts should include an emphasis on the value of and process for establishing formal plans and agreements with local and state public health entities, as well as routine review and updating of existing plans. Formal education and training should be provided to pharmacy staff to develop pharmacy policies and protocols and collaborative exercises can strengthen relationships between pharmacies and public health agencies. Findings from previous pandemic exercises, such as the PANRx, which facilitated pandemic preparedness exercise and discussion in Washington, may inform future programs to engage both public health and pharmacy, and learn from H1N1 and COVID-19 lessons.¹⁶ Ultimately, the information gathered through this

survey will inform the development of training programs and interventions in collaboration with key stakeholders to improve pharmacy participation in pandemic response efforts.

This study's limitations should be recognized. First, due to the cross-sectional nature of this survey, no causal relationships can be inferred. Second, due to the measurement of self-reported behaviors, social desirability and recall biases may be present. The conclusions drawn from this study may not be generalizable to other locations as inclusion was limited to South Carolina pharmacists. Further, the sample size was limited at 104 pharmacists. Participants who responded to this survey may differ from non-respondents. Finally, another limitation is only having pharmacists in charge participate – many of the participants were no longer the PIC and others had moved to another pharmacy. Allowing any actively practicing community pharmacist to participate may have resulted in a larger response rate but would have included duplicate respondents per pharmacy.

Conclusions

Pandemic preparedness plans and formal training are limited among community pharmacies in South Carolina. Willingness to participate in outbreak efforts, though, is noted by pharmacy protocols to protect staff and patients and by the creation of formalized plans and agreements with local health departments in preparation for the COVID vaccine. Pandemic preparedness plans may increase readiness and ability to combat pandemic situations, but further studies are needed to assess their impact.

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