COVID-19 vaccine hesitancy among medical students

Victoria C. Lucia[1], Arati Kelekar[2,3], Nelia M. Afonso[1]

[1]Foundational Medical Studies, Oakland University William Beaumont School of Medicine, Rochester, MI 48309, USA
[2]Internal Medicine, Beaumont Health, Royal Oak, MI 48073, USA
[3]Oakland University William Beaumont School of Medicine, Rochester, MI 49309, USA
Address correspondence to Victoria C. Lucia, E-mail: lucia@oakland.edu

ABSTRACT

Background Medical students are among the group of frontline healthcare providers likely to be exposed to COVID-19 patients. It is important to achieve high COVID-19 vaccination coverage rates in this group as soon as a vaccine is available. As future healthcare providers, they will be entrusted with providing vaccine recommendations and counseling vaccine-hesitant patients.

Methods This project used self-report to assess vaccine hesitancy and acceptance among medical students towards the novel COVID-19 vaccine.

Results Nearly all participants had positive attitudes towards vaccines and agreed they would likely be exposed to COVID-19; however, only 53% indicated they would participate in a COVID-19 vaccine trial and 23% were unwilling to take a COVID-19 vaccine immediately upon FDA approval. Students willing to immediately take the vaccine were more likely to trust public health experts, have fewer concerns about side effects and agree with vaccine mandates ($P < 0.05$). Concern for serious side effects was independently predictive of lower odds of intent to participate in a COVID-19 vaccine trial (AOR = 0.41, $P = 0.01$).

Conclusion This is the first study to evaluate COVID-19 vaccine hesitancy among US medical students and highlights the need for an educational curriculum about the safety and effectiveness to promote uptake of the COVID-19 vaccine.

Keywords COVID-19, medical students, vaccine hesitancy

Introduction

The COVID-19 pandemic has exacted a heavy toll in terms of the burden of disease and deaths worldwide, with dozens of candidate vaccines against COVID-19 in development. The Centers for Disease Control and Prevention and the National Academies of Science have issued a framework for vaccinating the US population[1] prioritizing people at a high risk for acquiring the infection or transmitting the disease, or those with preexisting medical conditions. Vaccination of healthcare providers (HCPs) will ensure an adequate workforce to provide care for infected patients.

The purpose of this study is to assess vaccine hesitancy and acceptance of medical students to a novel COVID-19 vaccine. Information obtained will help identify potential concerns to be addressed to ensure adequate uptake among this group and enable development of educational programs to teach skills to provide vaccine recommendations and counsel vaccine-hesitant patients.

Methods

The study was conducted with medical students at a single allopathic medical school in Southeast Michigan. An anonymous online survey was developed based on past research involving attitudes and behaviors about vaccination.[2–4] The survey assessed (i) previous immunization behavior; (ii) general attitudes and perception of vaccines; (iii) current knowledge/interest about COVID-19 vaccine; (iv) perceived likelihood of COVID-19 infection; and (v) personal experience with COVID-19. Pearson's chi-square was used to identify significant differences between preclinical and clinical students, students with and without previous COVID-19 experiences and students who would accept and decline the COVID-19 vaccine upon FDA approval. Logistic regression

Victoria C. Lucia, Assistant Professor, Course Director

Arati Kelekar, Assistant Professor, Course Director

Nelia M. Afonso, Professor, Assistant Dean, Course Director

was used to identify predictors of COVID-19 vaccine uptake and intent to participate in a COVID-19 vaccine trial. All authors reviewed free-text comments for emerging themes and patterns. The university's Institutional Review Board approved this study.

Results

The survey was completed by 168 of 494 medical students (response rate = 34%). The sample was 57% female and divided equally between preclinical (51%) and clinical (49%) students.

Nearly all respondents (>98%) agreed with the importance of developing a COVID-19 vaccine to decrease community spread. Although 98% of students agreed they would likely be exposed to COVID-19, only 53% indicated they would participate in a COVID-19 vaccine trial and 23% of students were unwilling to take a COVID-19 vaccine immediately upon FDA approval. Clinical students were more likely to participate in a vaccine trial (62 vs. 44%, $P = 0.02$). Students willing to take the vaccine were more likely to trust public health experts, had fewer concerns about side effects and agreed with vaccine mandates ($P < 0.05$) (see Table 1).

