2019 Novel Coronavirus Vaccination among Post-graduate Residents and Fellows

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Abstract

Background: Coronavirus-2 (COVID-19) has caused a worldwide pandemic since December 2019. Since then, clinical trials with vaccines have been started and completed, and at present, 3 COVID-19 vaccines have been approved for use in the United States. Healthcare providers were among the first to get vaccinated, but the precise attitudes of healthcare workers toward vaccination are uncertain. Objective: To understand residents and fellows’ attitudes toward vaccination and record any side effects after vaccination. Methods: We conducted an anonymous survey that was open from 3-1-2021 to 3-12-2021 using distribution lists from the Graduate Medical Education office on the Lubbock campus of the Texas Tech University Health Sciences Center after getting approval from the Institutional Review Board (L21-088). Results: Eighty-one residents and fellows (26.6% out of 304) responded to our survey. Among those who responded, 63 (77.8%) were between 25 and 35 years old, and 41 (50.6%) were males. Seventy-seven (95.1%) received the vaccine (Pfizer-BioNTech), 78 (96.3%) reported that they supported vaccination, and 3 (3.7%) reported that they did not want vaccination. Eight members (9.8%) had tested positive for COVID-19 infection before vaccination, but only 1 (1.23%) had tested positive for COVID-19 antibodies. All residents and fellows reported side effects after the vaccination, including pain at the injection site (77; 100%), local redness (9; 11.6%), local swelling (13; 16.8%), fever (25; 32.5%), fatigue (25; 32.5%), chills (34; 44.1%), headache (38; 49.4%). Conclusions: Most medical trainees have a high interest in COVID-19 vaccination; however, a few reported that they did not want vaccination.

Keywords

COVID-19 vaccination, graduate medical education, residents, fellows

Introduction

It has been a year since the World Health Organization announced that the 2019 Novel Coronavirus-2 (COVID-19) was causing a pandemic worldwide.1 Since then, clinical trials with vaccines have been started and completed, and at present, 3 COVID-19 vaccines have been approved for use in the United States.2,3 Healthcare providers were among the first to get vaccinated; however, some media reports did not support vaccination and exaggerated possible side effects.4,5 Studying the attitudes of residents and fellows, who are among the COVID-19 frontline healthcare workers, regarding COVID-19 vaccination is vital to understand how their hesitancies might affect public opinion.

A study done by Malek et al on the determinants of COVID-19 vaccine acceptance in adults in the United States showed that only 67% would accept COVID-19 vaccination if offered to them.6 Some reports indicate some hesitancy among healthcare workers. A study done by Dror et al indicated that healthcare staff involved in the care of COVID-19 positive patients were more likely to report acceptance of COVID-19 vaccination when available.7 In contrast, parents, nurses, and medical workers not caring for SARS-CoV-2 positive patients expressed higher levels of vaccine hesitancy.7 We surveyed residents and fellows who are among the frontline healthcare workers in the
COVID-19 pandemic to study their attitudes toward vaccination. This information provides the background for future studies on the basis for personal decisions regarding vaccination and discussions residents will have with patients regarding vaccination decisions.

**Methods**

We conducted an anonymous online survey of residents and fellows that was open from 3-1-2021 to 3-12-2021 using distribution lists for all residency and fellowship programs generated by the Graduate Medical Education office on the Lubbock campus of Texas Tech University Health Sciences Center after getting approval from the Institutional Review Board (L21-088). The distributed information was totally confidential, and the participants were permitted to terminate their participation at any time. Online Kobotoolbox (https://www.kobotoolbox.org/) and Excel were used to calculate the percentage of the different variables of our cohort. We created 2 tables: 1 for the residents and fellows’ attitudes towards vaccination and 1 for any side effects. Analysis of the information collected was limited to summary statistics.

**Results**

Eighty-one residents and fellows (26.6%) out of 304 responded to our survey. Among those who responded, 63 (77.8 %) were between 25 and 35 years old, and 41 (50.6%) were males (Table 1). Seventy-seven (95.1%) received the vaccine (Pfizer-BioNTech); 78 (96.3%) reported that they supported vaccination, and 3 (3.7%) reported that they did not want the vaccination. Eight house staff members (9.8%) had tested positive for COVID-19 infection before vaccination, but only 1 (1.23%) had tested positive for COVID-19 antibodies (See Table 1). One survey respondent tested positive for COVID-19 8 days following the first vaccine dose; no respondents tested positive following the second dose of vaccine.

