

# A Multicenter Cross-sectional Study of Intention to Vaccinate against SARS-CoV-2 amongst Healthcare Workers in India

Divya Dwivedi<sup>1</sup>, Uma Pandey<sup>2</sup>, Sarah McDonell<sup>3</sup>, Mark Hehir<sup>4</sup>, Stephen W Lindow<sup>5</sup>

## ABSTRACT

**Objectives:** The high fatality rate of the corona virus disease-19 (COVID-19) pandemic has led to the development of vaccines over a very short period of time. This is a study to assess the vaccine acceptability among Indian healthcare workers (HCWs) and to evaluate the knowledge, fears, and intentions among them regarding COVID-19 vaccination and to estimate the number of HCWs who will accept or refuse vaccination.

**Materials and methods:** A multicenter cross-sectional study on COVID-19 vaccination was done in three tertiary hospitals by an anonymous online questionnaire. Doctors, nurses, students, and laboratory and administration staff were invited to take part.

**Results:** A total of 314 HCWs participated voluntarily in the survey. Among the participants, 75.1% of them would definitely/probably accept the vaccination, and 24.8% would definitely/probably refuse if it were made available. Significant factors in the refusal were skepticism in the efficacy and safety of a vaccine.

**Conclusion:** The majority of the respondents (75.1%) in our study were willing to receive and accept the vaccine against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus. However, concerns about efficacy and safety of the vaccine need to be addressed to increase the uptake and ensuring coverage of large population in order to attain herd immunity against COVID-19.

**Keywords:** Attitudes, Beliefs, COVID-19, Health-care workers, Herd immunity, Hesitancy, Intention to vaccinate, SARS-CoV-2, Vaccine acceptability. *Journal of South Asian Federation of Obstetrics and Gynaecology* (2021): 10.5005/jp-journals-10006-1912

## INTRODUCTION

The uptake of vaccination is the key to success of any vaccination program to control the spread of an emerging infectious disease. Vaccination hesitancy was defined by the WHO in 2019 as one of 10 important global threats to health.<sup>1</sup> The main factors that contribute to vaccine hesitancy are that individuals may not trust and even fear vaccines, especially because of the misconception that vaccines pose a risk of infection. In addition, individuals may not see a need for a vaccine (e.g., due to underestimating the severity of the target disease) or do not value the vaccine and communities may have difficulty accessing the vaccine.<sup>2</sup> Vaccine hesitancy was most conspicuous during the influenza pandemic in 2009 and in the general US population, about half of them did not have a seasonal influenza vaccine in 2019.<sup>3</sup>

The success of controlling any infectious disease may be hampered by individuals or groups who choose to delay or refuse vaccines,<sup>4</sup> sometimes contributing to disease outbreaks.<sup>5</sup>

The basic or effective reproduction number  $R$  is an indication of the transmissibility of a virus, representing the average number of new individuals that can be infected by an infected individual in a totally naïve population. For  $R > 1$ , the number of newly infected individuals is likely to increase, and for  $R < 1$ , the virus is infecting fewer and fewer individuals. A review of 12 studies found that the mean  $R$  for the COVID-19 virus is 3.28,<sup>6</sup> suggesting that the threshold for achieving herd immunity ( $1 - 1/R$ ) is 70%.<sup>7</sup> Since people who do not accept vaccination are not randomly distributed and tend to occur in clusters,<sup>7</sup> more than 70% of people in a community would need to be vaccinated in order to achieve herd immunity. In order to limit the spread of COVID-19 pandemic, it is very important to identify the prevalence of vaccination hesitancy for the COVID-19 virus as the world now is suffering from double threats, one is the COVID-19 pandemic and second being the inability to achieve

<sup>1</sup>Department of Obstetrics and Gynaecology, Mayo Institute of Medical Sciences, Barabanki, Uttar Pradesh, India

<sup>2</sup>Department of Obstetrics and Gynaecology, Banaras Hindu University, Varanasi, Uttar Pradesh, India

<sup>3-5</sup>Department of Obstetrics and Gynaecology, Coombe Women and Infants University Hospital, Dublin, Ireland

**Corresponding Author:** Divya Dwivedi, Department of Obstetrics and Gynaecology, Mayo Institute of Medical Sciences, Barabanki, Uttar Pradesh, India, Phone: +91 9532506517, e-mail: dwivedi.divya115@gmail.com

**How to cite this article:** Dwivedi D, Pandey U, McDonell S, *et al.* A Multicenter Cross-sectional Study of Intention to Vaccinate against SARS-CoV-2 amongst Healthcare Workers in India. *J South Asian Feder Obst Gynae* 2021;x(x):xx-xx.

