



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Contents lists available at ScienceDirect

Journal of the American Pharmacists Association

journal homepage: www.japha.org

RESEARCH

Perceptions and barriers to the annual influenza vaccine compared with the coronavirus disease 2019 vaccine in an urban underserved population

Janessa R. Cohrs, Jay M. Mirtallo, Jennifer L. Seifert*, Sarah M. Jones, Ashley M. Erdmann, Junan Li

ARTICLE INFO

Article history:

Received 2 July 2021

Accepted 18 October 2021

Available online 21 October 2021

ABSTRACT

Background: For a vaccine to be successful, communities must perceive it as important, safe, effective, and necessary. However, there are many barriers and hesitations to vaccination. Underserved patient populations may face additional challenges related to access and cost. Because community pharmacists improve vaccine access and increase vaccination rates, it is beneficial for pharmacists to understand perceptions and barriers to vaccinations in their community to increase vaccine confidence.

Objectives: This study aims to assess and compare barriers and perceptions of the annual influenza to the coronavirus disease 2019 (COVID-19) vaccine for underserved patients of a charitable pharmacy.

Methods: Patients who qualified to receive medications from an outpatient charitable pharmacy took an electronic survey when receiving medications. The survey incorporated questions developed by the World Health Organization's Strategic Advisory Group of Experts on Vaccine Hesitancy on a 5-point Likert scale. Questions about the influenza and COVID-19 vaccines mirrored one another. Demographic data such as age, race, sex, and education level were also collected.

Results: Of the 189 patients surveyed at the charitable pharmacy, 71.7% were 55 years old and older and 58.9% were female. Of note, 78% and 77% of participants agreed or strongly agreed that the influenza and COVID-19 vaccines, respectively, were important for the health of others in their community. Adverse effects and the cost of the COVID-19 vaccine were noted to be statistically significantly more of a concern with the COVID-19 vaccine than that of the influenza vaccine ($P < 0.001$).

Conclusion: Ensuring equitable vaccine access, promoting the COVID-19 vaccine as free, and eliciting and addressing individual persons' concerns related to vaccine safety and adverse effects are all important ways pharmacists and other health care providers and community stakeholders can help promote vaccine confidence within the populations they serve.

© 2022 Published by Elsevier Inc. on behalf of the American Pharmacists Association.

Background

For any vaccine to be successful, it must not only pass rigorous safety and efficacy standards throughout laboratory tests and clinical trials, but the widespread community must

also perceive it as important, safe, effective, and necessary. Vaccine acceptance happens at an individual level, yet the impact of receiving a vaccine moves beyond just the individual to also affecting the health of the greater community. Experts from Johns Hopkins School of Public Health, the World Health Organization (WHO), and many other organizations have stressed the importance of vaccine acceptance, especially in the face of the coronavirus disease 2019 (COVID-19) pandemic and the severe acute respiratory syndrome coronavirus 2 vaccines.¹

With the understanding that acceptance and uptake of vaccination are crucial to preventing the spread of a disease, there are many complex and multifactorial barriers and

Disclosure: The authors declare no relevant conflicts of interest or financial relationships.

* **Correspondence:** Jennifer L. Seifert, BSP Pharm, MS, BCGP, Director of Continuing Professional Development, The Ohio State University College of Pharmacy, 500 West 12th Ave., Columbus, OH 43210.

E-mail address: Seifert.20@osu.edu (J.L. Seifert).

Key Points**Background:**

- The success of vaccines depends on individual and community-level acceptance and uptake; however, there are many complex and multifactorial reasons why individuals do not receive vaccines.
- The coronavirus disease 2019 (COVID-19) vaccine poses a unique set of challenges and potential barriers to widespread acceptance.
- Community pharmacies have demonstrated an increase in vaccination rates by increasing vaccine access.

