Information Sources and Attitudes Toward COVID-19 Vaccination at a Free Clinic in the State of Nebraska, USA

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Abstract
The full impacts of the COVID-19 pandemic are yet to be determined. While highly effective vaccines are available to prevent and decrease the severity of COVID-19 infection, significant COVID-19 vaccine hesitancy remains. Understanding motivations, discouraging factors, opinions, and information sources regarding COVID-19 is essential to targeting vaccine hesitancy and improving vaccine uptake. A 25 question survey was administered to the patients of a free clinic in the Midwest to assess patient demographic data, opinions about and experience with COVID-19, the COVID-19 vaccines, and information sources. The main outcome of interest was if vaccination status influenced information sources and opinions regarding COVID-19. This study also analyzed motivating and discouraging factors for vaccination. The study had a total of 104 participants with 7 being excluded. There were a total of 97 survey responses included in this study, there were 79 vaccinated patients and 18 unvaccinated patients. This survey study found differences in information sources between vaccinated and unvaccinated groups. Opinions surrounding the COVID-19 vaccine, public health agencies, and perceived severity of COVID-19 also varied between vaccinated and unvaccinated groups. The differential information sources and opinions between vaccinated and unvaccinated groups emphasizes the importance of access to high-quality sources and educating the community to improve public health.

Keywords COVID-19 · Vaccine hesitancy · Vaccine · Information sources

Introduction
The COVID-19 pandemic has had vast and long-lasting impacts. As of July 2022, there have been 87,407,521 cases of COVID-19 in the United States resulting in an estimated 1,013,261 deaths [1]. Since December 2020, Moderna and Pfizer have each had a two-dose series of vaccines available to prevent and mitigate the severity of COVID-19 [2, 3]. Although initially under Emergency Use Authorization (EUA) from the Food and Drug Administration (FDA), these vaccines have since received full FDA approval [4–6]. Janssen has also had a single dose vaccine available since February 2021 under EUA, but this vaccine has not yet received full FDA approval [7]. As of July 2nd 2022, 89.6% of people over the age of 18 in the United States have received at least one dose, while 76.8% have received both doses, and only 51.1% have received their first booster [1]. Those in Nebraska, where this study took place, are slightly below the national average at 75.3% of adults receiving both vaccine doses [1].

Vaccine hesitancy is defined as “the dynamic and challenging period of indecision around accepting a vaccination.” [8] There are several factors that are associated with increased vaccine hesitancy relating to the COVID-19 vaccine including female sex, conservative political leaning, racial or ethnic minority status, those of lower income status, and lower education level [9–12]. Many of the most vulnerable groups to complications and death due to COVID-19 infection are less likely to be willing to receive the COVID-19 vaccine [9, 13]. These disparities reinforce the need for
more effective information delivery to these populations. Although vaccine hesitancy remains a significant barrier to all forms of vaccination, including the COVID-19 vaccine, understanding how information sources influence decision-making is crucial to improving vaccine uptake. The purpose of this study was to gain an understanding of information sources in vaccinated and unvaccinated patients as well as gain a better understanding of opinions surrounding COVID-19 and COVID-19 vaccines.

**Methods**

This study was approved as expedited research by the Institutional Review Board (InfoEd record number: 2002393). We developed a 25-item questionnaire to gather information regarding patient demographic data, opinions about and experience with COVID-19, vaccination status, opinions about the Pfizer-BioNTech, Moderna, and Johnson’s and Johnson’s Janssen COVID-19 vaccines and boosters, masking as infection prevention, and information sources to assess qualitative and quantitative data (see supplemental Appendix). Demographic data assessed included sex, age, race, education level, income, and primary language. Additionally, information about previous experience with COVID-19 including personal and family history of illness and severity was assessed. The questionnaire also included questions to assess sources of information regarding the COVID-19 vaccine, motivating factors, and discouraging factors that allowed selection of multiple options and free response. A series of Likert scale questions were used to elicit attitudes surrounding the COVID-19 vaccine. To assess patient trust in the public health agencies that recommend the COVID-19 vaccine, a Likert scale from ‘not at all’ to ‘trust completely’ was used. Perceived COVID-19 vaccine safety was assessed with a Likert scale from ‘not safe at all’ to ‘completely safe.’ To assess concern of becoming seriously ill due to COVID-19, a Likert scale from ‘not concerned at all’ to ‘extremely concerned’ was used. Patient opinions about the efficacy of masking were also assessed using a Likert scale from ‘not effective at all’ to ‘extremely effective.’