Demographic variables and experience with COVID-19 were not predictive of COVID-19 vaccine uptake upon FDA approval. However, concern for serious vaccine side effects was independently predictive of lower odds of intent to participate in a COVID-19 vaccine trial, after controlling for trust in public health experts and vaccine mandates for HCPs and general public (AOR = 0.41, $P = 0.01$).

Twenty-six students provided comments about the COVID-19 vaccine. See Table 2 for themes and sample quotes.

Discussion

Main finding of this study

Nearly one-quarter of the students were hesitant to be vaccinated as soon as an FDA-approved vaccine becomes available. This indicates that, in our sample, more than 2 of 10 students were vaccine-hesitant despite self-perception of elevated risk of exposure to COVID-19 infection. This is in contrast to previous studies that show risk perception as a central predictor of protection intentions and preventive health behaviors.[5] Contributing factors to vaccine hesitancy in this group include concerns about serious vaccine side effects and lack of trust in the information received from public health experts. Additionally, students providing comments mentioned politi-

cization of the vaccine, need for transparency and concerns about the speed of vaccine development potentially impacting vaccine safety.

What is already known on this topic

A lack of trust and misinformation contribute to the low rates of acceptance (57–69%) among the general public for the COVID-19 vaccine.[6–8] Physicians play a critical role in influencing vaccination decisions;[8–10] their recommendations are one of the strongest correlates of vaccine acceptability among patients and the COVID-19 vaccine will not be any different. As pointed out by Schaffer Deroo, all individuals interfacing with patients in the clinical setting should be confident about the safety and effectiveness of a future COVID-19 vaccine.[11] This is critical for presenting a unified message of strong vaccination support from the medical community.

What this study adds

This study is the first to evaluate vaccine hesitancy among US medical students towards COVID-19 vaccination. Understanding medical students' perspectives is important as health systems begin planning vaccination rollout for the COVID-19 vaccine.

Limitations of this study

Limitations of this study include a low response rate (37%) and data collection at a single medical school which may impact generalizability. Respondents may also have been predominantly influenced by exposure to COVID-19 vaccine-related topics in the media, as this was not a topic formally incorporated into the curriculum.

Conclusions

The vast majority of this cohort had positive attitudes regarding immunizations in general and the importance of vaccines for themselves and patients, comparable to prior studies that have shown positive attitudes toward vaccinations among medical students.[12] Despite limitations this study sheds light on vaccine hesitancy related to COVID-19 vaccine among medical students. It also demonstrates the need for an educational curriculum designed to enhance student knowledge about the COVID-19 vaccine and to teach vaccine counseling skills. Previous studies have shown that medical students who are vaccinated have positive attitudes towards vaccines, and it is hoped they will be able to share their vaccination experiences with their patients and encourage vaccine uptake.[3,4]

Table 1 Survey responses among COVID-19 vaccine acceptance and hesitant groups (*N* = 167)

