



# Addressing COVID-19 Vaccine Hesitancy: The Role of Medical Students

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## Abstract

We conducted a survey study at the Icahn School of Medicine at Mount Sinai to assess COVID-19 vaccine attitudes and behaviors among medical students. Almost all respondents (96.5%,  $n = 222$ ) believed vaccines were effective and reported being asked about the COVID-19 vaccine by family members (79.0%,  $n = 180$ ). However, when asked how they respond when someone shares misinformation, 89.0% ( $n = 202$ ) responded they agree to avoid conflict, 44.9% ( $n = 102$ ) listened empathically, and 9.3% ( $n = 21$ ) corrected the misinformation. Medical school education can address this disconnect, using standardized patients and role-playing to give students the tools to address vaccine hesitancy within their communities.

**Keywords** Vaccine hesitancy · COVID-19 · Medical education · Standardized patients

## Background

At this stage in the COVID-19 pandemic, vaccination is broadly recommended for those eligible to limit COVID-19 infections, deaths, and hospitalizations [1–3]. In the USA, vaccine hesitancy remains a key barrier to achieving these goals [4–6]. In 2021, approximately 1 year after the COVID-19 pandemic was declared on March 11, 2020, studies have shown that only 54% of Americans expressed vaccine acceptance, compared to approximately 72% of people worldwide [6]. Vaccine hesitancy throughout the pandemic has been highest in the USA among 18–29-year-olds, those

without a college degree, with an annual income of \$50,000 or less, and identifying as Hispanic or Black/African American [4, 7–9].

Evidence-based interventions including conversations within one's social circle and dialogue-based programs have been found to be among the most effective strategies in changing perceptions around vaccines [10, 11]. Conversations with family members, close friends, and healthcare providers can influence hesitant individuals and help them choose to get vaccinated [7, 12].

Recognizing the structural and racial inequities that can affect decision-making among minority communities, these data underscore the importance of evidence-based training for community and healthcare workforces in order to have effective conversations with vaccine-hesitant individuals [10, 13]. As a future healthcare workforce, medical students are a key population that must be trained to have these discussions both with patients and within their own communities. Studies have shown that throughout the COVID-19 pandemic, medical students have had positive attitudes towards vaccines, though still express some hesitancy towards new vaccines that have yet to receive FDA approval [14]. Therefore, training in vaccine hesitancy for medical students must be grounded in knowledge of the science behind vaccines as well as an understanding of historical racial and structural biases that contribute to hesitancy.

Medical student training on vaccine hesitancy prior to the COVID-19 pandemic has been shown to increase knowledge and improve students' confidence in facilitating conversations with vaccine-hesitant individuals [15, 16]. Successful training has included sessions teaching the science and

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Miriam F. Frisch and Warda Chaudhary jointly completed the intellectual and other work typical of the first author.

## Previous Presentations

None.

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epidemiology of vaccines, understanding vaccine hesitancy including common misconceptions and fears, learning the role of the patient-provider relationship in building vaccine confidence, and the legal and historical background on vaccine exemptions [15, 16].

In early 2021, we sent out a survey to all medical students at the Icahn School of Medicine at Mount Sinai in New York City regarding COVID-19 vaccine hesitancy. Our study aimed to better understand rates of vaccination across the student body, medical students' own vaccine confidence, their access to vaccine-related information, their tendency to share vaccine-related knowledge with others, and their role within their community in conveying information. As a population with similar educational backgrounds but diverse socioeconomic and ethnic backgrounds, medical students are an important population in which to examine experiences around vaccine hesitancy. Understanding their access to key scientific information, and their role in communicating with family and friends about vaccines, is important in establishing the knowledge base and developing curricular materials to make them better champions of vaccine information.

## Activity

We conducted a survey at the Icahn School of Medicine at Mount Sinai in collaboration with a larger study across the Mount Sinai health system evaluating healthcare worker vaccine hesitancy [17]. An anonymous online survey using the REDCap platform was distributed via email to all medical students from March 1 to April 15, 2021. Questions included information regarding demographics, general beliefs on vaccinations, sources of medical advice, beliefs and practices around COVID-19 vaccination, sources of COVID-19 vaccine advice, providing COVID-19 advice, and media exposure. Responses (excluding demographic information) were assessed using Likert scales. The study was reviewed and deemed exempt by the Institutional Review Board of the Icahn School of Medicine at Mount Sinai.

Descriptive analyses were calculated for demographic and socioeconomic variables for survey respondents. We estimated the proportion of specific answers in each survey question. All analyses were conducted in SAS OnDemand for Academics (NC, Cary).

## Results

Descriptive characteristics of the sample are shown in Table 1. Of the 584 medical students at the Icahn School of Medicine at Mount Sinai, 230 students responded to the survey. The sample population was similar to that of the overall student population with regard to race and ethnicity.