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**Table 1.** Demographics and Behavior of Residents and Fellows Who Received the COVID-19 Vaccination.

| Variable | Category | Number | Percentage (%) |
|----------|-----------|--------|----------------|
| 1-Age    | <25       | 2      | 2.47           |
|          | 25-35     | 63     | 77.78          |
|          | 35-45     | 14     | 17.28          |
|          | >45       | 2      | 2.47           |
| 2-Gender | Male      | 41     | 50.62          |
|          | Female    | 37     | 45.68          |
|          | Prefer not to disclose. | 2 | 2.47 |
|          | Other     | 1      | 1.23           |
| 3-Did you get COVID-19 vaccination? | Yes | 77 | 95.06 |
|          | No        | 4      | 4.94           |
| 4-Do you believe in the need to get vaccinated? | Yes | 78 | 96.3 |
|          | No        | 3      | 3.7            |
| 5-Have you ever been tested for COVID-19? | Yes | 54 | 66.67 |
|          | No        | 27     | 33.33          |
| 6-Based on the previous question, Were you positive or negative? | Positive | 8 | 9.88 |
|          | Negative  | 46     | 56.79          |
|          | Not tested | 27 | 33.33 |
| 7-Were you diagnosed with COVID-19 3 months before vaccination? | Yes | 2 | 2.47 |
|          | No        | 79     | 97.53          |
| 8-Have you ever been tested for COVID-19 antibodies? | Yes | 28 | 34.57 |
|          | No        | 53     | 65.43          |
| 9-If the answer to the above question is yes, was the test positive or negative? | Positive | 1 | 1.23 |
|          | Negative  | 27     | 33.33          |
|          | Not tested | 53 | 65.43 |
| 10-Were you tested positive after the first dose of the vaccine? | Yes | 1 | 1.29 |
|          | No        | 76     | 98.70          |
| 11-If yes, after how many days had you been tested positive after the vaccine? (Write the number in days) | 11 days |
| 12-Did you get the second dose of the vaccine? | Yes | 77 | 100 |
|          | No        | 0      | 0              |
| 13-Were you tested positive after the second dose of the vaccine? | Yes | 0 | 0 |
|          | No        | 77     | 100            |
All residents and fellows reported side effects after vaccination, including pain at the injection site (77; 100%), local redness (9; 11.6%), local swelling (13; 16.8%), fever (25; 32.5%), fatigue (25; 32.5%), chills (34; 44.1 %), headache (38; 49.4%), but no anaphylaxis or palpitations (Table 2). No one reported severe incapacitating side effects.

Discussion

Vaccines for SARS-COV-2 became available in December 2020. The development of an effective vaccine over a relatively short period of time required the coordinated efforts of multiple scientists, pharmaceutical companies, and government organizations. This process produced widespread and conflicting media coverage, and vaccination compliance and hesitancy are concerns during this pandemic. Several factors contribute to this,5,8,9 and it depends mainly on personal risk-benefit perceptions that may be influenced by misinformation about vaccine safety. Addressing these concerns is crucial, especially in the middle of the vaccination campaign.

There have been no studies of vaccine uptake and vaccine hesitancy in physicians-in-training in the United States. The sample size in our survey is small, but the results suggest that most physicians-in-training support vaccination. Konopinska et al reported the results from an online survey of Polish ophthalmology residents in early 2021.10 About 126 residents completed to survey; 71.4% indicated that they would get vaccinated, 17.5% were unsure about vaccination, and 11.1% said they would refuse vaccination. Residents with children and residents living with their families were more likely to accept vaccination in an effort to reduce infection in their families. The response rate in the survey was not reported, and multivariable logistic regression for the willingness to take the COVID vaccine did not identify any statistically significant factors.10 The factors analyzed included gender, marital status, living situation, size of the city, and treating COVID-19 patients. This study suggests that multiple factors influence individual decisions regarding vaccination even in healthcare workers who are potentially exposed to infected patients.10

Arora et al surveyed pediatric residency residents in California in 2014 through 2015 to determine their vaccine health beliefs and educational influences on these beliefs.11 This study included 87 residents which represented a 46.3% response rate. Most residents reported they had received adequate education about vaccination in children. Many residents reported experience managing children with vaccine preventable diseases. All respondents agreed that the benefits of vaccination outweighed the risks, and many residents (78.0%) reported witnessing pediatric faculty agreeing to alternative or delayed vaccination when managing patients and families. The information in this study was collected before the COVID pandemic and involved residents who routinely participate in vaccination decisions when managing children in their clinics. This study demonstrates that faculty