Patients were approached while in the waiting area of the free community clinic. This clinic is located in a large city in Nebraska and serves adult under/uninsured patients on a weekly basis. The purpose of the questionnaire was explained to the patient with each patient offered additional written information regarding the questionnaire and subsequently given the opportunity to participate. Exclusion criteria included patients who were immunocompromised and therefore unable to receive the COVID-19 vaccine, patients with severe allergies to the vaccine, patients under the age of 19 (the age of majority in Nebraska), and patients who could not speak or understand fluent English. Non-English-speaking patients were excluded due to the limited number of volunteer translators available as their services were needed by providers during the patient appointments. Data collection occurred between October 2021 and March 2022. Collection ended when most active patients at the clinic had completed the survey or declined to participate. We analyzed the data using descriptive statistics.

All descriptive statistics were stratified by receipt of a COVID-19 vaccination. All data were categorical and therefore are presented as percentage. Demographic characteristics and Likert-type items were compared between vaccinated and unvaccinated patients using Fisher’s exact test. All analyses were conducted using SAS v. 9.4 with two-tailed p < 0.05 used to indicate statistical significance.

**Results**

In 2021, a total of 223 patients were seen at the clinic. Of these patients seen, 21 patients were non-English speaking. These numbers are slightly lower than the pre-pandemic years. In 2019, a total of 247 patients were seen in the clinic. A total of 146 patients were approached to participate in the study, 97 of whom completed the questionnaire; 42 patients declined to participate, and 7 patients were either non-English speaking or had an unknown vaccine status. Of the 97 patients who completed the questionnaire, 79 (81.4%) were vaccinated and 18 (18.6%) were unvaccinated. Table 1 provides demographic characteristics stratified by vaccination status, which were mostly statistically similar between groups with the exception that vaccinated patients tended to be older. A slightly higher proportion of unvaccinated patients were White at 77.8% compared to 58.2% in the vaccinated group. Vaccinated patients tended to have more formal education with 11.4% and 12.7% having associate’s or bachelor’s degrees, respectively. In the unvaccinated patients, 5.6% had an associate’s degree, and 5.6% had a bachelor’s degree. However, these differences did not reach statistical significance.

As shown in Fig. 1, in vaccinated patients, results indicated that the reasons for receiving the COVID-19 vaccine included protection of their own health (84.6%), protection of the health of family and friends (61.5%), and protection of the health of the community (56.4%).

As shown in Fig. 2, in unvaccinated patients, results indicated that sources of hesitancy that dissuaded receipt of COVID-19 vaccination were that it was developed too quickly (64.7%), potential adverse side effects (41.2%), and lack of FDA approval (23.5%). Approximately 60% of unvaccinated patients cited other reasons as discouraging vaccination. The open-ended comments provided included
the potential to change DNA, mistrust with the government, lack of desire to receive the vaccine, that God is in control, and fear of affecting the immune system.

As shown in Fig. 3, when asked about resources used to inform their decision to receive the COVID-19 vaccine or not, vaccinated patients most often reported relying on healthcare providers (43.6%), family/friends (33.3%), and news sources (32.1%), whereas unvaccinated patients relied most heavily on family/friends (50.0%), other sources (33.3%), and news sources (27.8%). The 33.3% that responded they used other sources had open-ended responses that included the Bible, personal beliefs including natural immunity, and personal research. Between-group comparisons indicated that vaccinated patients relied more on healthcare providers as a source of information compared to unvaccinated patients ($p < 0.05$), whereas unvaccinated patients relied more on social media, religious leaders, and politicians as sources of information ($p < 0.05$).

Finally, Table 2 provides patient opinions regarding trust in public health agencies, concern of severe illness due to COVID-19, safety of COVID-19 vaccines, and mask efficacy. Trust in public health agencies that recommend the COVID-19 vaccine differed between vaccinated and unvaccinated patients as greater than 50% of vaccinated patients reported they have complete trust compared to greater than 50% of unvaccinated patients reported do not trust at all ($p = 0.001$). A similar trend was observed when asked about vaccine safety, with the majority of vaccinated patients reporting they felt the vaccine was completely safe compared to the majority of unvaccinated patients reporting the vaccine was ‘somewhat unsafe’ ($p < 0.001$). Further, vaccinated patients were more likely to be ‘somewhat concerned’ about becoming seriously ill due to COVID-19, and unvaccinated patients were ‘not concerned at all’ ($p = 0.004$). Finally, vaccinated patients tended to state that they believe masks are ‘extremely effective,’ while unvaccinated patients were more likely to believe masks are ‘not effective at all’ ($p < 0.001$).