**Table 1** Demographic data

Demographic	Survey respondents, <i>n</i> (%)
<b>Gender</b>	
Male	88 (38.3%)
Female	131 (57.0%)
Other	5 (2.2%)
Prefer not to say	6 (2.6%)
<b>Age</b>	
19–25	103 (44.8%)
26–39	121 (52.6%)
Prefer not to say	6 (2.61%)
<b>Race/ethnicity</b>	
White/Caucasian	148 (64.4%)
Asian American/Pacific Islander	50 (21.7%)
Black/African American	15 (6.5%)
Hispanic/Latinx	24 (10.4%)
Other	4 (1.7%)
Prefer not to say	8 (3.5%)
<b>Do you rely on financial aid?</b>	
Yes	110 (47.8%)
No	107 (46.5%)
<b>Do you identify as a first-generation college student?</b>	
Yes	22 (9.6%)
No	203 (88.2%)
Prefer not to say	5 (2.2%)

By self-report: 64.4% ( $n = 148$ ) identified as White/Caucasian, 10.4% ( $n = 24$ ) as Hispanic/Latinx, 6.5% ( $n = 15$ ) as Black, and 21.7% ( $n = 50$ ) as Asian American/Pacific Islander. Roughly half (47.8%,  $n = 110$ ) of the survey population reported relying on financial aid, and 9.6% ( $n = 22$ ) self-identified as being a first-generation college student, similar to the proportion in the student body. There was a statistically significantly higher proportion of females (57.0%,  $n = 131$ ,  $p < 0.013$ ) and students aged 26 and above (52.6%,  $n = 121$ ,  $p < 0.0002$ ) compared to the overall medical student population.

An overwhelming majority of respondents (99.6%,  $n = 229$ ) had received the vaccine at the time of survey with no significant differences by race or ethnicity (Table 2). Across race/ethnicity distinctions, 96.5% ( $n = 222$ ) of students believed that vaccines were effective, and 97.4% ( $n = 224$ ) strongly agreed that vaccines are important in preventing more deaths due to COVID-19 in their communities.

With regard to sources of information regarding COVID-19 vaccines, respondents reported their trust was highest (34.5%,  $n = 77$ ) for advice from federal government agencies (e.g., CDC, FDA), followed by healthcare professionals, including doctors and nurses who may not

**Table 2** Select survey responses

Question	N (%)
<b>Have you received the COVID-19 vaccine?</b>	
Yes	229 (99.6%)
No	1 (0.4%)
<b>Do you believe that the COVID-19 vaccine is effective?</b>	
Strongly agree	222 (96.5%)
Somewhat agree	3 (1.3%)
Somewhat disagree	1 (0.4%)
Strongly disagree	4 (1.7%)
<b>Do you believe that COVID-19 vaccines are effective in preventing more deaths in your community?</b>	
Yes	224 (97.4%)
No	6 (2.62%)
<b>Who do you trust MOST to give you advice on COVID-19 vaccines?</b>	
Family and friends (social circle)	6 (2.6%)
My primary care doctor	39 (17.0%)
Other healthcare professional	80 (34.8%)
Federal government agencies (CDC, FDA)	77 (33.5%)
Local government agencies (New York City Dept of Health)	7 (3.0%)
Religious leaders	214 (9.3%)
<b>In the past month, have family members asked for your opinion about the COVID-19 vaccine?</b>	
Multiple times	180 (79.0%)
Only once	27 (11.8%)
Never	21 (9.2%)
<b>In the past month, have any non-related community members asked for your opinion about the COVID-19 vaccine?</b>	
Multiple times	164 (71.9%)
Only once	35 (15.4%)
Never	29 (12.7%)
<b>I can act as a positive role model in encouraging my relatives/close friends that the COVID-19 vaccine is safe</b>	
Strongly agree	197 (85.7%)
Somewhat agree	26 (11.3%)
Neutral	6 (2.6%)
Somewhat disagree	1 (0.43%)
<b>I do the following when someone in my home or community shares misinformation or fake news (respondents could select more than one response)</b>	
Listen empathically	102 (44.9%)
Using motivational interviewing techniques to engage	125 (55.1%)
Correcting the misinformation	21 (9.3%)
Providing links or information to trusted sources of information	83 (36.6%)
Agree to avoid conflict	202 (89.0%)
Say nothing and change the subject	198 (87.2%)
None of the above	6 (2.0%)

be government affiliated (34.8%,  $n = 80$ ), and then specifically primary care doctors (17%,  $n = 39$ ). In the 30 days prior to the survey, 79.0% ( $n = 180$ ) reported being asked multiple times for their opinion about the COVID-19 vaccine by family members, and 71.9% ( $n = 164$ ) reported being asked by other community members or friends. Most respondents (85.7%,  $n = 197$ ) reported they strongly

agree that they act as a positive role model in encouraging relatives/close friends that the COVID-19 vaccine is safe.