Table 2. Side Effects of the COVID-19 Vaccination.

| Question                          | Yes | No |
|----------------------------------|-----|----|
| 1-Did you get side effects from the vaccine? | 77  | 0  |
| 2-Did you develop pain at the site of the injection after the vaccine? | 77  | 0  |
| 3-What was the severity of the pain after the vaccine? | 44.15 | 50.64 |
| 4-Did you develop redness at the injection site after the vaccine? | 88.3 | 11.68 |
| 5-Did you get swelling at the injection site after the vaccine? | 83.11 | 16.88 |
| 6-Did you develop anaphylaxis after the vaccine? | 0  | 77 |
| 7-Did you develop palpitation after the vaccine? | 0  | 77 |
| 8-Did you develop fever after the vaccine? | 32.46 | 67.53 |
| 9-Did you develop chills after the vaccine? | 44.15 | 55.84 |
| 10-Did you develop fatigue after the vaccine? | 32.46 | 67.53 |
| 11- Did you develop headache after the vaccine? | 49.35 | 50.64 |
can influence the health beliefs of residents-in-training and suggests that large-scale efforts to vaccinate the public must involve education of healthcare workers about all aspects of any vaccination program. A small minority of respondents (3.7%) in our study reported that they did not want the vaccination, indicating that some highly educated healthcare workers do not support this campaign; this percentage is similar to the percentage in the study from Poland.

Reports in the medical literature from different countries also show that some doctors oppose vaccination, but the exact percentage among frontline health care workers is uncertain. The study done by Dror et al in Israel compared the responses from 829 healthcare staff with 1112 members of the general population. This study identified a high rate of vaccine skepticism among medical staff, and the main concern was the safety of a rapidly developed vaccine. In contrast, individuals considering themselves to be at a higher risk of disease had higher vaccine participation rates. Another study done by Grech et al on vaccine hesitancy among healthcare workers in Malta included 9681 questionnaires with 1002 (10.4%) responses. This study showed that the likely/undecided/unlikely responses to take a COVID-19 vaccine were 52%/22%/26%, respectively. Doctors were the occupation with the highest percentage (69%), which indicated that they would get the vaccine. Both of these studies were done before vaccination campaigns had started. Another study done by Gagneux-Brunon in France with healthcare workers reported that 76.9% would accept vaccination, with 92% of physicians saying that they would get vaccinated. A similar study done by Gadoth et al among healthcare workers in the United States included 609 participants and showed that 66.5% would delay the vaccine, including 49.9% who would prefer to wait to see how the vaccine affected others first. A small percentage (16.6%) would not get it at the time of the survey but might get it in the future; 1.31% said that they would never get vaccinated. The remaining participants (32.3%) reported that they intended to get a coronavirus vaccine as soon as possible.

The second part of our study addressed the side effects and outcomes of vaccination. Based on very limited data given the short time frame and the small number of responses, this vaccine appears to prevent additional infection. These results are better than the results reported in clinical trials. Our study also demonstrates that medical trainees who participate in the care of patients with COVID-19 have a high interest in vaccination. All trainees noted some side effects from the vaccination, but the side effects were not severe enough to limit work. The studies discussed above and our study demonstrate that there is still hesitancy about vaccination in the middle of the pandemic, even by physicians. Despite being a low percentage, their views might affect public opinion. In contrast to published studies, our study included only medical trainees, that is, residents and fellows, in the United States to determine the vaccination rate among post-graduate trainees. Our study was limited by the small sample size (81 subjects) and was not designed to develop in-depth information about the lack of interest or participation in vaccination. Respondent bias is also a possible concern as those who responded may have different attitudes than those who did not. Approximately 82% of the trainees in our health sciences center have had vaccination. This occurred during the phase of the pandemic in West Texas in which our hospital had multiple critically ill patients in ICUs. Therefore, these results may not be generalizable to other geographic regions or to cohorts of trainees with less involvement in the care of these patients.

Although the exact numbers are uncertain, based on Internet reports, a few trainees in the United States have died from COVID-19 infections. Therefore, training programs need to provide continuous education about this infection and methods to reduce infection, address anxiety and uncertainty, encourage residents to undergo vaccination based on expert opinion, discuss vaccination outcomes with all healthcare workers, and create alternatives to traditional educational activities that focus on safety.

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