Findings:

- An underserved patient population at a charitable pharmacy largely accepted both the influenza and COVID-19 vaccines as important, safe, and effective at preventing influenza and COVID-19, respectively.
- The level of acceptance was similar for both the annual influenza vaccine and the COVID-19 vaccine.
- Concerns for adverse effects and the cost of the COVID-19 vaccine were statistically more significant than the influenza vaccine.

hesitancies to vaccination to address. Some of these barriers and hesitancies include concerns about vaccine safety, adverse effects, efficacy, and necessity and societal and peer influences, lack of education and understanding, fear of needles, and mistrust of the health care system. Often, barriers and hesitancies are amplified in underserved and minority populations. Because of several factors including a lack of access, education, language barriers, and health literacy, underserved populations have a higher chance of receiving inadequate care, misunderstanding explanations of treatments, and becoming lost to follow-up within the health care system. One recent study focusing on vaccine hesitancy and uptake in underserved African American older adults notes that social isolation, living alone, loneliness, and poor mental health may be associated with lower vaccination rates.² The cost of vaccines is one example of an additional challenge that underserved patient populations may face.

Specifically in the current COVID-19 pandemic, there are additional challenges that can further contribute to individual and community-level barriers and hesitancies. Some of these barriers include rapid vaccine development, limited supplies of high demand vaccines, decreased health care access because of diminished capacity and social distancing regulations, and changes to public transportation and access to public spaces. The COVID-19 pandemic has also highlighted new challenges that arise from the rapid dissemination of information and misinformation through media platforms. For the vulnerable, underserved people in a community, these pandemic-specific challenges may be amplified as well because many of these challenges already exist for patients who have difficulty accessing and utilizing the health care system

One demonstrated means to improving vaccine acceptance is by increasing the number of accessible vaccine providers. Community pharmacists play a key role in improving vaccine access and vaccination rates, particularly in areas where health care was previously lacking that often are home to many underserved patient populations.³⁻⁵ State and national-level health services have also acknowledged this as the U.S. Department of Health and Human Services recognized pharmacists' value as immunization providers by authorizing pharmacists to administer all childhood vaccines without a prescription during the COVID-19 pandemic.⁶ As accessible authorized providers of immunizations who are also able to establish relationships with patients, pharmacists need to understand individuals' perceptions and barriers to vaccination as the first step to increasing vaccine rates and ensuring widespread uptake. This is especially true for pharmacists who work in underserved patient populations and have built the rapport needed to care for these patients.

Community pharmacies are an easily accessible point of the health care system creating enhanced opportunities for daily patient contact, administering vaccines, and establishing relationships with patients who may otherwise have difficulty navigating the health care system. Pharmacists are uniquely placed within communities to be approachable, knowledgeable, familiar faces at pharmacies that serve as no or low-cost points of access to the health care system with extended hours and unique understanding of their communities' needs.

It is critical that pharmacists in community-based settings, especially in underserved areas, understand their patients' perceptions, potential hesitancies, and perceived barriers to vaccination. Especially in the COVID-19 pandemic, this understanding will help pharmacists and other health care providers know how to better address the perceptions and barriers their underserved patients may face to vaccination and medication access in general.

Objectives

For the sake of improving individual health and public health during the COVID-19 pandemic, the purpose of this study is to compare an urban underserved patient populations' perceptions and barriers of the influenza vaccine with the perceptions and barriers of the COVID-19 vaccine. The objectives of this study are to define the urban underserved patient population surveyed in this project, assess patients' perceptions and barriers of the influenza vaccine, assess patients' perceptions and barriers of the COVID-19 vaccine, and compare these urban underserved patients' perceptions and barriers with the influenza vaccine versus the COVID-19 vaccine. Ultimately, understanding patients better will elucidate ways to address the hesitancies and barriers this study identifies and improve vaccination rates within this patient population.

Methods*Study setting*

For more than a decade, the Charitable Pharmacy of Central Ohio's (CPCO) mission has been to provide affordable and appropriate pharmacy services and coordinate access to health care for people who are vulnerable in the community. CPCO strives to alleviate challenges related to cost and access by

providing medication-related services at no cost for low-income, uninsured, and underinsured residents of Franklin County, Ohio.

The CPCO provides prescription medications and pharmacy services to individuals living in Franklin County, Ohio, who are uninsured or underinsured. CPCO served 1530 unduplicated patients in 2020 with 54.5% of patients being female and 45.5% male. Approximately 8% of CPCO's population is Hispanic or Latino. The breakdown of race is 48% black or African American, 36% white, and 16% other or unknown. Notably, 29% of CPCO's patients are 65 years old and older, 33.2% are 55 to 64 years old, and 37.3% are 54 years old or younger. To qualify for CPCO's services, individuals must have an income at or below 200% of the federal poverty level. CPCO's services include prescription medications, medication counseling, medication therapy management, and blood pressure and blood glucose screenings (before moving services to fully curbside because of the COVID-19 pandemic). CPCO receives medications through multiple sources of inventory including donated repository medications, manufacturer bulk replenishment programs, and a formulary of purchased medications. Uniquely, CPCO also has a full-time social worker on site who coordinates the patient services team and connects patients to resources such as food, housing, transportation, and health care provider access.