We also asked students to describe how they respond when someone in their home or community shares misinformation or fake news (checking all responses that apply); 89.0% ( $n = 202$ ) responded that they agree to avoid conflict, while 44.9% ( $n = 102$ ) responded that they listened

empathically and 55.1% ( $n = 125$ ) responded by using motivational interviewing techniques. Only 9.3% ( $n = 21$ ) responded that they corrected the misinformation.

## Discussion

In a sample similar to the broader medical student body, nearly 100% of our survey respondents—regardless of gender, race/ethnicity, and socioeconomic indicators—were vaccinated by April 15, 2021. When the survey was conducted, there were no institutional vaccine mandates. The majority of the medical student body was vaccinated throughout the spring of 2021, and all students were vaccinated, in line with institutional mandates, by September 2021.

Our data reveals that medical students, even in this early phase of their education, had a high degree of trust in advice regarding COVID-19 vaccines from government and healthcare institutions. Most students were being asked by their families and communities for guidance around vaccination.

These findings suggest that by improving medical students' health communication skills around vaccine hesitancy, we can leverage the crucial role medical students play in the community. We know that members of the healthcare workforce as well as trusted members of the community such as religious leaders have been able to impact community uptake of vaccines; medical students are positioned also to contribute in this role, bridging their family and community and medical education [18, 19].

However, we see a gap in the ways students feel equipped to address misinformation, and an opportunity to develop these skills and harness medical student influence in their communities. Medical students reported a lack of confidence in addressing misinformation around vaccines: only 9.3% ( $n = 21$ ) of students corrected misinformation when someone in the community shared misinformation while 87.2% ( $n = 198$ ) reported saying nothing and changing the subject. There was a disconnect between the students' personal trust in vaccines and their confidence in addressing vaccine misinformation.

Medical school education can address this gap through implementation of teaching modules grounded in specific strategies for addressing vaccine hesitancy, specifically standardized patient methodology. Standardized patient (SP) methodology uses actors to portray patients in clinical scenarios. This methodology is used in medical education to simulate physician–patient interactions and is well-suited to both teaching and assessing medical student communication skills around healthcare education and behavior change [20].

SP methodology has already been used to examine general physician communication strategies around vaccines. A study by Bryant et al. using SPs identifies several valuable communication skills (e.g., listening, eye contact) that aid in

discussing vaccines [21]. Prior to COVID-19, SP methodology has also been used in building specific skills in responding to vaccine hesitancy, using influenza vaccine refusal; in a study by Vyas et al. using SPs, participating students noted improvement in their confidence and ability to address vaccine hesitancy and refusal at the end of the sessions with SPs [16, 21].

The SP model could be easily adapted to address COVID-19 vaccine hesitancy and give students the tools to address patient concerns and fears in the hopes of overcoming this hesitancy. In addition, all clinical clerkships should emphasize vaccine confidence counseling, a skill that traditionally has been primarily addressed only in pediatrics education. The COVID-19 pandemic provides a new opportunity for students to broaden their skillset as future physicians and gain the tools necessary to be trusted leaders in their communities, even immediately upon entering medical school and prior to obtaining their degree. Through developing these skills, these identified gaps in addressing misinformation can be filled, and help to reduce vaccine hesitancy in the society at large.

There are limitations to this study. The relatively low response rate (39.3%,  $n = 230$ ) among the medical student body can make it difficult to make broad conclusions. There were significant differences in gender and age between respondents and the student population. Finally, this study was only conducted within one medical school in New York City, where overall vaccination rates are high. Therefore, this study population may not be representative of medical students' perceptions and experiences around vaccine hesitancy nationwide, where vaccine hesitancy may be higher [15, 22].

## Conclusion

Traditionally, much of our focus in medical education has been on the role medical students and, indeed, physicians have with our patients. The pandemic has brought to light medical providers' role as public health communicators. Medical education must equip this new generation with the skills and confidence to communicate with and advise their community on healthcare. We have an opportunity to impact vaccine hesitancy, amidst the COVID-19 pandemic, and going forward for public health more broadly.

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**Author Contribution** WC contributed to the survey development, data analysis, and drafting of the paper. MF contributed to the literature

review, data analysis, and drafting of the paper. XZ contributed to the methods, data analysis, and manuscript review. BF contributed to the survey development, data analysis, and drafting of the paper. VP contributed to the survey development, data analysis, and drafting of the paper.

**Data Sharing** N/A.

## Declarations

**Ethics Approval** Ethics approval has been granted by the Icahn School of Medicine Institutional Review Board for HCWs PREVENT COVID. HS#: STUDY-20–01964, 12/23/2020.

**Disclaimers** None.

**Conflict of Interest** The authors declare no competing interests.

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