Survey item	Participants that responded affirmatively (agree/strongly agree)			P value
	All respondents (N = 167) n (%)	COVID-19 vaccine acceptance group (n = 126) n (%)	COVID-19 vaccine hesitant group (n = 37) n (%)	
General attitudes to vaccine				
People get more vaccines than are good for them	10 (6.0)	6 (4.8)	4 (10.8)	0.1776
Vaccines are important for me to stay healthy as a future physician	166 (99.4)	125 (99.2)	37 (100.0)	0.5867
It is my role as a future physician to learn about vaccines for myself and my patients	166 (99.4)	125 (99.2)	37 (100.0)	0.5867
COVID-19 vaccine—general opinions				
Development of a COVID-19 vaccine is important to decrease spread of the disease	161 (98.8)	126 (100.0)	35 (94.6)	0.0504
COVID-19 vaccination is important for the overall public health of our communities	161 (98.8)	126 (100.0)	35 (94.6)	0.0504
The COVID-19 vaccination should be mandatory for the general public	110 (67.9)	92 (73.6)	18 (48.6)	0.0043
The COVID-19 vaccination should be mandatory for all health care providers	140 (85.9)	116 (92.1)	24 (64.9)	<0.0001
Personal views—COVID-19 and vaccine				
I am likely to be exposed to COVID-19 as a future physician	160 (98.2)	124 (98.4)	36 (97.3)	0.6572
COVID-19 vaccination is important for me as a health care provider	160 (98.2)	125 (99.2)	35 (94.6)	0.0665
I would like to be involved in a COVID-19 vaccine trial	86 (52.8)	82 (65.1)	4 (10.8)	<0.0001
I am concerned that a COVID-19 vaccine may not be effective	125 (76.7)	94 (74.6)	31 (83.8)	0.2456
I am concerned about serious side effects from a COVID-19 vaccine	89 (54.6)	56 (44.4)	83 (89.2)	<0.0001
I need more information about the COVID-19 vaccine	154 (94.5)	117 (92.8)	37 (100.0)	0.0944
I trust the information I am receiving about the COVID-19 vaccine from the public health experts	141 (87.0)	116 (92.8)	25 (65.6)	0.0003
The only reason I will get a COVID-19 vaccine is if it is mandated by health systems/medical school	24 (14.7)	10 (7.9)	17 (37.8)	<0.0001
Experience with COVID-19	**Participants that responded affirmatively (yes)**			
I had COVID-19 infection	5 (3.1)	4 (3.2)	1 (2.7)	0.8836
I cared for someone with COVID-19 infection	18 (11.0)	14 (11.1)	4 (10.8)	0.9591
I personally know someone who has had COVID-19 infection	123 (75.5)	97 (77.0)	26 (70.3)	0.4041
I personally know someone who has died from COVID-19 infection	34 (20.9)	28 (22.2)	6 (16.2)	0.4292
Personal vaccination behavior				
As an adult, have you ever delayed getting a vaccine for reasons other than illness or allergy?	18 (11.1)	13 (10.3)	5 (13.9)	0.5476
Do you plan on getting a flu vaccine this flu season (2020–2021)?	162 (100.0)	126 (100.0)	36 (100.0)	_

It is important for health systems to achieve high COVID-19 vaccination coverage rates among frontline HCPs, including medical students, as soon as a vaccine is available to ensure an adequate workforce to treat patients. It is their responsibility to train HCPs to make strong vaccine recommendations and respond effectively to vaccine-hesitant

Table 2 Comments provided by medical students

Theme	Representative quotes
Personal concern about vaccine safety/efficacy	'Personally, I would like to see the vaccine in the market for several years before receiving the vaccine, as I am concerned about possible congenital defects in newborns born to mothers who received the new vaccine.'
	'I would rather wait a little bit longer for a better crafted vaccination with fewer side effects (if any) than a rushed vaccination that ends up dissuading more people from getting it. It should be released with the knowledge of exactly how it will adversely effect people if at all.'
Rapid development/implementation of vaccine	'I think it is important to not release a vaccine before it has been thoroughly vetted and tested for both efficacy and safety.'
	'I am concerned with the rapid development and push to create a vaccine that it will not be safe—I would want to hear about all the measures that were taken to ensure the vaccine is safe and any corners that were cut to create it more quickly.'
	'I hope there is phase 3 evidence of efficacy with sufficient completion of trial before vaccine role out, and I hope the decisions made are of evidence rather than political in nature.'
Politicization	'Many people do not trust the CDC and the FDA because President Trump might be pressuring these institutions to rush out a vaccine for his own political gain.'
	'I am concerned about the efficacy and safety of a purported vaccine by our country's government, especially in regards to admitted "downplaying of the severity" by the current leadership.'
Trust in regulatory agencies	'As a future provider, I believe it to be my obligation to my future patients to not only understand the benefits but also the risks of the disease, and the simple word of the CDC is not currently a trustable one.'
	'Furthermore, reading about how some vaccine trials skipped certain phases of testing makes me feel uncomfortable with taking the vaccine immediately after FDA approval.'
Education for public	'Easy to understand information that is written for the general public, based on reputable resources that are linked, that is easy to digest but also informative and can be shared easily on social media.'
	'I think this knowledge needs to get out there to the general public and students, that speedy science does not equal bad science. Once we understand this we can educate patients.'

persons. Future research in this area should focus on practicing physicians, nurses and dentists, as well as students associated with these disciplines, as all of these professions are involved in direct patient care and could be entrusted with making vaccine recommendations to patients.

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Conflict of interest

The authors have no competing financial interests or personal relationships to declare.

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