Survey tool

This observational, cross-sectional study consisted of designing and implementing a survey tool to gauge patients' perceptions and barriers to both the influenza and COVID-19 vaccines.

The survey tool was derived from the question matrix developed by WHO's Strategic Advisory Group of Experts on Vaccine Hesitancy.⁷ The survey contained statements on a 5-point Likert scale about perceptions of the influenza vaccine and COVID-19 vaccine and barriers to receiving each of the vaccines. The questions about each vaccine mirrored one another for consistency and analysis. Responses to survey questions with a mean greater than 3 suggest that most participants agree or strongly agree with the statement, and mean values less than 3 for negative statements suggest that most participants disagree or strongly disagree with the statements. Perception-related questions included importance of the vaccine to the health of the individual and others, vaccine efficacy, adverse effects, trust of health care providers' recommendations, and willingness to receive each vaccine (once available). Barrier-related items assessed included travel, wait time, hours of operation, and vaccine cost. Demographic questions on the survey included age, gender, race/ethnicity, U.S. residency status, insurance status, and education level. Income level was not included because all CPCO patients must have an income at or below 200% of the federal poverty level. A full copy of the survey is available as a supplement to this manuscript. The survey tool was face validated for readability and comprehension via additional proofreading and testing by 5 individuals who were non-health care professionals. A native Spanish-speaking employee of CPCO and a bilingual member of the research team translated the survey into Spanish to help capture a sample that was more representative of the population CPCO serves.

Study protocol

This study was approved by The Ohio State University Institutional Review Board (IRB) as exempt category 2b. From January 2021 to March 2021, all new and existing patients of CPCO who speak English or Spanish and were 18 years old or older were eligible to participate in the survey and receive a \$5 gift card as an optional incentive for completing the survey. Funding for the gift card came from within CPCO's general operating budget. Willing participants consented to participate in the survey. This study excluded individuals who came to CPCO on behalf of qualified CPCO patients and were not qualified CPCO patients themselves, were less than 18 years old, or did not speak English or Spanish. The first survey question asked each participant whether they had previously completed the survey to help ensure participants did not take the survey more than once. Student research assistant volunteers from The Ohio State University College of Pharmacy (listed in the IRB) assisted in the recruitment, data collection, and incentive distribution. These students were trained on data collection policies through a virtual orientation and an on-site orientation on their first day of data collection.

When patients arrived at the pharmacy to pick up medication refills (curbside pickup only at the time of the study), the student research assistants asked the patients whether they would like to participate in an optional survey and gave an "invitation" on a half sheet of paper containing a brief explanation of the survey, its purpose, and offer for the incentive gift card for completing the survey. This paper also contained a short link and a quick response (QR) code to access the survey via an electronic device. If patients did not have an electronic device, they had the option of taking the survey on one of CPCO's iPads while they waited for their medications to be delivered to their vehicle. A student assisting with data collection could also help them access the survey on their personal electronic device.

To allow for the broadest and most generalizable study population, patients who received their prescriptions from CPCO through the mail received the same invitation paper (with the explanation of the survey, its purpose, the incentive gift card for completing the survey, and link/QR code to access the survey via an electronic device) in the mail with their prescription medications.

Upon completion of the survey, participants were redirected to a separate, optional survey where they entered their name and address to receive the optional incentive provided by CPCO. Participants could receive the \$5 gift card either in person at the pharmacy or through the mail. To keep survey responses anonymous, the information collected in the incentive survey remained separate from the study survey and could not be traced to any participants' responses.

The CPCO serves approximately 1500 unduplicated patients each year. Based on a 7% margin of error and a 50% response rate, we aimed to invite 348 patients to participate in the survey to obtain a target sample of 176 complete responses.