**Source of support:** Nil

**Conflict of interest:** None

the target of more than 70% vaccination in order to achieve herd immunity.

Healthcare workers (HCWs) could have an important role in addressing vaccine hesitancy; not only their own health and that of their families but also their status enables them to encourage vaccination.

In light of this, understanding the determinants of vaccine hesitancy among HCWs could have broader policy implications for improving the COVID-19 vaccination program acceptability.

The aim of this study is to evaluate the knowledge, fears, and intentions in Indian HCWs regarding COVID-19 vaccination and to estimate the number of HCWs who will take or refuse vaccination.

# METHODS

A questionnaire was developed to study vaccine intention in a mixed group of HCWs. It was validated by a focus group who studied the questions and answer options. The resulting questionnaire was given as a pilot to a group of junior hospital doctors to complete.

The questionnaire was transferred to an online format in Google Forms and a link sent via email, WhatsApp, and a paper version for hospital workers who did not have an electronic connection.

The survey was started on December 26, 2020 and finished on January 23, 2021. The data were then summarized on Google Forms and then transferred to Excel and analyzed via SPSS (IBM, Armonk, New York). Basic responses were tabulated and a secondary Chi-square analysis was performed by categorizing the intention to vaccinate against answers to other questions about vaccination. To make the review of the results easier, the answers were categorized as either definitely/probably yes or definitely/probably no to the intention to receive the vaccine. Answers to secondary questions were similarly summarized and then tabulated.

# Informed Consent

The respondents were verbally informed regarding the nature of the study, and their verbal consent was taken for voluntary participation in the study.

# Ethical Committee Approval

The study was passed by the local ethics and research committee.

**Table 1:** Basic responses to questions about vaccines, knowledge, and beliefs given to 314 healthcare professionals

Age*	131	41.7%
Less than 25		
25–34	130	41.4%
35–49	37	11.8%
50–64	9	2.9%
65 and above	1	0.3%
Previously infected with COVID-19—YES	66	21.0%
Influenza vaccine this year—YES	21	6.7%
Influenza vaccine in previous years—YES	49	15.6%
Do you believe COVID-19 is more severe than influenza—YES	248	79.0%
Do you believe COVID-19 is a life-threatening infection—YES	136	43.3%
Do you believe COVID-19 is a life-threatening infection ONLY to the with underlying health conditions—YES	144	45.9%
Do you believe the severity of the pandemic in the media/politics/health reports has been accurate	93	29.6%
—Overstated	92	29.3%
—Understated	129	41.1%
Your role	124	39.5%
Doctor		
Nursing/healthcare/allied	135	43.0%
Administration/other	19	6.1%
Student	24	7.6%
Laboratory/research	12	3.8%

\*Six (1.9%) preferred not to answer

**Table 2:** Responses from 314 health care professionals for the intention to receive a vaccine if offered and provided by their employer

<i>Would you receive a vaccine against COVID-19 if it was recommended and provided by your employer?</i>		
Definitely yes	154	49.0%
Probably yes	82	26.1%
Probably no	33	10.5%
Definitely no	45	14.3%

# RESULTS

A total of 314 HCWs completed the survey. The makeup and background beliefs are stated in Table 1. Notably, 21% had been previously infected with corona virus, and 83.1% were less than 35 years old. Table 2 indicates that 77 (24.8%) would definitely or probably refuse vaccination.

Table 3 presents the decision to refuse vaccination and answers to questions about beliefs on vaccination. The full spectrum of answers was analyzed, summarized, and tabulated to make it easier to read.

Significant reasons for HCWs to refuse vaccination were concerns over vaccine safety (Chi-sq 20.02  $p < 0.0001$ ), speed of development (Chi-sq 23.39,  $p < 0.0001$ ), lack of faith in vaccine effectiveness (Chi-sq 13.46,  $p < 0.01$ ), and the belief that the corona virus infection was not as serious as influenza (Chi-sq 5.09,  $p \leq 0.05$ ) (Table 3).