### Discussion

Disparities in vaccine acceptance highlight the importance of pinpointing sources of vaccine hesitancy. Several characteristics have been associated with increased vaccine hesitancy regarding the COVID-19 vaccine. Conservative political leaning, African American race, younger age, female sex, and lower education level are all associated with increased vaccine hesitancy [9–12]. Our study did not find many statistically significant demographic differences between the vaccinated and unvaccinated groups; however, statistical differences were limited by inadequate statistical power given the small sample size, particularly in the unvaccinated patients. The slightly lower education level among the unvaccinated patients may contribute to less health literacy influencing their vaccination status [14]. Individuals with less education may have difficulty interpreting the rapidly evolving information relating to COVID-19, which could contribute to vaccine hesitancy [14].

In considering the difference in number of vaccinated compared to unvaccinated patients, there are several possibilities. One possibility is that the vaccinated patients felt
more secure being in public due to perceived protection from the COVID-19 vaccine, whereas the unvaccinated patients felt less secure in public and are thus underrepresented in this study. However, this study found that unvaccinated patients were more likely to report that they were ‘not concerned at all’ about becoming ill with COVID-19. This suggests that they may still feel comfortable receiving care at the clinic despite not having received a COVID-19 vaccine, but this does not assess the opinions of those patients that did not seek care at this time. Additionally, the opinions and vaccination status of those patients that were approached but declined to participate remain unknown.

The opinions expressed by participants in our study is unique in that we were specifically analyzing the opinions and information sources of vulnerable patients that are uninsured and underinsured, whereas other studies have analyzed the opinions of the general population [14–18]. Of the 223 patients that were seen in the clinic in 2021, 98 patients had some form of insurance and 125 had no insurance. Although some patients have insurance, these may be high deductible plans that they are unable to afford to utilize. The results of our study suggest that vaccinated patients were more likely to utilize healthcare providers as their source for information. Interestingly, both vaccinated and unvaccinated patients reported friends/family and news as important sources for vaccine information. This emphasizes the strong impact personal relationships and news sources can have on individuals in their decision-making regarding COVID-19 vaccination. A study by Al-Uqdah et al. (2022) found using friends and family as a resource decreased vaccine hesitancy [14]. However, personal relationships were a significant information source in both vaccinated and unvaccinated groups in our study. Similar to findings among other studies, vaccine hesitant individuals in our study were more likely to use
Fig. 3 Sources of information about the COVID-19 vaccine for both vaccinated and unvaccinated patients analyzed with SAS v. 9.4 with two-tailed $p < 0.05$ to indicate statistical significance.
social media as an information source [14–16]. Unvaccinated participants in our study were also significantly more likely to utilize political and religious leaders as information sources. Interestingly, while conservative political standing is associated with vaccine hesitancy, there is limited data specifically analyzing politicians as information sources [11, 12]. A 2022 study by Rutjens et al. found that vaccine skepticism was correlated to spirituality but not traditional religiosity, and a 2021 study by Williams et al. found no association between parental vaccine hesitancy and religiosity [19, 20]. Unlike these previous studies, our research demonstrated a significant correlation between religious information source use and vaccine hesitancy, indicating a need for further understanding of the connection between religion and vaccine hesitancy.

The use of non-scientific sources such as social media, religious leaders, and politicians among the unvaccinated seen in our study may also contribute to their vaccine hesitancy. This association may be due to vaccine hesitant individuals seeking sources that reinforce their beliefs and avoidance of sources that conflict with their perspectives. These findings reinforce the importance of ensuring access to high-quality information sources both on social media and through those in positions of power to engage the community through trusted leaders. One avenue is to establish more engaging government-run sources on social media to provide education and unbiased information [15]. The lack of regulation on social media also poses a challenge as misinformation can quickly be disseminated [15]. To address misinformation on social media, sites can include flags on information to alert users to misinformation and rapidly remove material [15]. Another option is to provide sources with material that is posted to allow rapid identification of less credible sources [15]. Social media can be a useful tool to provide vaccine information if it is coming from a trusted source, thus it is imperative to increase fact-based information on social media content [14]. Utilizing social media and political and religious leaders to gain the trust of the community and overcome mistrust of the vaccine process may be a powerful tool.