Data analysis

Only participants saying "yes, I consent to participate in this survey" were included in the data analysis. Given that all questions were optional and voluntary, some of these

Table 1
Survey participant demographics

Demographics, n = 189	Number (%)
Age (y), n = 159	
19–44	17 (10.7)
45–54	28 (17.6)
55–64	74 (46.5)
≥65	40 (21.2)
Gender, n = 112	
Female	66 (58.9)
Male	46 (41.1)
Race, n = 118	
Black or African American	41 (34.7)
White	63 (53.4)
Other	14 (11.9)
Education status, n = 114	
≤11th grade	15 (13.2)
High school graduate or GED	37 (32.5)
Some college, technical school, college, or graduate degree	62 (54.4)
Language of survey used	
English	184 (97.4)
Spanish	5 (2.6)

Abbreviation used: GED, general educational development.
Note: Values are number (%).

participants did not respond to all questions, leading to missing data for various questions throughout the survey. All statistical tests were 2 sided, and the significance level was preset at $\alpha = 0.05$. All individuals involved with data analysis only had access to deidentified data from the Qualtrics (Provo, UT) survey.

Demographic characteristics and patients' responses were first analyzed using descriptive statistics. Discrete data were presented as count (n) and frequency (%), and Likert scale data were summarized as mean and SD. Comparison of discrete data among different groups was analyzed using chi-square tests or Fisher exact tests where appropriate; Likert scale data were compared among different groups using *t*-tests (2 groups) or 1-way analysis of variance (ANOVA) (3 and more groups). Potential associations between responses to different questions were analyzed using chi-square tests or Fisher exact tests (between 2 discrete variables), *t*-tests or 1-way ANOVA (between a discrete variable and a Likert scale variable), and Pearson correlation analyses (between 2 Likert scale variables). Although open-ended survey questions were included in the survey tool, responses were not included in this analysis. R3.4 software (The R project for statistical computing, <http://www.r-project.org>, R Foundation) was used in this study.

Results

Demographics

At the conclusion of data collection, 189 patients at the CPCO consented to participate in this survey-based study. In general, participants were known to be a part of an underserved population given that they met the qualifications to receive medications from CPCO. Patient-reported demographics are listed in Table 1. Of those who participated, 60.4% were 55 years old and older and 34.9% were female. Participants were white (33.3%) and black or African American (21.6%), and 7.9% had an education of 11th grade or less. Of note, the age and gender distribution are comparable with that of CPCO's general patient

population. However, of the participants who disclosed their race, a larger portion of participants were white compared with CPCO's patient population.

Influenza and COVID-19 vaccine perceptions

When looking at the perception questions for both influenza and COVID-19 vaccines alone, as shown in Table 2, most participants answered in a way that reflected a positive view on vaccines, with mean values above 3 for positive statements, suggesting that most participants agreed or strongly agreed with the statements. Of note, participants most strongly agreed with the statement, "Getting the COVID-19 vaccine is important for the health of others in my community." Moreover, 77% of participants agreed or strongly agreed with this statement. For the mirrored statement regarding influenza vaccines, 78% of participants agreed or strongly agreed. In addition, 77% of participants agreed or strongly agreed with the statement, "I plan to get the COVID-19 vaccine this year." Approximately 76% of participants agreed or strongly agreed with the same statement regarding influenza vaccines.

Influenza and COVID-19 vaccine barriers

Similar to the perception questions for both influenza and COVID-19 vaccines alone, most participants had a positive outlook on the barriers. With means less than 3 for each barrier listed, most participants disagree or strongly disagree that any of the suggested options were perceived as a potential or actual barrier to receiving either the influenza or COVID-19 vaccine, as seen in Table 2. However, it is worth noting that some individuals within the surveyed population did identify the options to be an actual or potential barrier to receiving the influenza or COVID-19 vaccine. The cost of the COVID-19 vaccine was the largest perceived potential barrier, with 10 participants (7%) strongly agreeing and 36 participants (25%) agreeing that cost of the COVID-19 vaccine could make it difficult to receive the COVID-19 vaccine. All other barrier-related questions had no more than 26 participants total agreeing or strongly agreeing that any of the barriers listed could make it difficult for them get the influenza or COVID-19 vaccine.

Comparing influenza and COVID-19 vaccine perceptions and barriers

We compared participants' answers for each set of mirrored questions and found that there was largely no statistically significant difference in the way questions were answered regarding influenza vaccines and COVID-19 vaccines, as seen in the *P* values in Table 2. Exceptions to this were concerns for serious adverse effects and the cost of the vaccines as a perceived barrier to these vaccines. More individuals expressed concerns for serious adverse effects with the COVID-19 vaccine than the influenza vaccine. In addition, more individuals expressed concerns regarding cost of the vaccine being a barrier with the COVID-19 vaccine than the influenza vaccine. Answers to the open ended question "what is the first thing you want to know before you get the (COVID-19 or Influenza) vaccine" are listed in Table 3.