Previous receiving an influenza vaccine this year was associated with increased acceptance of vaccine against COVID-19 (Chi-sq 4.86  $p < 0.05$ ) but receiving the influenza vaccine in previous years was not associated (Chi-sq 0.67,  $p =$  not significant, NS).

Notably, working with COVID-19 patients (Chi-sq 0.80,  $p =$  NS) was not associated with vaccine hesitancy but working clinically (Chi-sq 4.92,  $p < 0.05$ ) reduced the numbers who would refuse the vaccine. Age was not a factor in vaccine uptake (Chi-sq 9.84,  $p =$  NS).

Of those who have previously had COVID-19 diagnosed, 84.8% would want the vaccine whereas 27.4% of those who had not had the infection would refuse a vaccine (Chi-sq 4.2,  $p < 0.05$ ).

In summary, a mixed group of 314 HCWs who were mostly less than 35 years old demonstrated that 75.2% were intending to definitely or probably receive a corona virus vaccine. Age and clinical COVID-19 exposure were not factors in refusal to receive a vaccine, and concerns about vaccine safety, adverse effects, and efficacy were significant issues for those HCWs who intended to refuse a vaccine.

# DISCUSSION

HCWs working in hospitals are a high-risk group during the COVID-19 pandemic due to several factors: continued patient exposure, shortage of personal protective equipment, and inadequate infection control measures. HCWs account for a large number of infected people,<sup>8</sup> and hence, they are both potential victims and spreaders<sup>9</sup> of the disease. Protecting HCWs from SARS-CoV-2 infection would be beneficial for themselves, their household contacts, and their patients and is crucial in the preservation and protection of the healthcare system. Protecting HCWs from infection plays a fundamental role in the control of nosocomial transmission. Additionally, HCWs are a reliable and credible source of vaccine-related information for patients.<sup>10</sup> HCWs can convey the message of vaccination benefits and address the worries and concerns of the patients face to face. However, prior research indicated that the vaccine uptake rate among HCWs was low, and

**Table 3:** Answers to specific questions about vaccination set against the intention for vaccination

	<i>Will you receive the vaccine? Definitely/probably YES</i>	<i>Will you receive the vaccine? Definitely/ probably NO</i>	<i>Chi-square Significance</i>
Age <25	88 (67.2%)	43 (32.8%)	9.84 <sup>+</sup> <i>p</i> = NS
Age 25–34	103 (79.2%)	27 (20.8%)	
Age 35–49	30 (81.1%)	7 (18.9%)	
Age 50–64	9 (100%)	0	
65 and above	1 (100%)	0	
Previous COVID-19 infection—YES	56 (84.8%)	10 (15.2%)	4.2 <i>p</i> <0.05
Previous COVID-19 infection—NO	180 (72.6%)	68 (27.4%)	
Had previous Influenza vaccine this year—YES	20 (95.2%)	1 (4.8%)	4.86 <i>p</i> ≤0.05
Had previous Influenza vaccine this year—NO	216 (73.7%)	77 (26.3%)	
Influenza vaccine previous years—YES	38 (77.6%)	11 (22.4%)	0.67 <i>p</i> = NS
Influenza vaccine previous years—NO	198 (74.7%)	67 (25.3%)	
Do you believe COVID-19 is more severe than influenza—YES	194 (78.2%)	54 (21.8%)	5.9 <i>p</i> ≤0.05
Do you believe COVID-19 is more severe than influenza—NO	42 (63.6%)	24 (36.4%)	
Do you believe COVID-19 is a severe/fatal infection—YES	100 (73.5%)	36 (26.6%)	2.07 <i>p</i> = NS
Do you believe COVID-19 is a severe/fatal infection—ONLY IN THOSE WITH OTHER CONDITIONS*	113 (78.5%)	31 (21.5%)	
Do you believe COVID-19 is a severe/fatal infection—NO	23 (67.6%)	11 (32.4%)	4.92 <i>p</i> <0.05
Work with patients—YES	131 (80.4%)	32 (19.6%)	
Work with patients—NO	105 (69.5%)	46 (30.5%)	
Work with COVID-19 patients—YES	92 (78%)	26 (22%)	0.80 <i>p</i> = NS
Work with COVID-19 patients—NO	144 (73.5%)	52 (26.5%)	
Do you believe the vaccine is safe—YES, VERY/MOSTLY	101 (79.5%)	26 (20.5%)	20.02 <i>p</i> <0.0001
Do you believe the vaccine is safe—SOMEWHAT	55 (70.5%)	23 (29.5%)	
Do you believe the vaccine is safe—NOT AT ALL/LITTLE EFFECT	80 (73.4%)	29 (28.6%)	
Do you believe that the vaccine is effective: YES/MOSTLY	130 (81.3%)	30 (18.7%)	13.46 <i>p</i> <0.01
Do you believe that the vaccine is effective: SOMEWHAT	47 (79.6%)	15 (20.4%)	
Do you believe that the vaccine is effective: NO/SLIGHTLY	59 (64.1%)	33 (35.9%)	
Are you concerned about adverse effects of the vaccine YES/FAIRLY	85 (69.1%)	38 (30.9%)	7.9 <i>p</i> = NS
Are you concerned about adverse effects of the vaccine SOMEWHAT	51 (82.3%)	11 (17.7%)	
Are you concerned about adverse effects of the vaccine: NO/SLIGHTLY	100 (77.5%)	29 (22.5%)	23.39 <i>p</i> <0.0001
Are you concerned safety has been compromised by the speed of development YES VERY/MOSTLY	69 (65.7%)	36 (34.3%)	
Are you concerned safety has been compromised by the speed of development SOMEWHAT	70 (84.3%)	13 (15.7%)	
Are you concerned safety has been compromised by the speed of development NO/SLIGHTLY	97 (77.0%)	29 (23%)	