Our study found that the most cited concern was how quickly the vaccine was developed followed by concern for side effects. Other studies have found similar results with vaccine side effects being a significant source of hesitancy [17]. In unvaccinated patients there was a broad range of responses to vaccine hesitancy, although not every patient provided a specific reason beyond the choices provided in our questionnaire. Assessing concerns outside of what was

Table 2 Responses to Likert questions assessing attitudes relating to trust in public health agencies, COVID-19, the COVID-19 vaccines, and efficacy of masking compared using Fischer’s exact test

|                               | Unvaccinated (n = 18) | Vaccinated (n = 79) | p       |
|-------------------------------|-----------------------|---------------------|---------|
| Trust in public health Agencies that recommend COVID-19 vaccination |                        |                     |         |
| Not at all                    | 55.6                  | 3.9                 | <.001   |
| Trust a little bit            | 22.2                  | 3.9                 |         |
| Moderately trust              | 5.6                   | 38.5                |         |
| Trust completely              | 0.0                   | 50.0                |         |
| Unsure                        | 16.7                  | 3.9                 |         |
| Vaccine safety                |                        |                     |         |
| Not safe at all               | 38.9                  | 2.6                 | <.001   |
| Somewhat safe                 | 44.4                  | 2.6                 |         |
| Neither unsafe or safe        | 0.0                   | 5.3                 |         |
| Somewhat safe                 | 0.0                   | 29.0                |         |
| Completely safe               | 0.0                   | 60.5                |         |
| Concern about becoming seriously ill due to COVID-19                  |                        |                     |         |
| Not concerned at all          | 61.1                  | 18.2                | 0.013   |
| Slightly concerned            | 16.7                  | 22.1                |         |
| Somewhat concerned            | 11.1                  | 23.4                |         |
| Moderately concerned          | 0.0                   | 7.8                 |         |
| Extremely concerned           | 11.1                  | 28.6                |         |
| Mask effectiveness            |                        |                     |         |
| Not at all effective          | 38.9                  | 7.8                 | <.001   |
| Somewhat effective            | 16.7                  | 3.9                 |         |
| Slightly effective            | 27.8                  | 22.1                |         |
| Extremely effective           | 16.7                  | 66.2                |         |
listed in our questionnaire may provide further insight into sources of vaccine hesitancy.

Our study also found significant differences between groups regarding trust of public health agencies. Similar to our results, mistrust of public health agencies is significant among unvaccinated groups in other studies [17]. This stresses the importance of working to improve public perceptions of healthcare providers and public health efforts [17]. A study by Padameese et al. (2022) looking at opinions of the COVID-19 vaccine over a period of seven months found that opinions did change, suggesting that vaccine hesitancy is adaptable and malleable [18]. These findings reinforce the notion that quality information sources and education are essential to overcome vaccine hesitancy and assist individuals in making informed decisions.

In considering the motivating factors cited by patients for receiving the COVID-19 vaccine, the most frequently reported responses included protecting personal health, health of family and friends, and health of the community. These motivating factors likely can be emphasized to help target vaccine hesitancy when discussing and providing information to vaccine hesitant patients.

Limitations and Conclusion

Vaccine hesitancy remains a significant barrier to all forms of vaccination, including the COVID-19 vaccine. Understanding how information sources influence decision-making is crucial to targeting sources of hesitancy and improving vaccine rates. We acknowledge several limitations to this study. First, given that participation was completely voluntary, the vaccination status and opinions of those that were approached but declined participation may have incorporated some level of unquantifiable bias into our findings. Second, our sample size was limited with 72 vaccinated and 18 unvaccinated patients. The small number of unvaccinated patients also makes it difficult to fully analyze their vaccine hesitancy due to lower statistical power. This study was also unable to survey patients that were non-English speaking due to the limited number of available interpreters. Thus, the attitudes and information sources of these patients remain unknown. Additionally, mechanisms to provide information about COVID-19 vaccination are constantly changing. Given that our study was conducted from October 2021 to March 2022, our results may not represent current the attitudes and opinions of vaccinated and unvaccinated patients; thus, follow-up studies are warranted, particularly as different COVID-19 variants emerge with differing levels of transmissibility and disease severity. Future studies should continue to analyze how information sources impact COVID-19 vaccine hesitancy. Assessing health literacy as it relates to vaccine hesitancy may be beneficial to assess this as a reason for pursuing social media and opinions of those in positions of power as their sources of vaccine information in vaccine hesitant individuals. Given that protection of health of those in the community was found to be a major reason for vaccination among vaccinated individuals in our study, it may be pertinent to analyze strategies to foster this sentiment among vaccine hesitant individuals. This would be essential to reduce vaccination disparity within communities with multiple barriers to vaccination. It would be prudent for studies to assess the role of physician–patient relationships in vaccine hesitancy.

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Data Availability The data from this study is available upon request. Please contact the corresponding author to request.

Code Availability N/A.

Declarations

Conflict of interest The researchers of this study have no conflicts of interest to report.

Ethical Approval This study was approved as expedited research by the Institutional Review Board at Creighton University (InfoEd record number: 2002393).

Consent to Participate All study participants signed informed consent and were able to voluntarily withdraw from the study at any point.

Consent for Publication N/A.

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