Table 2
Perceptions and barriers to the annual influenza vaccine compared with the COVID-19 vaccine

Question	Influenza vaccine		COVID-19 vaccine		P value ^a
	N	Mean (SD)	N	Mean (SD)	
Perceptions					
The ___ vaccine is important for my health.	154	3.97 (1.20)	167	4.00 (1.01)	0.76
The ___ vaccine is effective for preventing ___.	146	3.78 (1.17)	150	3.77 (1.06)	0.54
Getting the ___ vaccine is important for the health of others in my community.	143	4.01 (1.07)	150	4.13 (0.94)	0.55
New vaccines have more risks than older vaccines.	142	3.01 (1.03)	148	3.05 (1.05)	0.48
Getting the ___ vaccine is a good way to protect myself from the ___.	140	3.86 (1.17)	146	3.96 (1.02)	0.81
The information I get from my health care provider(s) about vaccines is reliable and trustworthy.	166	4.11 (0.96)	163	4.09 (0.85)	0.71
Generally, I do what my pharmacist recommends about the ___ vaccine.	135	3.77 (1.11)	135	3.72 (1.06)	0.75
Generally, I do what my doctor recommends about the ___ vaccine	140	4.04 (1.06)	137	4.04 (0.98)	0.78
Generally, I do what my nurse recommends about the ___ vaccine.	129	3.78 (1.11)	127	3.72 (1.06)	0.78
Generally, I do what my NP/PA recommends about the ___ vaccine.	131	3.87 (1.10)	130	3.88 (1.01)	0.22
I am worried about serious side effects of the ___ vaccine.	171	2.75 (1.15)	163	3.42 (1.27)	< 0.001
I plan to get the ___ vaccine this year.	150	3.93 (1.14)	145	4.02 (1.10)	0.41
If available, I would get my ___ shot from CPCO.	151	3.83 (1.15)	105	3.88 (1.02)	0.86
Barriers					
Distance to the pharmacy/clinic has made/could make it difficult for me to get a ___ vaccine.	170	2.29 (1.01)	158	2.28 (0.95)	0.55
The hours that the clinic/pharmacy is open has made/could make it difficult for me to get a ___ vaccine.	146	2.19 (0.92)	142	2.33 (1.01)	0.10
Wait time at the clinic/pharmacy has made/could make it difficult for me to get a ___ vaccine.	145	2.26 (1.02)	144	2.31 (1.00)	0.71
The cost it takes to get to the clinic/pharmacy has made/could make it difficult for me to get a ___ vaccine.	143	2.31 (1.02)	144	2.36 (1.07)	0.62
Transportation issues has made/could make it difficult for me to get a ___ vaccine.	143	2.27 (1.01)	143	2.22 (0.96)	0.92
The cost of the vaccine has made/could make it difficult for me to get a ___ vaccine.	144	2.31 (1.04)	143	2.72 (1.18)	< 0.001
If I had to travel for over an hour to get the ___ vaccine, it is worth my time to get it.	143	3.2 (1.24)	145	3.37 (1.24)	0.069
If I had to wait at the clinic for over an hour to get the ___ vaccine, it is worth my time to get it.	141	3.5 (1.20)	142	3.58 (1.14)	0.38

Abbreviations used: COVID-19, coronavirus disease 2019; CPCO, Charitable Pharmacy of Central Ohio; NP/PA, nurse practitioner or physician assistant.

^a All statistical tests (paired *t*-tests) were 2 sided and the significance level was 0.05. Data were in Likert scale and treated as continuous and "normally distributed." Missing data were not included in statistical tests.

Discussion

Based on the results of this study, the underserved population at CPCO has a positive perception toward both the influenza vaccine and COVID-19 vaccines as being effective and important for their health and the health of others in their community. Participants also had a mostly positive outlook on the vaccine information and recommendations they receive from members of their health care teams. In addition, most of the survey population did not perceive issues related to vaccine cost, clinic/pharmacy hours, travel, or transportation to be major barriers to receiving either vaccine. The results of this survey also showed that although the survey population trusted the vaccine recommendations from their physicians the highest, pharmacists and nurses, nurse practitioner, and physician assistants are also trusted by this population. This information can be useful to show how pharmacists and other members of patients' health care teams can promote vaccination and fulfill roles as vaccine experts and educators.