Chi-square analysis performed on the whole spectrum of answers to both questions. Summated answers are presented for clarity; <sup>+</sup>Six respondents stated they preferred not to answer. \*Other conditions are those with health conditions, compromised immune systems or older age groups

there were discrepancies between the immunization practice for themselves, their patients, and their children.<sup>11,12</sup>

Anticipating and preparing for problems concerning vaccination acceptance when a vaccine for SARS-CoV-2 becomes available is a critical step in managing the COVID-19 pandemic.

The percentage of respondents refusing vaccination in the present study is 24.8% which is similar with other studies. Studies conducted

during March – April 2020, which was earlier than the present study (December 2020–January 2021), reported similar findings in terms of percentages of people who refused to get vaccinated against SARS-CoV-2: Italy<sup>13</sup> (14%), France<sup>14</sup> (26%), and Australia<sup>15</sup> (14%). In a European survey, in June 2020, 24% of respondents were either unwilling or unsure about getting vaccinated.<sup>16</sup> More recent surveys (August–September, 2020) in the United States and Britain suggest that

more than 50% of people would not get vaccinated.<sup>17,18</sup> Significant reasons for HCWs to refuse vaccination were concerns over vaccine safety, speed of development, lack of faith in vaccine effectiveness, and belief that corona virus infection was not as serious as influenza. Among respondents who accepted vaccination, significant factors influencing their vaccination acceptance were as follows: previous COVID-19 infection, those who received previous Influenza vaccine this year, and those who were of the opinion that COVID-19 is more severe than influenza. If vaccine hesitancy is going to be addressed, then reassurance of safety and effectiveness need to be promoted.

The current study has certain shortcomings; participation was on voluntary basis and this could have led to a selective uptake. Another shortcoming is the cross-sectional design of the study leading to the possibility that COVID-19 vaccination-related attitudes may vary over time in different areas and local governments or health authorities may have different schedules for information about vaccination. The emergence of vaccine-related adverse effects in due course may negatively affect the vaccine uptake as the vaccination program rolls out. Contextual factors, such as the media discourse around a COVID-19 vaccination, are likely to influence beliefs and attitudes toward the vaccine. The findings of the present study cannot be generalized across different countries and cultures; however, it is necessary for effective implementation of an Indian vaccination program that the issues identified by the study are addressed.

This study shows high acceptance rate of the vaccine in HCWs. The first step to address vaccine hesitancy could be to promote the safety and effectiveness of a vaccine; however, the acceptability might increase depending upon the overall performance of a vaccine. Developing strategies such as education programs and vaccination campaigns that will promote participation of HCWs may in turn help educate the public. It is important to remove their fears about vaccination and ultimately HCWs own vaccination status will promote vaccine acceptability.