The generally positive perception of the COVID-19 vaccine seen with the patients at CPCO is different than what other studies and the media have reported. One national survey by Szilagyi et al.⁸ demonstrated an overall decline in self-reported likelihood of getting a COVID-19 vaccine when comparing

participants surveyed in April 2020 to December 2020. The survey did not specifically evaluate contributing factors to participants' likelihood to receive a vaccine, but these authors believe educational campaigns may help increase the public's willingness to receive a COVID-19 vaccine. Meanwhile, Nguyen et al.⁹ found that intent to receive the COVID-19 vaccine had increased from September 2020 to December 2020 by approximately 10% across the United States. However, they noted that adults with less education, less income, and without insurance still had lowest rates of COVID-19 vaccine intent. This may contrast the results of our survey that generally showed a positive view of the COVID-19 vaccine. Nguyen et al.⁹ believe that addressing concerns of individual persons and communities is an important way to increase vaccine confidence and ultimately prevent COVID-19. Educational campaigns and equitable vaccine access noted in these studies will certainly help increase vaccine confidence.^{8,9} However, our patients' differing, more positive results are potentially also caused, in part, by the existing efforts CPCO takes every day to build relationships with patients, listen to their concerns, and help address any barriers to accessing health care this population may face.

As one of the statistically significant differences in survey answers for the influenza and COVID-19 vaccines, adverse

Table 3
Example responses to open-ended survey questions

Open-ended questions: “What is the first thing you want to know before you get the (influenza/COVID-19) vaccine?”	
Influenza (n = 107)	COVID-19 (n = 105)
How effective is it?/Does it work?	Adverse effects, long term
Adverse effects	adverse effects
I trust my doctor/I've been getting influenza shots forever	Is it free?
Nothing/N/A	When can I get it?
	Am I allergic to it?
	Will it affect my health conditions?
	Am I receiving a live virus?
	How effective is it?/Does it work?
	Which one can I get?/Which manufacturer?

Abbreviations used: COVID-19, coronavirus disease 2019; N/A, not available.

effects are an aspect of vaccine hesitancy that pharmacists, public health initiatives, and other health care providers can help address for patients. Nguyen et al.⁹ discovered that concerns for adverse effects and vaccine safety were the top reasons for not intending to get the COVID-19 vaccine. Another survey-based study based in Finland evaluated perceived risk of COVID-19 infection, perceived safety of a COVID-19 vaccine, and intentions to accept a COVID-19 vaccine.¹⁰ Overall, participants perceived COVID-19 as a more threatening disease than influenza or measles, but the views of vaccine safety were shown as the strongest predictor of participants intending to receive a COVID-19 vaccine, which is like Nguyen et al.'s^{9,10} findings. These findings of adverse effect and safety are consistent with our participants' concerns related to adverse effects of the COVID-19 vaccine. Just like with any other disease state or medication, pharmacists and other health care providers need to take time to discuss each individuals' concerns related to vaccination, especially related to safety and adverse effects. Health professionals should be forthcoming about vaccine safety information, potential adverse effects, how long these adverse effects should last, and how to manage adverse effects, as appropriate. Community pharmacists are uniquely positioned to listen to specific barriers and hesitations, address and acknowledge patients' concerns, and inform patients using evidence and personal testimonies. Ultimately, building this rapport with patient will increase vaccine confidence, understanding, and uptake.

Limitations

As with any survey-based research, this study has several limitations including survey fatigue leading to skipped survey questions, potential social desirability bias influencing individuals' responses, and the possibility that individuals who were not qualified as CPCO patients but were at the pharmacy to pick up medications for another individual could have taken the anonymous survey. Historical bias, meaning conditions outside of the survey's control such as evolving conditions of the COVID-19 pandemic and vaccine availability, changes in political climate, and COVID-19 vaccine coverage on social media, could change participants' responses that could be a limitation to this study as well. However, a preliminary data

set consists of the mean and SD for each question halfway through data collection was compared with the final data, and there were no major, meaningful differences in survey responses. Finally, convenience sampling is a limitation of this survey-based study. Patients who did not come to the pharmacy during the data collection time period or individuals who received the survey invitation via mail but did not have Internet access could not participate in the survey.

Future directions

Although this study provides insight into one underserved patient populations' perceptions and barriers of the annual influenza vaccine and the COVID-19 vaccine, future studies could further evaluate subgroups of this populations' views and concerns related to these vaccines. Evaluating which sources and types of information this population finds most helpful when making choices about vaccines could also be beneficial to develop more targeted, effective promotional and educational tools to improve vaccine confidence.

Conclusion

For the sake of improving individual health and public health by preventing the spread of COVID-19, it is important to understand all patients' perceptions and barriers to the COVID-19 vaccine. This study found that this underserved patient population largely accepted both the influenza and COVID-19 vaccines as important, safe, and effective at preventing influenza and COVID-19, respectively. The level of acceptance was similar for both the annual influenza vaccine and the COVID-19 vaccine. This underserved population largely did not perceive barriers such as cost and transportation as issues to receiving either vaccine. Although the participants did not see cost as a concern overall, participants perceived cost and adverse effects as more concerning with the COVID-19 vaccine than their mirrored responses to the influenza vaccine. Ensuring equitable vaccine access, promoting the COVID-19 vaccine as no cost to the patient, eliciting individual persons' concerns related to vaccine safety and adverse effects, and addressing these concerns in a personable manner are all important ways pharmacists and other health care providers and community stakeholders can help promote vaccine confidence within the populations they serve.

References

- Schoch-Spana M, Privor Dumm L. Enhancing public trust and health with COVID-19 vaccination: why “If we build it/they will come” may not apply to humans and vaccines and what can be done about it. Johns Hopkins Bloomberg School of Public Health. Available at: <https://www.jhsph.edu/covid-19/articles/enhancing-public-trust-and-health-with-covid-19-vaccination.html>. Accessed October 20, 2020.
- Bazargan M, Wisseh C, Adinkrah E, et al. Influenza vaccination among underserved African-American older adults. *BioMed Res Int*. 2020;2020(2):2160894.
- Patel AR, Breck AB, Law MR. The impact of pharmacy-based immunization services on the likelihood of immunization in the United States. *J Am Pharm Assoc* (2003). 2018;58(5):505–514.e2.
- Shah PD, Trogon JG, Golden SD, Golin CE, Marciniak MW, Brewer NT. Impact of pharmacists on access to vaccine providers: a geospatial analysis. *Milbank Q*. 2018;96(3):568–592.
- Murphy PA, Frazee SG, Cantlin JP, Cohen E, Rosan JR, Harshburger DE. Pharmacy provision of influenza vaccinations in medically underserved communities. *J Am Pharm Assoc* (2003). 2012;52(1):67–70.

6. U.S. Department of Health and Human Services. HHS expands access to childhood vaccines during COVID-19 pandemic. Available at: <https://www.hhs.gov/about/news/2020/08/19/hhs-expands-access-childhood-vaccines-during-covid-19-pandemic.html>. Accessed September 27, 2020.
 7. Larson HJ, Jarrett C, Schulz WS, et al. Measuring vaccine hesitancy: the development of a survey tool. *Vaccine*. 2015;33(34):4165–4175.
 8. Szilagyi PG, Thomas K, Shah MD, et al. National trends in the US public's likelihood of getting a COVID-19 vaccine—April 1 to December 8, 2020. *JAMA*. 2020;325(4):396–398.
 9. Nguyen KH, Srivastav A, Razzaghi H, et al. COVID-19 Vaccination intent, perceptions, and reasons for not vaccinating among groups prioritized for early vaccination - United States, September and December 2020. *MMWR Morb Mortal Wkly Rep*. 2021;70(6):217–222.
 10. Karlsson LC, Soveri A, Lewandowsky S, et al. Fearing the disease or the vaccine: the case of COVID-19. *Pers Individ Dif*. 2021;172:110590.
- Janessa R. Cohrs, PharmD**, Clinical Pharmacist, Heart of Ohio Family Health, Columbus, OH
- Jay M. Mirtallo, MS, BSPHarm, BCNSP, FASHP, FASPEN**, Clinical Practice Specialist, The American Society for Parenteral and Enteral Nutrition and Professor Emeritus, College of Pharmacy, The Ohio State University, Columbus, OH
- Jennifer L. Seifert, BSPHarm, MS, BCGP**, Director of Continuing Professional Development and PGY-1 Community-Based Residency Program Director, College of Pharmacy, The Ohio State University, Columbus, OH
- Sarah M. Jones, PharmD**, Pharmacy Manager, Linden Community Pharmacy, Charitable Pharmacy of Central Ohio, Columbus, OH
- Ashley M. Erdmann, PharmD**, Pharmacy Advancement Fellow, College of Pharmacy, The Ohio State University, Columbus, OH
- Junan Li, PhD**, Research Specialist, College of Pharmacy, The Ohio State University, Columbus, OH