## ORCID

Divya Dwivedi  <https://orcid.org/0000-0001-5168-3989>

## REFERENCES

1. Ten health issues WHO will tackle this year; n.d. Available from: <https://www.who.int/newsroom/feature-stories/ten-threats-to-global-health-in-2019> [Accessed April 3, 2020].
2. World Health Organization, 2015. SAGE working group dealing with vaccine hesitancy (March 2012 – November 2014). World Health Organization.
3. Centers for Disease Control and Prevention, 2019. Flu vaccination coverage, United States, 2018–19 influenza season. FluVaxView.
4. Paterson P, Paterson P, Meurice F, et al. Vaccine hesitancy and healthcare providers vaccine hesitancy and healthcare providers. *Vaccine* 2016;34(52):6700–6706. DOI: 10.1016/j.vaccine.2016.10.0425.
5. Larson HJ, Smith DMD, Paterson P, et al. Measuring vaccine confidence: analysis of data obtained by a media surveillance system used to analyse public concerns about vaccines. *Lancet Infect Dis* 2013;13(7):606–613. DOI: 10.1016/S1473-3099(13)70108-7.
6. Liu Y, Gayle AA, Wilder-Smith A, et al. The reproductive number of COVID-19 is higher compared to SARS corona virus. *J Travel Med* 2020;27(2):1–4. DOI: 10.1093/jtm/taaa021.
7. Fine P, Eames K, Heymann DL. “Herd immunity”: a rough guide. *Clin Infect Dis* 2011;52(7):911–916. DOI: 10.1093/cid/cir007.
8. Nguyen LH, Drew DA, Graham MS, et al. Risk of COVID-19 among front-line health-care workers and the general community: a prospective cohort study. *Lancet Public Health* 2020;5(9):e475–e483. DOI: 10.1016/S2468-2667(20)30164-X.
9. Schwierzeck V, König JC, Kühn J, et al. First reported nosocomial outbreak of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in a pediatric dialysis unit. *Clin Infect Dis* 2021;72(2):265–270. DOI: 10.1093/cid/ciaa491.
10. European Centre for Disease Prevention and Control. Vaccine hesitancy among healthcare workers and their patients in Europe – a qualitative study. Stockholm: ECDC; 2015.
11. Killian M, Detoc M, Berthelot P, et al. Vaccine hesitancy among general practitioners: evaluation and comparison of their immunisation practice for themselves, their patients and their children. *Eur J Clin Microbiol Infect Dis* 2016;35(11):1837–1843. DOI: 10.1007/s10096-016-2735-4.
12. Agrinier N, Le Maréchal M, Fressard L, et al. Discrepancies between general practitioners’ vaccination recommendations for their patients and practices for their children. *Clin Microbiol Infect* 2017;23(5):311–317. DOI: 10.1016/j.cmi.2016.08.019.
13. Barello S, Nania T, Dellafiore F, et al. “Vaccine hesitancy” among university students in Italy during the COVID-19 pandemic. *Eur J Epidemiol* 2020;35(8):781–783. DOI: 10.1007/s10654-020-00670-z.
14. COCONEL Group. A future vaccination campaign against COVID-19 at risk of vaccine hesitancy and politicisation. *Lancet Infect Dis* 2020;20(7):769–770. DOI: 10.1016/S1473-3099(20)30426-6.
15. Dodd RH, Cvejic E, Bonner C, et al. Willingness to vaccinate against COVID-19 in Australia. *Lancet Infect Dis* 2020;21(3):318–319. DOI: 10.1016/S1473-3099(20)30559-4.
16. Neumann-Böhme S, Varghese NE, Sabat I, et al. Once we have it, will we use it? A European survey on willingness to be vaccinated against COVID-19. *Eur J Health Econ* 2020;21(7):977–982. DOI: 10.1007/s10198-020-01208-6.
17. Bracken M. A trend that worries health experts: as U.S. gets closer to COVID-19 vaccine, fewer people say they’d get one. 2020. Available from: <https://morningconsult.com/2020/09/11/vaccine-acceptance-public-poll/> [Accessed September 19, 2020].
18. McKie R. COVID-19: Only half of Britons would definitely have vaccination. 2020. Available from: <https://www.theguardian.com/world/2020/aug/09/only-half-of-britons-would-definitely-have-covid-19-vaccination> [Accessed September 19, 2020].