Appendix

Appendix 1

Perceptions surveyed in the study

Influenza vaccine perceptions	COVID-19 vaccine perceptions
The influenza vaccine is important for my health.	The COVID-19 vaccine is important for my health.
The influenza vaccine is effective for preventing the influenza.	The COVID-19 vaccine is effective for preventing COVID-19.
Getting the influenza vaccine is important for the health of others in my community.	Getting the COVID-19 vaccine is important for the health of others in my community.
New vaccines have more risks than older vaccines.	New vaccines have more risks than older vaccines.
Getting the influenza vaccine is a good way to protect myself from the influenza.	Getting the COVID-19 vaccine is a good way to protect myself from COVID-19.
The information I get from my health care provider(s) about vaccines is reliable and trustworthy.	The information I get from my health care provider(s) about vaccines is reliable and trustworthy.
Generally, I do what my pharmacist recommends about the influenza vaccine.	Generally, I do what my pharmacist recommends about the COVID-19 vaccine.
Generally, I do what my doctor recommends about the influenza vaccine.	Generally, I do what my doctor recommends about the COVID-19 vaccine.
Generally, I do what my nurse recommends about the influenza vaccine.	Generally, I do what my nurse recommends about the COVID-19 vaccine.
Generally, I do what my NP/PA recommends about the influenza vaccine.	Generally, I do what my NP/PA recommends about the COVID-19 vaccine.
I am worried about serious side effects of the influenza vaccine.	I am worried about serious side effects of the COVID-19 vaccine.
I plan to get the influenza vaccine this year.	I plan to get the COVID-19 vaccine this year.
If available, I would get my influenza shot from CPCO.	If available, I would get my COVID-19 vaccine from CPCO.
Open-ended: What is the first thing you want to know before receiving the influenza vaccine?	Open-ended: What is the first thing you want to know before receiving the COVID-19 vaccine?
Influenza vaccine barriers	COVID-19 vaccine barriers
In the past, distance to the pharmacy/clinic has made it difficult for me to get my influenza vaccine.	Distance to the pharmacy/clinic could make it difficult for me to get a COVID-19 vaccine.
In the past, the hours that the clinic/pharmacy is open has made it difficult for me to get my influenza vaccine.	The hours that the clinic/pharmacy is open could make it difficult for me to get a COVID-19 vaccine.
In the past, wait time at the clinic/pharmacy has made it difficult for me to get my influenza vaccine.	Wait time at the clinic/pharmacy could make it difficult for me to get a COVID-19 vaccine.
In the past, the cost it takes to get to the clinic/pharmacy has made it difficult for me to get my influenza vaccine.	The cost it takes to get to the clinic/pharmacy could make it difficult for me to get a COVID-19 vaccine.
In the past, transportation issues have made it difficult for me to get my influenza vaccine.	Transportation issues could make it difficult for me to get a COVID-19 vaccine.
In the past, the cost of the vaccine has made it difficult for me to get my influenza vaccine.	The cost of the vaccine could make it difficult for me to get a COVID-19 vaccine.
If I had to travel for over an hour to get the influenza vaccine, it is worth my time to get it.	If I had to travel for over an hour to get the COVID-19 vaccine, it is worth my time to get it.
If I had to wait for over an hour at the clinic/pharmacy to get the influenza vaccine, it is worth my time to get it.	If I had to wait for over an hour at the clinic/pharmacy to get the COVID-19 vaccine, it is worth my time to get it.

Abbreviations used: COVID-19, coronavirus disease 2019; CPCO, Charitable Pharmacy of Central Ohio; NP/PA, nurse practitioner or physician assistant.

Note: All questions were asked using a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree).